MALLA REDDY ENGINEERING COLLEGE

(AUTONOMOUS)

Estd: 2002

(An UGC Autonomous Institute, Approved by AICTE and Affiliated to JNTUH Hyderabad,
Accredited by NBA & NAAC with 'A' Grade and Recipient of World Bank Assistance under TEQIP Phase - II, S.C 1.1)
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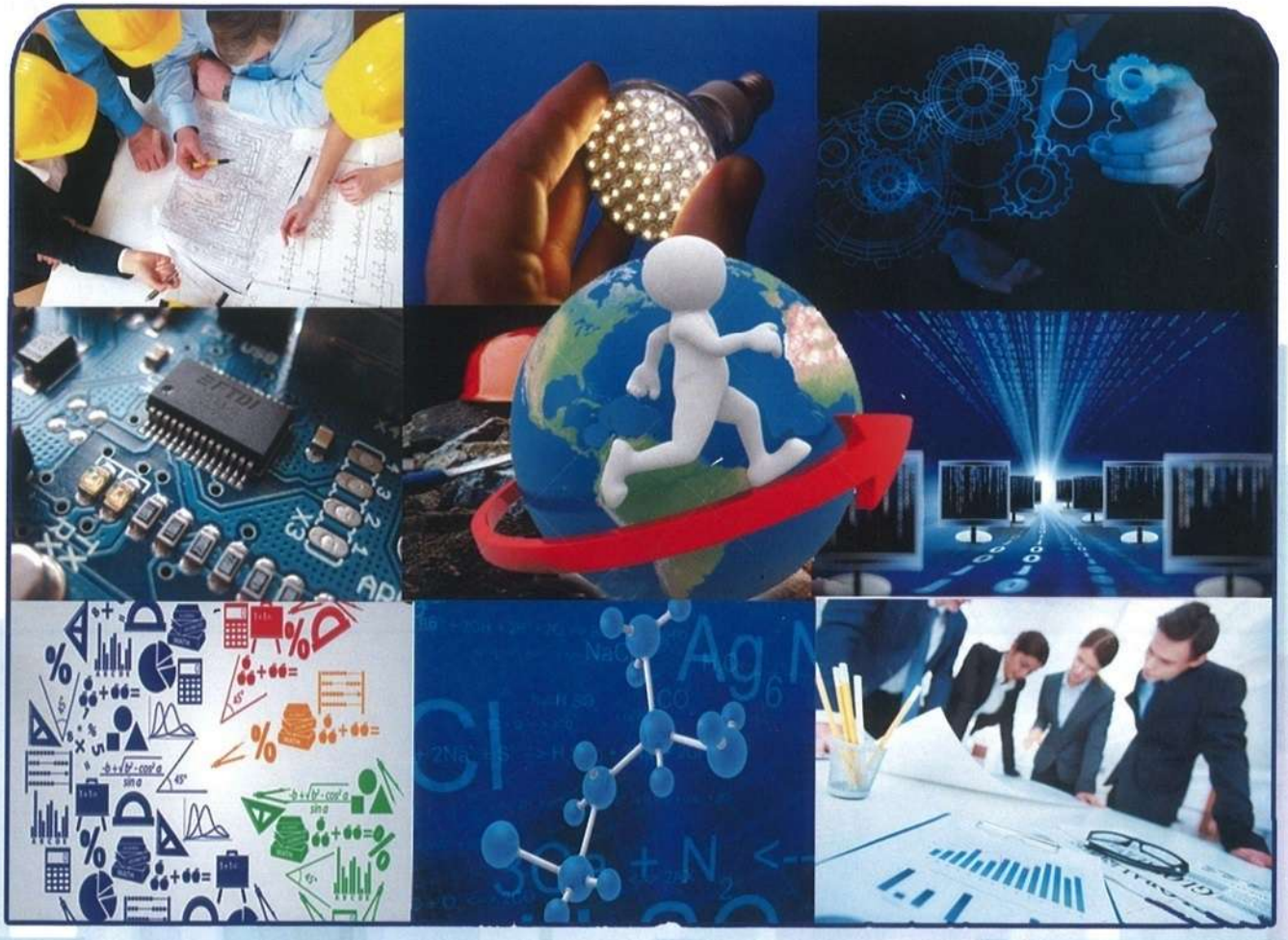

RESEARCH PUBLICATION IN CONFERENCE

Compilation of Research Papers Contributed by Faculty Members of MREC

A.Y. 2019-20

Malla Reddy Engineering College

(AUTONOMOUS)

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Sri. Ch. Malla Reddy
Founder Chairman, MRGI
Hon'ble MP, Malkajgiri



MESSAGE

It gives me immense pleasure to pen a few words as prologue to our in-house magazine "Research Publications in MREC" with a collection of research papers contributed by the faculty members of our organization.

I believe this will flourish to become very useful source for the researchers, academicians and students who want to further improve their research profile and contribute to the arena of knowledge based wisdom. I hope this magazine will create interest and enhance inspiration of the readers to carry out new research ventures.

I extend my best wishes to bring more challenging research works which is useful to the society from the teaching fraternity with a sense of commitment in the future years to come.

C. H. Malla Reddy

Sri. Ch. Malla Reddy

Maisammaguda, Dhulapally (Post Via Kompally), Secunderabad - 500 100.
Phone: 040-65864982, 65918418, Fax: 040-23792153
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Malla Reddy Engineering College

(AUTONOMOUS)

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Sri. Ch. Mahender Reddy
Secretary, MRGI



MESSAGE

I am pleased to know that MREC(A) is bringing out a magazine "Research Publications in MREC" which embrace the research contribution of faculty members of MREC. It is the outcome of our enthusiastic, dedicated and committed faculty members.

I take the pleasure to thank the Principal for providing continuous support and encouragement to the faculty members to publish their papers in Conferences and Journals.

I extend my heartfelt wishes for all to succeed in future endeavors.

Sri. Ch. Mahender Reddy

Maisammaguda, Dhulapally (Post Via Kompally), Secunderabad - 500 100.
Phone: 040-65864982, 65918418, Fax: 040-23792153
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Dr. A. Ramaswami Reddy

Director



MESSAGE

Its my pleasure to know that our in-house magazine "Research Publications in MREC" is being brought out with a collection of research contributions by our faculty members. This collection will be an inspiration to upcoming researchers to set new aspirations in research. This edition is an evidence for comfortable environment provided by MREC(A) for teaching and research activities to the faculty members to improve their career.

I wish to express my heartfelt thanks to the Management for their support and encouragement. Also my sincere regards to the HOD's and faculty members for their continuous efforts and contribution in research fields.

I extend my heartfelt wishes for all to succeed in future endeavors.

DIRECTOR
Malla Reddy Engineering College
Maisammaguda, Dhulapally,
(Post Via Kompally), Sec'bad-500 100.

Malla Reddy Engineering College

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Dr. A. Raveendra

Principal



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Malla Reddy Engg. College (A) 500 100 Hyderabad

Principal

PRINCIPAL
Malla Reddy Engineering College
(Autonomous)
Maisammaguda, Dhulapally,
(Post Via Kompally), Sec'bad-500 100

MREC,CIVIL ENGINEERING DEPARTMENT (2019-20)

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NUMERICAL STUDY ON	Dr	Civil	Internatio	2019	2395-	https://w
Investigation and Approach of	G.	Civil	Internatio	2019	2321-	https://w
Seismic Response Study and	Dr	Civil	Internatio	2019	2278-	https://w
Performance of the Building in	Dr	Civil	Internatio	2019	2321-	https://w
Analysis and Design of RCC	Dr.Rex	Civil	IJIRT	2019	2349-	http://ijirt
An Explicit Study of Pedestrian	Mr. P	Civil	The	2019	0886-	http://ijrd
Deformation of Anti	B. Vamsi	Civil	Solid	2020-	0038-	http://soli
Shear Wall Analysis And Design	B. Vamsi	Civil	Solid	2020-	0038-	http://soli
Behaviour Of Pedestrians At	A. Naga	Civil	Solid	2020-	0038-	http://soli
A Study on Enhancement of	A. Naga	Civil	Solid	2020-	0038-	http://soli
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Pharmaceutical Wastewater	Dr.C.M.	Civil	Solid	2020-	0038-	http://soli
Durability of Brick Cast by	Dr.	Civil	Solid	2020-	0038-	http://soli
Critical Gap Calculation At	Dr.C.M.	Civil	Solid	2020-	0038-	http://soli
Comparitive Study Of Different	K.	Civil	Solid	2020-	0038-	http://soli
Dynamic Analysis On	J Selwyn	Civil	Solid	2020-	0038-	http://soli
Analysis Of G+20 Rc Building	J. Rex	Civil	Solid	2020-	0038-	http://soli
Analysis And Design Of G+10	J. Rex	Civil	Solid	2020-	0038-	http://soli
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Dynamic Investigation of RCC	J Selwyn	Civil	Solid	2020-	0038-	http://soli
Analysis of pounding effects on	S.Pooja	Civil	Solid	2020-	0038-	http://soli
Seismic analysis of masonary	S.Pooja	Civil	Solid	2020-	0038-	http://soli
Seismic Study Of High-Rised	Chintala	Civil	Solid	2020-	0038-	http://soli
Dynamic Response Of A	L.	Civil	Solid	2020-	0038-	http://soli
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EXPERIMENTAL STUDY ON	Mandala	Civil	Journal	2020- Jun	2394-	http://ww
Investigation Analysis on Self	Mandala	Civil	Journal	2020-	2394-	http://ww
COMPARATIVE STUDY OF	G	Civil	Journal	2020-	2394-	http://ww
Effects on dual fibres to act as	C.M.	Civil	Materials	2020-	2214-	https://w
Effective study of Geocell,	Gajula	Civil	Solid	2020-	0038-	http://soli
SEISMIC ANALYSIS OF	Rex J, A.	Civil	JOURNA	2020-	2454-	https://w
Dynamic Analysis Of Sloped	K.Harsha	Civil	Solid	2020-	0038-	http://soli
Analysis Of Column Under The	J. Rex	Civil	Solid	2020-	0038-	http://soli

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An evaluation based study on	R.Sumath	Civil	Solid	Nov,2020	0038-	http://soli
Studies On Seismic Resistance	Dr.J.Rex	Civil	Journal	2019	1076-	http://j-
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Mode Selection And Route	Ms.	Civil	Journal	2019	0022-	http://ww
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weight concrete slabs	Babu,	Engineeri	nal	2018	3878	ww.ijitee.
Unsymmetrical Buildings With	Babu,Jag	Engineeri	nal	2018	9637	ww.ijitee.
towards a new revolution	Upadhya	Engineeri	internatio	2018	9598	.org/oiirj/
tall RC building	mi	Engineeri	nal	2018	3075	ww.ijitee.
aggregate and fine aggregate in	.Vishwan	Engineeri	nal	2018	3075	ww.ijitee.
of bacterial concrete	Babu	Engineeri	nal	2018	3075	ww.ijitee.
expansive soils with egg cell	Upadyay	Engineeri	nal	2018	3075	ww.ijitee.
spaces in medium sized cities of	ibaba	Engineeri	nal	2018	524X	w.ijetch.or
uncontrolled road traffic	ibaba	Engineeri	nal	2018	524X	ww.scienc
dissipation and effect in	Banu,	Engineeri	nal	2018	3075	ww.ijitee.
blended using crimped fibres	h1*,	Engineeri	nal	2018	9637	ww.ijrat.o
isolation systems by using	Banu,San	Engineeri	nal	2018	9637	ww.ijrat.o
light weight concrete slabs	Dr. J.	Engineeri	nal	2018	3878	w.ijetch.or
bacterial concrete	Dr. J.	Engineeri	nal	2018	3075	ww.ijitee.
aggregate concrete with quary	B.	Engineeri	Publishin	2018	9583757	ww.hinda
Compressive Strength of	i,Shyama	Engineeri	nal	2018	3075	ww.ijitee.
for the preparation of eco-	Krishna,	Engineeri	nal	2018	524X	ww.scienc
concrete by replacing natural	Prasanna	Engineeri	nal	2018	9637	ww.ijrat.o
geopolymer concrete by using	yn	Engineeri	nal	2018	9637	ww.ijrat.o
strength properties of M30 grade	akshmi,K	Engineeri	nal	2018	9637	w.ijrat.org
coarse aggregates in short term	j,Gone	Engineeri	nal	2018	9637	ww.ijrat.o
Multistorey building with	yn	Engineeri	nal	2018	9637	ww.ijrat.o
RCC frame with and without	S.N. Jaya	Engineeri	nal	2018	9637	asc.com/
concrete by partial replacement	a Rao,K.	Engineeri	nal	2018	9637	ww.ijrat.o
multistory building on sloping	i,P.Chaita	Engineeri	nal	2018	9637	ww.ijrat.o

helicoidal and pseudoorthogonal	Banu,M.	Engineeri	IJRASET	2018	9653	ww.ijraset
dissipation and effect in	Banu	Engineeri	IJITEE	2018	3075	ww.ijitee.
approach to modeling	Srikanth	Engineeri	ICETC	2018	3447	ww.spring
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Using Probabilistic Neural	Dhanalak	Engineeri	IJIEMR	2018	–5083	emr.org/
And Multipoint Shape	& Mr. L	Engineeri	IJIEMR	2018	–5083	emr.org/
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Engineering Experiment Data	Bhoomes	Engineeri	IJARST	2018	0362	ww.ijraset
Stationary Plates Of Industrial	DHANA	Engineeri	IJRDST	2018	4575	w.ijarst.co
Blast Response of Structural	Banu	Engineeri	of	2018	2149	ww.spring
water using hybrid cylindrical	tha	Engineeri	of water	2018	3556	k.springer.
meteorological and sea surface	a	Engineeri	Manager	2018	1536	anagerpu
maintained and recycled	Upadhya	Engineeri	j.sci.res	2018	2876	ww.ijsr.in/
PRECAST BEAM TO BEAM	Lakshmi	Engg	Journal	2019	5131	w.j-

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evaluation of a road pavement	Prasanna	Engineeri	nal	2017	6316	ww.iaeme
management practices in	ul	Engineeri	nal	2017	1537	w.ijtre.co
leachate treatment using	tha	Engineeri	n and	2017	3986	water.co
paver Blocks	J.Rex	Engineeri	nal	2017	0697	ndia.in/jo
Geopolymer Concrete	Babu,s.ka	Engineeri	nal	2017	6106	ww.ijrsae.
Lightweight Concrete of Waste	Babu	Engineeri	nal	2017	6002	.org/
On Crop Water Requirement In	a	Engineeri	Sciences	2017	8691	ww.imrfjo
Assessment To Climate Change	a	Engineeri	nal	2017	0263	holars.uo
Antibiotic Gemifloxacin In	tha	Engineeri	Africa	2017	9185	ww.journa
Improving The Cbr Value Of	handra	Engineeri	nal	2017	4847	w.ijlemr.c
Capacity Of Soft Clays	meswara	Engineeri	nal	2017	5031	w.ijlret.co
PartiallyReplacement Of Fine	i	Engineeri	IJIRT	2017	6002	.org/
using Plastic Fiber Waste	i	Engineeri	nal	2017	5031	w.ijlret.co
High Strength Concrete Using	j	Engineeri	nal	2017	6106	w.mahend
performance Concrete using	j	Engineeri	nal	2017	8753	t.com
Raft System in Soft Statified	meshwar	Engineeri	nal	2017	5031	w.ijlret.co
properties of red soil using waste	Chandra	Engineeri	nal	2017	5398	ttjournal.o
of uncertain structural systems	Bhoomes	Engineeri	nal	2017	6124	w.ijtre.co
factors that affect the strength of	Krishna	Engineeri	nal	2017	6124	emr.org
for urban rail Transportation	Gayathri	Engineeri	nal	2017	6124	ernational

Elective Course Learning &	Vamshi	Engineeri	of	2017	8354	w.journale
maintenance and Recycled	Gayathri	Engineeri	Journal	2017	0138	ww.world
Raft Foundation Systemin Soft	Krishna,	Engineeri	of	2017	334X	w.iosrjour
Methods in structural Parameter	Bhoomes	Engineeri	Journal	2017	5131	asc.com/
Structure Configuration of	Gayathri	Engineeri	Journal	2017	5131	asc.com/
NCA RECYCLED CONCRETE	h*, Dr.	Engineeri	of	2017	5131	asc.com/
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Title of paper	**the**	**ent of**	**journal**	**publicati**	**number**	**the**
Reinforced Concrete Building	Krishna	Engineeri	IJARTET	2016	3785	rtet.com/
flexible pavements for low	Ranjith	Engineeri	ATIONA	2016	4718	w.ijtre.co
TRANSPORTATION SYSTEM	sai baba,	Engineeri	ATIONA	2016	4718	w.ijtre.co
FLAKINESS & ELONGATION	sai	Engineeri	ATIONA	2016	4718	w.ijtre.co
CORRELATION BETWEEN	sai	Engineeri	ATIONA	2016	4718	w.ijtre.co
Supply Chain Dynamics Control	Vamsi	Engineeri	IJIEMR	2016	5083	emr.org/
Enclosure For Avionic	i	Engineeri	nal	2016	5762	w.cosmicj
Information Based On Spatial	Saritha,	Engineeri	IJARST	2016	0362	w.ijarst.co
analysis in cybereabad and	Ranjith	Engineeri	ATIONA	2016	4718	w.ijtre.co
analysis on Nh-163 using limped	Ranjith	Engineeri	ATIONA	2016	4718	w.ijtre.co
Transport in Cyberabad and	Ranjith	Engineeri	ATIONA	2016	4718	w.ijtre.co
median openings of along NH	Ranjith	Engineeri	ATIONA	2016	4718	w.ijtre.co
reinforced concrete struture on a	Vamshi	Engineeri	nal	2016	0613	d.com/
of Concrete with Addition of	Vamshi	Engineeri	nal	2016	067X	d.com/

of self Compacting Concrete by	Sumathi,	Engineeri	nal	2016	0613	d.com/
SERVICE AT SUCHITRA	sai	Engineeri	ATIONA	2016	4718	w.ijtre.co
Intersection to uppal intersection	Ranjith	Engineeri	ATIONA	2016	4718	w.ijtre.co
BEHAVIOUR AT SUCHITRA	sai baba	Engineeri	ATIONA	2016	6010	st.org/
norfloxacin in aqueous solution	Saritha	Engineeri	Desalinat	2016	3986	ww.tandf
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Rapid Transit System for Urban	Ranjith	Engineeri	IJTRE	2016	4718	w.ijtre.co
and nearby ground water:	sujatha	Engineeri	Journal	2016	5645	ww.indjst.
containing GBFS as a fine	Kameswa	Engineeri	Journal	2016	5645	ww.indjst.
Compliance to site regulations	Kameswa	Engineeri	of	2016	1945	w.jicrjour
A NATURAL FIBRE TESTING	Krishna*,	Engineeri	of	2016	1945	w.jicrjour
BEAMSANALYSIS USING	Nagaraj*,	Engineeri	of	2016	1945	w.jicrjour
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CONCRETEBEHAVIOUR ON	sekhar*,	Engineeri	of	2016	1945	w.jicrjour
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GRADE CEMENT WITH	Upadhya	Engineeri	of	2016	1945	w.jicrjour
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PARTIAL REPLACEMENT OF	and	Engineeri	of	2016	1945	w.jicrjour

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Properties of Light Weight	Krishna	Engineeri	nal	2015	0181	org
Elevated Tennis Court By Virtue	Krishna	Engineeri	nal	2015	5518	ww.ijser.o
like Deflection, Bending	Krishna	Engineeri	nal	2015	4845	w.ijmetmr
Ultra-High Strength Concrete	Krishna	Engineeri	nal	2015	3706	w.yuvaen
of Cross Traffic Works using	Krishna	Engineeri	nal	2015	3706	w.yuvaen
CONNECTIVITY ANALYSIS	sai baba	Engineeri	nal	2015	4470	w.ijaerd.c
EVALUATION OF CARBON	sai baba	Engineeri	nal	2015	4470	w.ijaerd.c
URBAN UNCONTROLLED	sai baba	Engineeri	nal	2016	4470	w.ijaerd.c

building using shear wall	Viswesw	Engineeri	nal	2016	0613	w.ijmetmr
HYDERABAD AND	sai baba	Engineeri	ATIONA	2016	4718	ww.ijtre.c
reinforced concrete solid slab	Kamesh	Engineeri	n Journal	2015	7968	w.ijiset.co
and Prestressed Concrete flyover	Kamesh	Engineeri	IJSRD	2015	0613	d.com/
Identification Granulated blast	Kamesh	Engineeri	ATIONA	2015	4562	ww.ripubli
for RCC Irregular building in	Srikanth	Engineeri	nal	2015	1776	anjournals
impact on cost of reinforced	Srikanth	Engineeri	nal	2015	1776	anjournals
Experimental study on the	VAMSI	Engineeri	nal	2015	4845	archgate.n
and biological substances	Srikanth	Engineeri	nal	2015	5152	ww.ijert.o
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severity analysis on NH 202 in	Kumar	Engineeri	nal	2015	0181	ww.ijert.o
Constructuion Dbris with	Rajasekh	Engineeri	IJERM	2015	2058	ww.ijerm.
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Study of NMT in hyderabad	meswara	Engineeri	nal	2015	4470	w.ijtre.co
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carbon fiber in dense bituminous	Kamesh	Engineeri	nal	2016	4718	w.ijtre.co
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on bending strength of RCC	Kamesh	Engineeri	nal	2015	4845	w.ijmetmr
construction	kumar,A	Engineeri	nal	2015	1776	ww.resear
Multistoried buidlings with	Sandeep,	Engineeri	nal	2015	0181	ww.ijert.o
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Principles in the Indian	Abdul	Engineeri	nal	2016	2763	ae.com/
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plasticizers filled binary	Kamesh	Engineeri	IJSRST	2016	602X	rst.com/
concrete filled with fly	Kamesh	Engineeri	IJSRST	2016	602X	rst.com/
Steel moment Resisting frames	i	Engineeri	journal	2016	555X	ww.world
Enclosure for Avionic	i,Palanive	Engineeri	Journal	2016	5762	w.cosmicj
procedure for analysis of steel	Sumathi	Engineeri	Journal	2016	555X	ww.world
And Vehicular Traffic At The	Srinivas	Engineeri	IJRDST	2016	4575	st.org/
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Pounding Effects on Buildings under Seismic Loads

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Abstract: Seismic pounding is a very prevalent phenomenon observed in metropolitan towns with densely packed structures without adequate gap in separation.
Pounding can cause severe structural harm and boost the risk level. Although there are structures that are resistant to earthquake, it is hard to regulate pounding impacts. The simplest way to decrease the impact of pounding is by maintaining an adequate separation gap between structures and this is not everywhere practical. There comes, shear walls and braces to enhance the stability of structures.
This project deals with the behaviour of adjacent buildings affected by seismic pounding. The assessment considers a comparative assessment of buildings, structures with and without shear walls and symmetric structures and asymmetric structures of equal and unequal height.
Building codes provides rules for structural engineering practice and play a significant role in transferring technology from studies and research to practice.
Keywords: pounding effect, shear walls, symmetric and asymmetric buildings, and base reactions.

I. INTRODUCTION

In metropolitan places, structures are very close to each other because of fast rise in urban development and the real-estate value. These buildings collide with each other when subjected to earthquake or any loads due to their closeness. The phenomenon pounding occurs when the adjacent buildings start vibrate out of phase during the earthquake which causes collision amongst the neighbouring buildings.
If the separation distance between adjacent buildings is not enough during seismic activities to compensate the relative motion, the pounding occurs.

A. What is Pounding Effect?

Pounding effect refers to collision between adjacent structures under seismic loads and it is occurred when structures with different dynamic properties, without proper separation gap between them.

B. Pounding can be Caused By

Seismic Pounding can be caused from the following:

1) Nearby buildings with the equal height and the equal floor level.
2) Nearby buildings of different height with the same floor level.
3) Nearby structures with different overall heights and with different floor levels.
4) Structures which are situated in a line or row.
5) Parts of the same buildings which are linked by one or more bridges or joints.
6) Pounding occurs along the unsupported components in building results in serious pounding damage.
7) The structures built according to the old codes that was vague on separation distance.
8) Buildings with uneven lateral load-resistance structures and torsional rotations, pounding can occur near the building premises around the nearby buildings.

C. Shear Walls.

Shear walls are structural elements of a reinforced concrete framed structure designed to withstand lateral forces including wind loads. They are used in tall buildings subject to lateral wind and seismic movements. This approach increases height of the storeys, hence increases the cost of buildings. . The best position for the shear walls is in the middle of every half of the tower, but this is never feasible, so they are usually at the ends.

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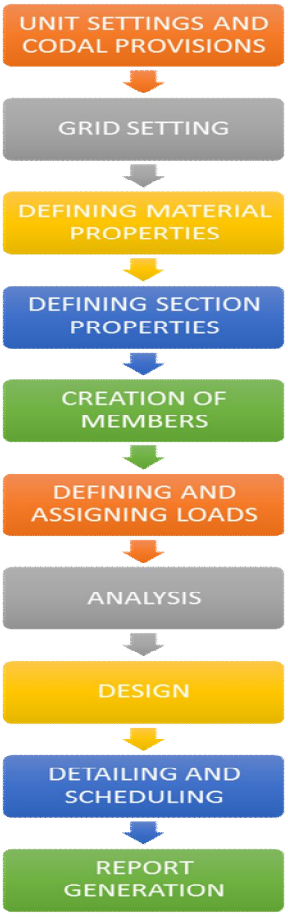
II. OBJECTIVE OF THE STUDY

A. Seismic pounding is a serious phenomenon which involves local damage to structures during earthquakes.
B. The main objective of the project is to study pounding effect on different types of reinforced buildings.
C. Pounding effect is considered for symmetric (rectangular shape) adjacent buildings of different height and asymmetric (L-shape) adjacent buildings of same height.
D. A comparative study is done by analysing different parameters like storey response factors, deflections, and drift along with separation gaps with the help of E-TABS (2013).
E. Comparing analysis results of impacts of seismic and wind interactions in adjacent buildings with and without shear wall using E-TABS.

III. METHODOLOGY.



IV. STRUCTURAL MODELLING

The present study is by using ETABS 2013 technology to analyse the performance of symmetric and asymmetric adjacent framed structures with and without shear walls exposed to Zone V earthquake forces. Assumed separation distance is taken as 0.5m by trial and error method.

Four models are considered for the purpose of the study.

1) Six storey (G+6) and eight storey (G+8) adjacent buildings with shear walls.
2) Six storey (G+6) and eight storey (G+8) adjacent buildings without shear walls.
3) Two eight storey (G+8) adjacent buildings with shear walls.
4) Two eight storey (G+8) adjacent buildings without shear walls.

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A. Design Data For Symmetric Adjacent Buildings

1) Without Shear Wall

a) Material Properties

i) Grade of concrete: M30 , M25

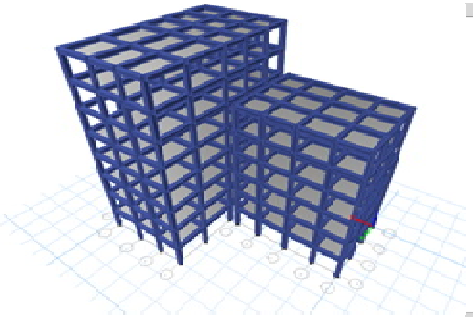
ii) Grade of steel: Fe415 for all beams, columns and slabs.

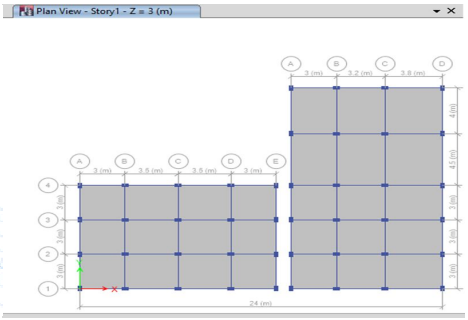
b) Section Properties

i) Column Size: Rectangular Columns = 230mm*400mm.

ii) Beam Sizes = 230mm*450mm.

iii) Slab Sizes: Thickness = 125mm.





2) With Shear Wall

a) *Material Properties*

i) Grade of concrete: M30 , M25

ii) Grade of steel: Fe415 and HYSD 500 for beams, columns and slabs.

b) Section properties

i) Column Size: Rectangular Columns = 230mm*400mm.

ii) Beam Sizes = 230mm*450mm.

iii) Slab Sizes: Thickness = 125mm.

iv) Shear wall thickness = 230mm.

v) Floor finishing load =1.5kN/m2

vi) Live load =4.5kN/m2

c) Seismic Data

(Using Code IS1893:2002)

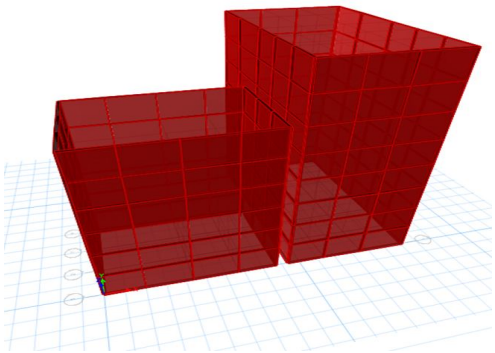
i) Zones : V

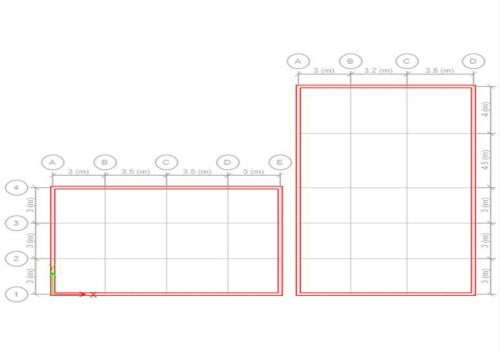
ii) Soil type : Type II (Medium)

iii) Importance Factor, I : 1

iv) Response Reduction Factor, R : (SMRF).

v) Damping : 5%





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B. Design Data For Asymmetric Adjacent Buildings

1) Without Shear Wall

a) Material Properties

i) Grade of concrete: M30 , M25

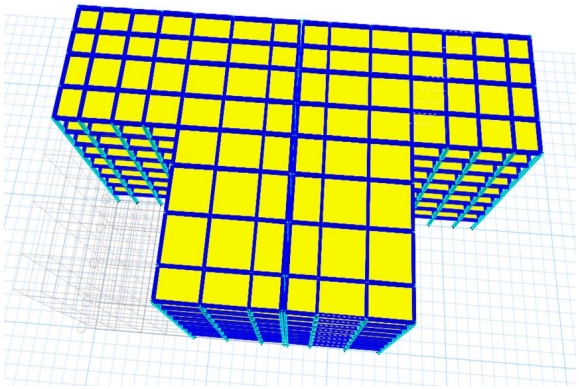
ii) Grade of steel: HYSD 500 for beams, columns and slabs.

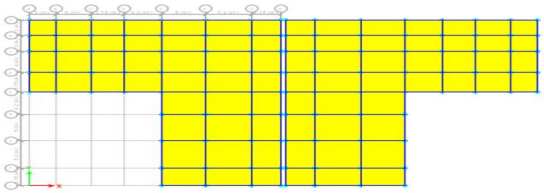
b) Section Properties

i) Column Size: Rectangular Columns = 230mm*450mm.

ii) Beam Sizes = 230mm*450mm.

iii) Slab Sizes: Thickness = 150mm.





2) With Shear Wall

a) Material Properties

i) Grade of concrete: M30 , M25

ii) Grade of steel: Fe415 and HYSD 500 for beams, columns and slabs.

b) Section Properties

i) Column Size: Rectangular Columns = 230mm*450mm.

ii) Beam Sizes = 230mm*450mm.

iii) Slab Sizes: Thickness = 150mm.

iv) Shear wall thickness = 230mm.

c) Seismic Data

(Using Code IS1893:2002)

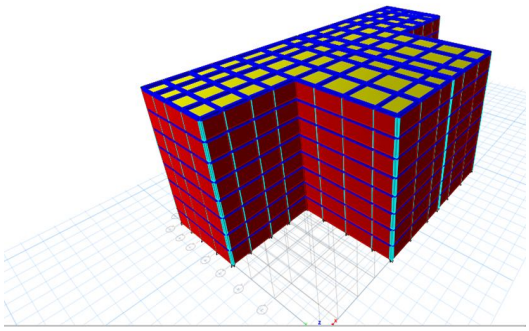
i) Zones : V

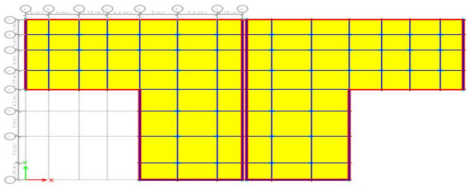
ii) Soil type : Type II (Medium)

iii) Importance Factor, I : 1

iv) Response Reduction Factor, R : 5(SMRF).

v) Damping : 5%





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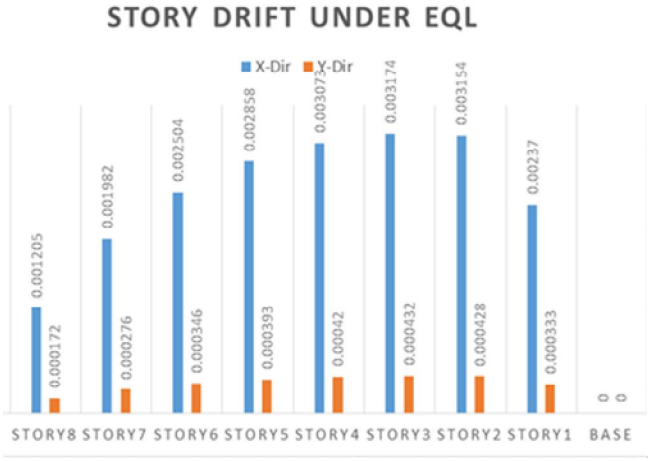
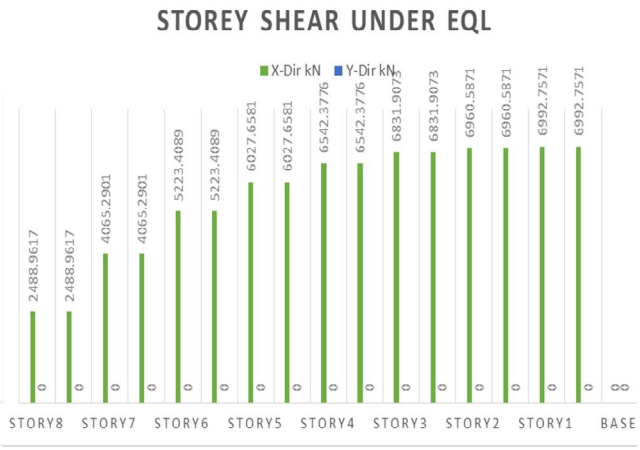
V. RESULTS AND DISCUSSIONS

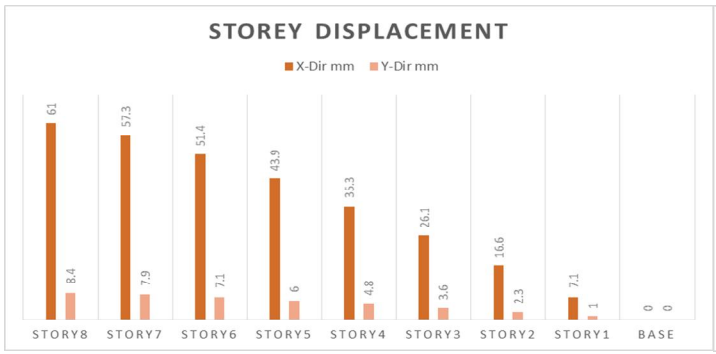
A. For Asymmetric L Buildings without Shear Wall

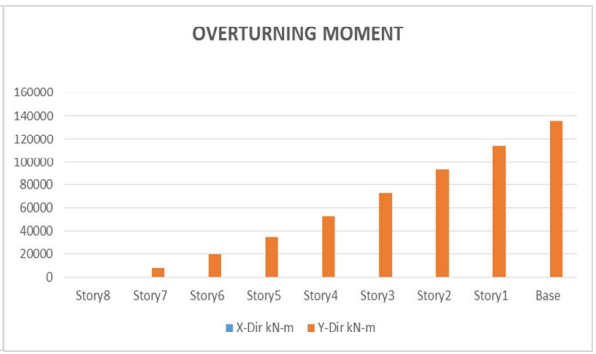
Storey drift is shift of one storey of building relative to the level below or above when earthquake occur. It is observed that at third storey level there is the maximum drift. Storey drifts are increased in first, second, third and fourth stories under earthquake loads and decreasing towards higher floor levels. The storey drift should not go beyond 0.004 or 0.005.Storey drift can be decreased by increasing the column and beam sizes.

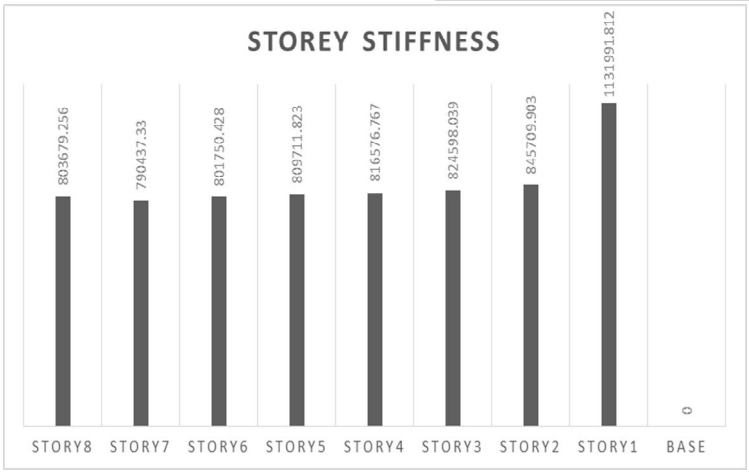
Storey shear is decreasing towards top floors and it is maximum in ground floor. Storey shear is caused by a portion of dead loads and live loads acting on each floors. It will be minimum at the topmost level of the building and maximum at the bottom of the structure. Overturning moment is maximum at base and minimum at the top. Storey displacement is displacement of stories with respect to the base of the building and it will be increasing towards top stories of the building. Storey stiffness is the ratio of storey shear to storey drift. In this graph we can observe it is maximum at the base and decreases gradually as we going up and maintaining a stable values throughout the height with slight variations.











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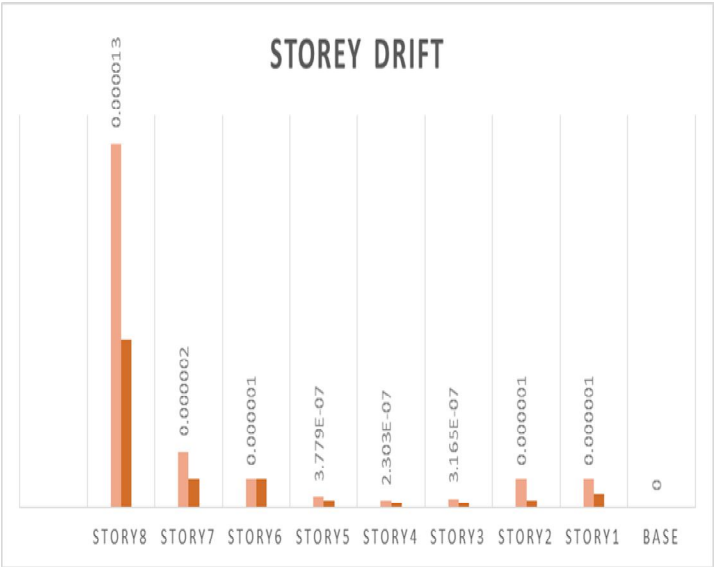
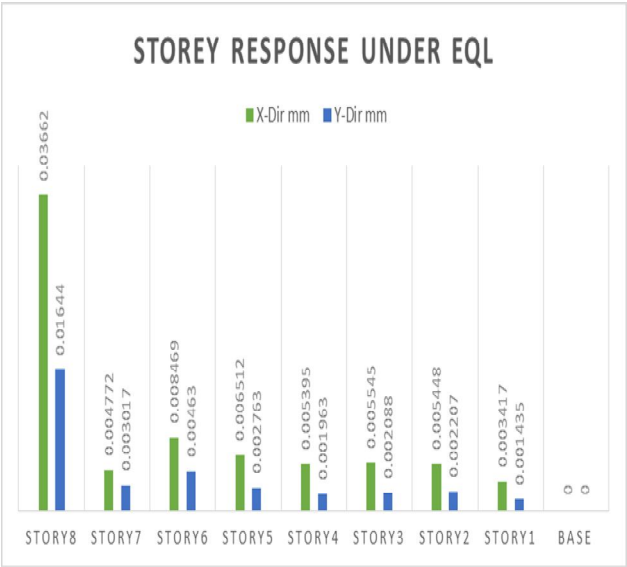
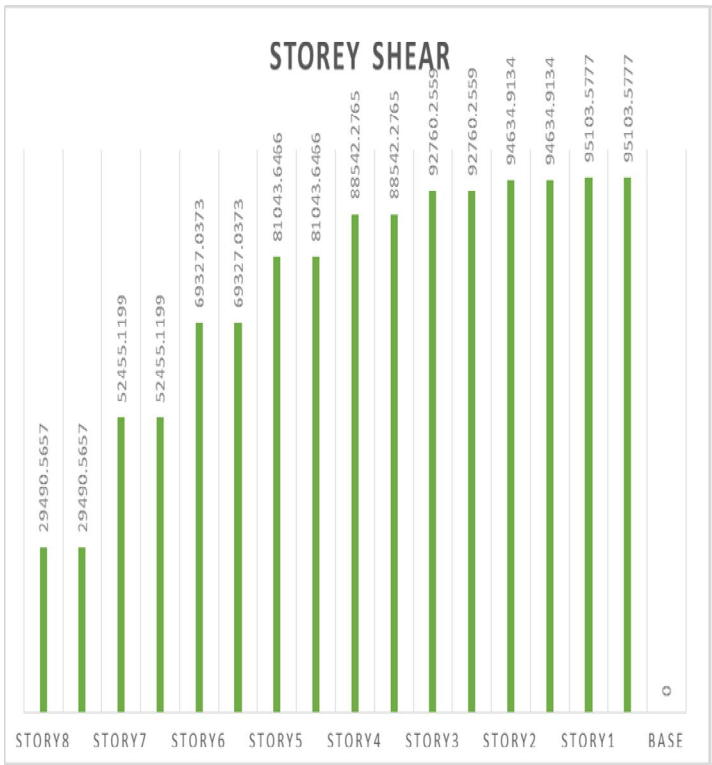
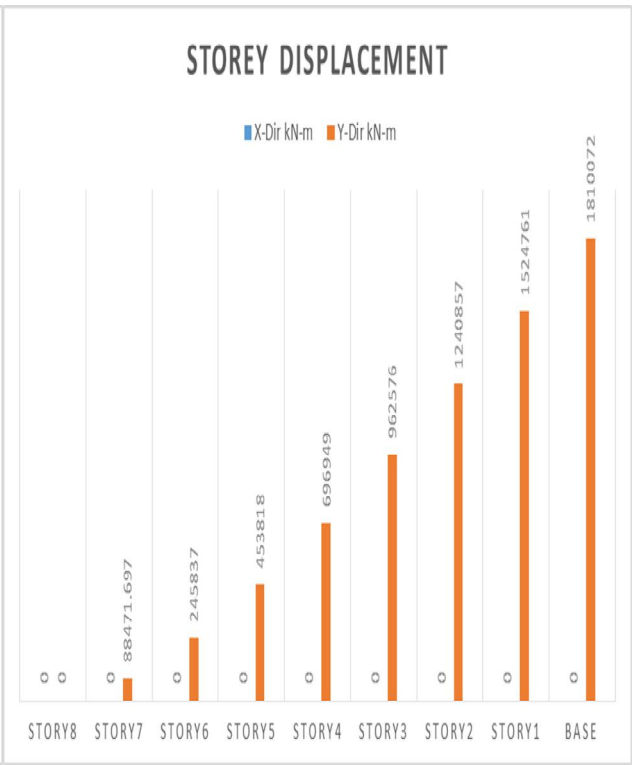
B. For Asymmetric L Buildings with Shear Wall

For structures with shear wall, storey drift is found to be very less and it is increasing towards the top of the building. Here it is observed that maximum variation occurs at the top storey and base is not affected. A gradual increase is seen up to storey 5 and at storey 6 there is a slight increment and later it decreases and steadily increased at the top storey. The storey shear is maximum at base and its gradually decreasing around the top. As we know dead load will be more in bottom floors than upper floors. As seismic forces are greater at base level, storey displacement will be higher in bottom storeys and it will be gradually decreasing towards top storeys.









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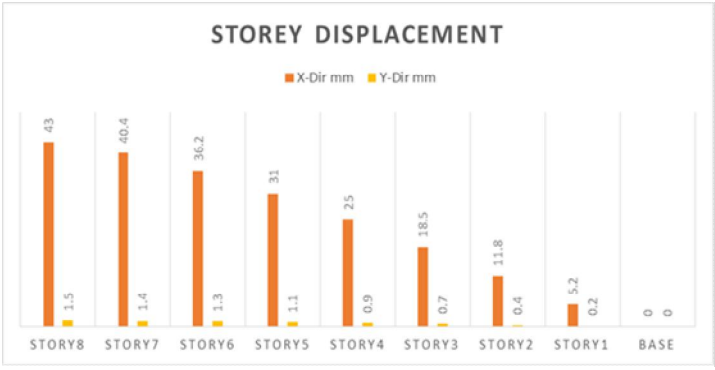
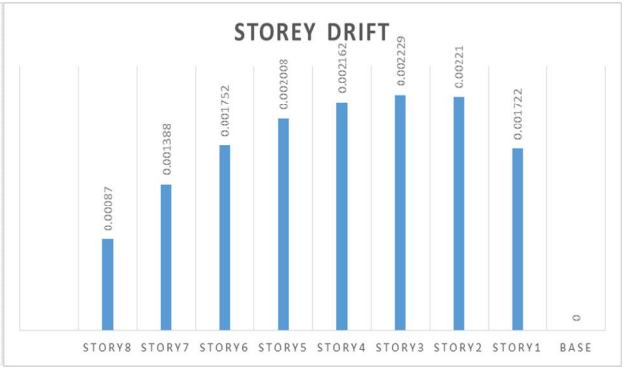
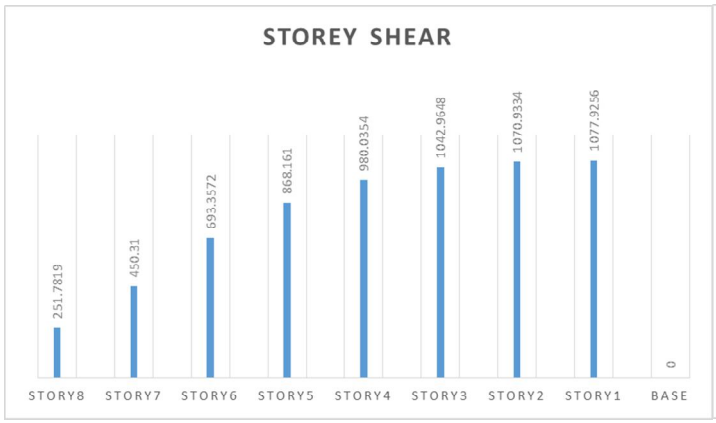
C. For Symmetric Buildings without Shear Wall

For symmetric buildings doesn't provided with shear wall, it is observed that the storey displacements are maximum at the top level storey and minimum at the base. As it is observed, all the values dint exceed the limit value of storey drift. It is visible that at storey 3 drift is maximum and at the top floor it is minimum. A slight decline in story shear can be observed from the first storey to the top storey. It is clear that at top levels stiffness is low and at the base level stiffness is more.



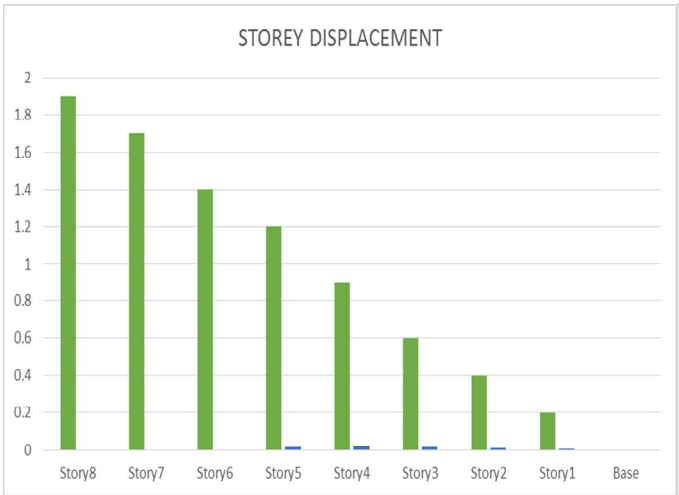


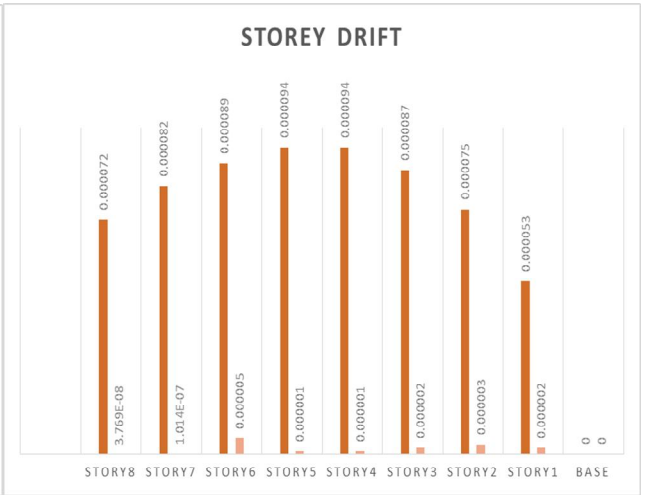




D. For Symmetric Buildings with Shear Wall

Top levels are more vulnerable for displacement and its increasing in a gradual rate difference of 0.2 from the base level of the structures. It is observed that at storey 5 and storey 4 storey drift is maximum. Overturning moment is maximum at base and minimum at the top. It is clear that at top levels stiffness is low and at the base level stiffness is more.





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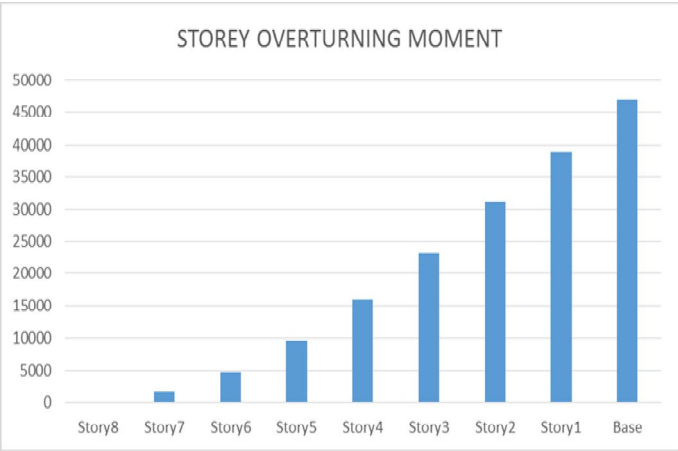

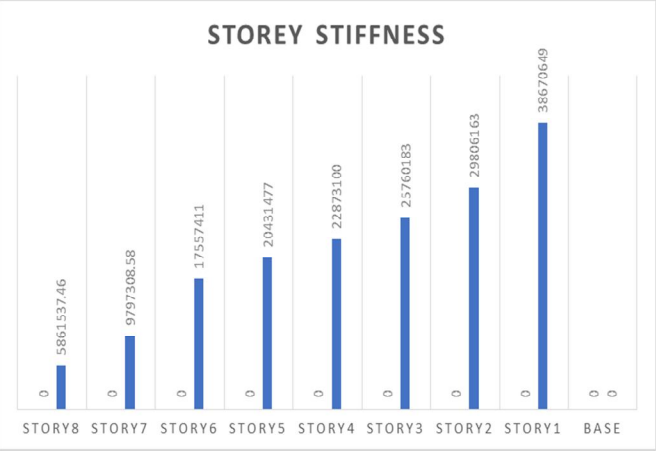

VI. CONCLUSIONS

Major earthquakes have significantly impacted large metropolitan areas in recent years, resulting in drastic pounding damage. In this study, it was established and analyzed the factors that influence seismic pounding of neighboring buildings. Pounding forces can be estimated using commercial software packages such as ETABS for measuring pounding forces using nonlinear gap elements between adjacent building levels. . A detailed study of the project pointed to the following conclusion:

A. It is concluded in this study that the installation of nearby buildings with similar floor levels and separation gaps significantly reduces the pounding effects.
B. Performance of Symmetrical buildings is better than Asymmetrical buildings.
C. For adjacent buildings the structural damage is more for unequal heights compared to equal heights, due to difference in their masses and periods.
D. It has been found that asymmetric neighbouring buildings with same heights are less affected to acceleration.

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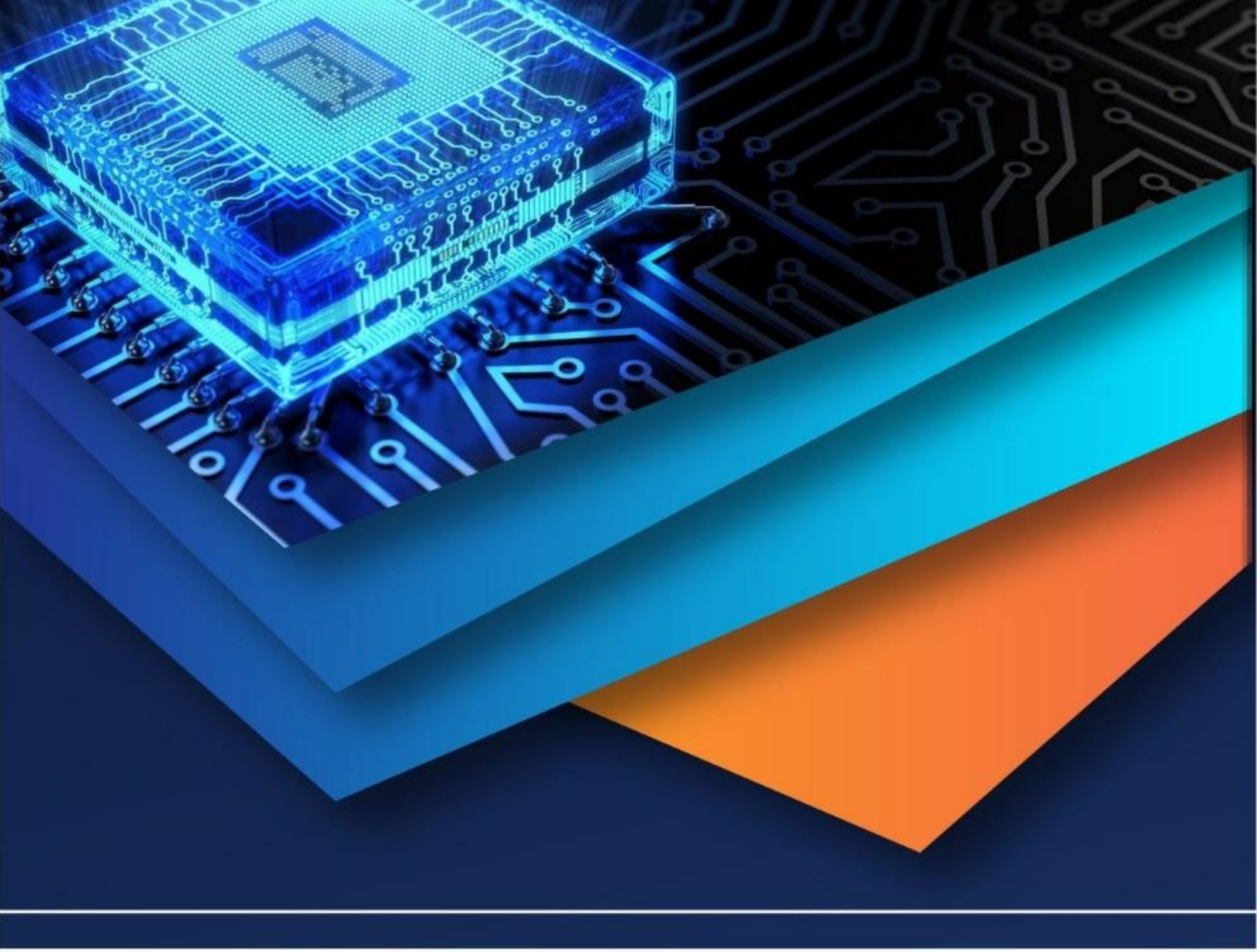

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NUMERICAL STUDY ON BEHAVIOUR OF NON-TOWER BUILDING ATTACHED WITH TOWER

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ABSTRACT:- *Podium surrounding tower walls are often widely preferred for multifaceted functionality of Tall buildings. Horizontal offset buildings constitute a class of structures that are particularly prone to in-plane floor deformation and torsion occurring simultaneously. It is found from previous studies that podium can impose significant differential restraint on coupled tower walls, these walls displaces under lateral loads contributing to the generation of in-plane strutting forces in podium floors leading to its un-conservative design. The in-plane rigid diaphragm assumption commonly adopted in practice can significantly suppress these strutting forces. Key parameters contributing to these in-plane strutting forces and drift at top of tower are analysed by way of parametric studies on representative models of the podium-tower assemblage by incorporating in-plane flexibility in modelling for different sizes of podium with beam-column frame and flat slabs structure, introducing extended blade walls and outriggers in podium to minimize the effect of strutting forces and study the contribution of podium in controlling tower displacement.*

Keywords: Podium-tower buildings, Backstay effect, In-plane Strutting forces, Floor diaphragms, Jump-formwork, Connectrix boxes.

1. INTRODUCTION

Modern architectural design of mixed use complex has introduced a building system which consists of multiple high-rise towers sitting on a common podium. Podiums are augmented floor area at the lower level of a high rise building surrounding it as shown in (Fig. 1.1). These are common in metropolitan areas in regions of low-to-moderate seismicity. A podium may be permitted in plot admeasuring 1000 sq.m or more. The podium provided with ramp may be permitted in one or more level, total height not exceeding 32 m above ground level [*DCR-2034*].

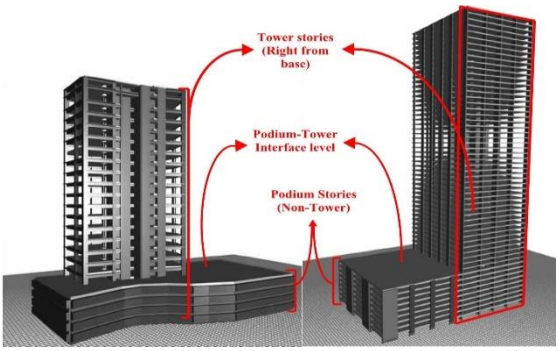


Figure 1.1

At the podium-tower interface, horizontal forces are transferred from the tower to the podium. Reactive forces are developed at the podium-tower interface to resist the overturning actions (Fig. 1.2). This reacting mechanism is similar to the backstay phenomena. It can induce high intensity shear force in the structural (tower) wall within the podium. The amplitude of the induced shear force is dependent on the in-plane flexibility of the floor structure connecting the pair of walls. This was recently studied by Mehair Yacobian et al.[1]. Avigdor Rutenberg [2] studied the prevalence of incompatibility (strutting) forces in slabs and beams connecting structural walls of different base dimensions. The Lateral load displaces tower walls and is responsible for generation of in-plane strutting forces in podium floors leading to its un-conservative design. But the in-plane rigid diaphragm assumption commonly adopted in practice can significantly suppress compatibility forces generated within the podium floor. Therefore, this strutting action can only be reported accurately if the horizontal in-plane deformation of the floor diaphragm has been incorporated into the modelling. This was stated by Gardiner et al. [3]. Therefore, podium slabs are defined as semi-rigid Shells in modelling and casted monolithic on site. [Refer Table 1]

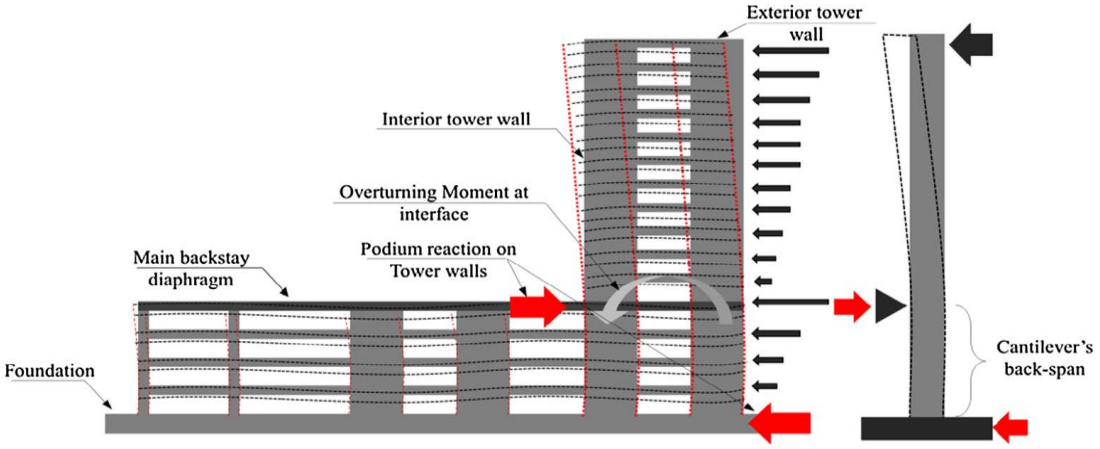


Figure 1.2

These reactive forces are *strutting forces* as shown in (Fig 1.3). One of the objectives of this study is to reduce strutting forces at podium-tower interface level.

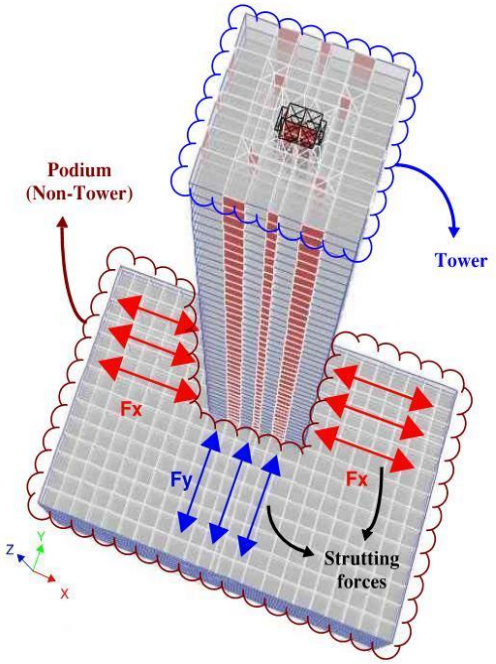


Figure 1.3

IS 16700-2017(Criteria for Structural Safety of Tall Concrete Buildings), clause 7.3.11 *"Stiffness of flat slab frames (that is, slab-column frames) shall be ignored in lateral load resistance, in all seismic regions".* Tall building code suggests that stiffness of slabs is ignored in all seismic zones, i.e., Slabs in tall buildings are infinitely stiff and lateral load is transferred 100% to vertical structural elements without any membrane deformation. Therefore, no in-plane stresses and no out of plane bending moments are reported in slabs of tower structure. To make this happen in software (ETABS) and practically on site, the slabs in tower are dealt as follows:

Software (ETABS): As discussed above, with reference of Table-1, we have to define modelling type of slab as 'membrane' (as it has no out of plane bending moments) and assign a 'rigid' diaphragm (as it has no in-plane stresses).

Practically on site: In order to satisfy the guidelines of code, stiffness of slab for lateral loads is ignored by implementing the latest construction practice of *"Jump formwork with* Connectrix *boxes"*

Table-1

Property of diaphragm/slab	In-plane stresses	Out of plane bending
Rigid	No	Yes
Semi-rigid	Yes	Yes
Membrane	Yes	No
Shell	Yes	Yes

Rigid diaphragms are infinitely stiff; therefore relative displacement between any two points/joints is zero. These diaphragms don't report shell stresses and in-plane forces, but reports out of plane bending, whereas Semi-rigid diaphragms report both in-plane stresses and out of plane bending. Membranes transfers load directly to supporting structural objects and do not take part in load bearing; load is transferred 100% to the vertical members (based upon their own stiffness). In shells, the stiffness of diaphragm and associated members contributes in load transfer; therefore resist a portion of the load through flexural deformation.

Jump formwork system (also referred as self-climbing or self-lifting) to construct the central core walls. The central core is typically constructed ahead of the residential wings by using a climbing formwork system as shown in Figure 1.4. The formwork supports itself on the

concrete cast earlier so does not rely on support or access from other parts of the building or permanent works.

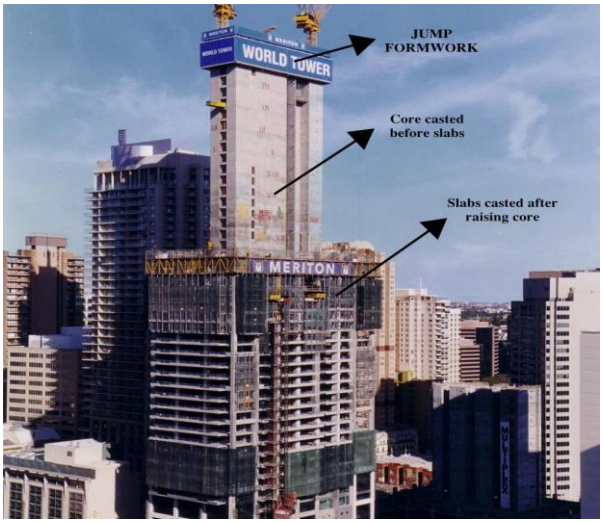


Figure 1.4

Connectrix connection box is used to eliminate/reduce the moment transfer from slab to vertical elements. Box installation is as shown in Figure 1.5 and is widely suitable for:

- Wall to Slab Connections
- Slab to Slab Connections
- Wall to Wall Connections
- Stair Landing Connections



Figure 1.5

2. NUMERICAL STUDY

The structural model adopted for the study is a tall building with 50 storeys, the plan area is 30 m x 30 m. The structural configuration is a 'tube in tube' lateral load resisting system. Later podium structure is attached to the existing tower and the studies are carried out on 18 models by changing the structural configuration of podium structure.

Case (I) : Independent tower model.

In order to understand the contribution of podium, we need to identify the analysis results of an individual tower model independent of podium.

Case (II) : Podium-tower with 10 m podium width.
Case (III): Podium-tower with 20 m podium width.
Case (IV): Podium-tower with 30 m podium width.
Case (V): Podium-tower with 40 m podium width.

From Case – II to Case – V, Podium (a non-tower structure) is attached to the tower on its three sides with 10 m, 20 m, 30 m and 40 m width. Tower is at one side of podium. The sensitivity study is done by varying structural configuration of podium as following options:

i. Slab with beams of 10 m span.
ii. Flat Plate with columns at 10 m distance.
iii. Flat Plate with columns at 5 m distance .
iv. Flat Plate with columns at varying distance.

Case (VI): Outrigger in podium.
Case (VII): Extended blade walls in podium.

2.1 Description of Building Model

The podium-tower assemblage adopted is as follows for loading in Table-2

- Number of floors = 3B+G+50 ***(153 m)***
- Number of podium floors = 3B+G+9 (***30m)***
- Storey height = 3 m *(3.5 m for basements)*
- Grade of concrete
  - Base to G+20 = M60
  - G+21 to G+40 = M55
  - G+41 to G+50 = M50
- Sectional properties changed for every 10 floors
- Cracking of elements (as per IS 16700-2017)
  - Beams = 0.7 (M.O.I about 2 and 3 axis)
  - Slabs = 0.35 (Bending M11 and M22)

Table-2

Type of load	Intensity
SDL(Finishes, ceiling and services)	1.5 (kN/m^2)
Live load	2.0 (kN/m^2)
Partition wall load	2.0 (kN/m^2)
Facade (Glass)	4.0 (kN/m)
Wind speed	44 m/sec (Hyderabad)
Terrain category -	2
Structure class -	C

Table-3: Sectional properties

Structural elements		Sectional Properties
Tower columns	G+41 – G+50	450 x 450
	G+31 – G+40	600 x 600
	G+21 – G+30	700 x 700
	G+11 – G+20	850 x 850
	B – G+10	1000 x 1000
Tower walls	G+41 – G+50	300
	G+31 – G+40	350
	G+21 – G+30	400
	G+11 – G+20	450
	B – G+10	500
Retaining wall		400
Depth of tower peripheral beams		750
Peripheral beams of tower in podium		400 x 1200
Beams in podium		400 x 1200
Peripheral beams in podium		300 x 800
Columns in podium		800 x 800
Tower slabs (rigid membrane)		250
Podium slabs (semi rigid shell)		270
Outriggers		7500 x 500
Blade walls		3500 x 600

2.2 Analytical Models

P-Delta effect is considered for analysis, which is a non-linear effect and studied for wind forces in X and Y directions to compare following results.

a) Displacement at the roof level.
b) Moment contributed by outer core, inner core and retaining wall at the base.
c) Moments in slab at podium-tower interface.
d) Stresses in slab at podium-tower interface.
e) Strutting forces in slab at podium-tower interface.

Case (I) : Independent tower model

An independent tower with plan and elevation views as shown in Figures 2.1 and 2.2. The tower has 3 basements and G+50 floors, total height of building above G.L is 150 m. Table-4 shows the results from analysis, it is observed that the tower displacement is exceeding the allowable limit.

Allowable displacement is **H/500**

=> (153000)/500 = **306 mm.**

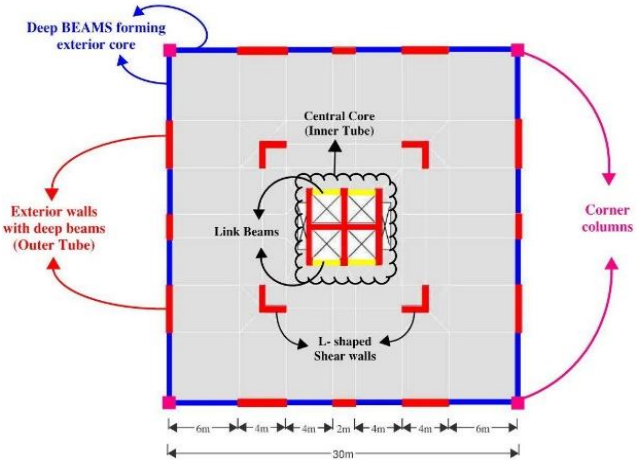


Figure 2.1

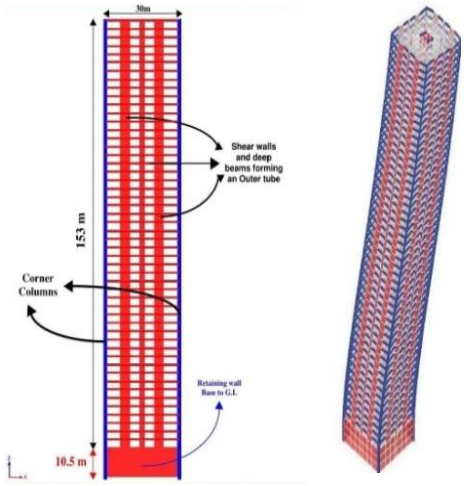


Figure 2.2

Table-4: CASE – I Independent Tower

Displacements (mm)	Wind X	488
	Wind Y	517
	Allowable (H/500)	306
	% reduction for Wind X	-37.3
Total moment	My for Wx (kN-m)	1766013
	Mx for Wy (kN-m)	1787986
Moment contribution (Wind X)	Outer core (kN-m)	1607642
	%	91.0
	Inner core (kN-m)	158370.6
	%	9.0
	Retaining wall (kN-m)	included with outer core
	%	-
Moment contribution (Wind Y)	Outer core (kN-m)	1745442.9
	%	97.6
	Inner core (kN-m)	42543.24
	%	2.4
	Retaining wall (kN-m)	included with outer core
	%	-
Stresses/Moments/Axial forces	-	-

Case II - Podium-Tower with 10 m Podium Width

Option – (i) Slab with beams of 10 m span:

Podium (a non-tower structure) is attached to the tower on its three sides with 10 m width. Tower is at one side of podium as shown in Figure 2.3

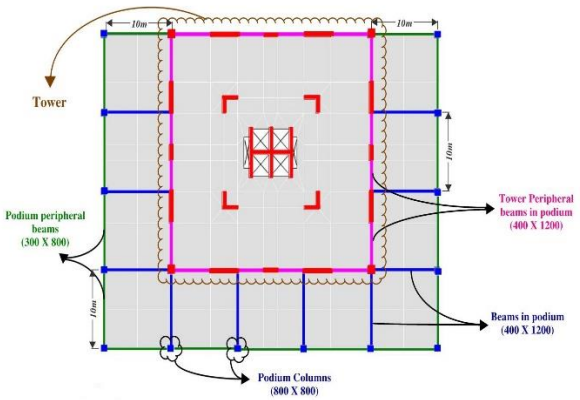


Figure 2.3

Table-5: Case II – (Option - i)

Displacements (mm)	Wind X	360
	Wind Y	384
	Allowable (H/500)	306
	% reduction for Wind X	-26.2
Total moment	My for Wx (kN-m)	1788293
	Mx for Wy (kN-m)	1814857
Moment contribution (Wind X)	Outer core (kN-m)	552582
	%	30.9
	Inner core (kN-m)	71531
	%	4.0
	Retaining wall (kN-m)	851227
	%	47.6
	Podium columns **(%)**	17.5
Moment contribution (Wind Y)	Outer core (kN-m)	662422
	%	36.5
	Inner core (kN-m)	29037
	%	1.6
	Retaining wall (kN-m)	878390
	%	48.4
	Podium columns **(%)**	13.5
Stresses in podium diap.	S11 for Wx (MPa)	2.2
	S22 for Wy (MPa)	2.1
Moments in podium diap.	M11 for Wx (kN-m)	29
	M22 for Wy (kN-m)	31
Axial forces in podium diap.	F11 for Wx (kN/m)	147
	F22 for Wy (kN/m)	133

From Table-5, the drift at top of tower is controlled by 26%, even though the allowable limit is not satisfied. On the other hand, depth of beams in podium is reducing the storey height. Simultaneously, axial forces are generated in beams and interface level slab of podium model, which makes the design complicated and requires more steel. Hence, there is a need to study with flat slabs instead of beam-slab.

Option – (ii) Flat slab with columns at 10 m distance:

The podium comprises of flat slabs with peripheral beams as shown in Figure 2.4. The interior beams in podium structure are eliminated because such deep beams are reducing the floor height.

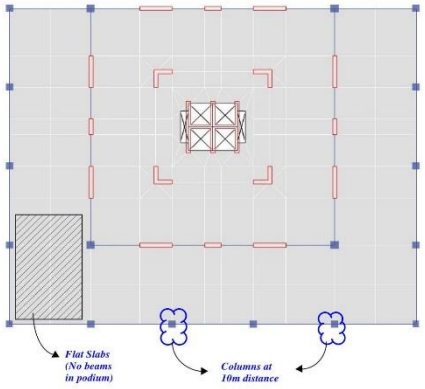


Figure 2.4

Table-6: Case II – (Option - ii)

Displacements (mm)	Wind X	385
	Wind Y	404
	Allowable (H/500)	306
	% reduction for Wind X	-21.1
Total moment	My for Wx (kN-m)	1788293
	Mx for Wy (kN-m)	1814857
Moment contribution (Wind X)	Outer core (kN-m)	763601
	%	42.70
	Inner core (kN-m)	80473
	%	4.5
	Retaining wall (kN-m)	661668
	%	37.0
	Podium columns **(%)**	15.8
Moment contribution (Wind Y)	Outer core (kN-m)	820315
	%	45.20
	Inner core (kN-m)	29037.712
	%	1.6
	Retaining wall (kN-m)	787647
	%	43.4
	Podium columns **(%)**	9.8
Stresses in podium diap.	S11 for Wx (MPa)	2
	S22 for Wy (MPa)	1.9
Moments in podium diap.	M11 for Wx (kN-m)	32
	M22 for Wy (kN-m)	37
Axial forces in podium diap.	F11 for Wx (kN/m)	136
	F22 for Wy (kN/m)	128

From Table-6 it is observed that around 21% drift is reduced, though axial forces at interface diaphragm are less but tower is not meeting the allowable drift. Therefore, the column spacing in podium is reduced from 10 m to 5 m and the effect of framing action on drift and diaphragm forces are noted.

Option – (iii) Flat Plate with Columns at 5 m design:

In this model column spacing in podium structure is 5 m as shown in Figure 2.5

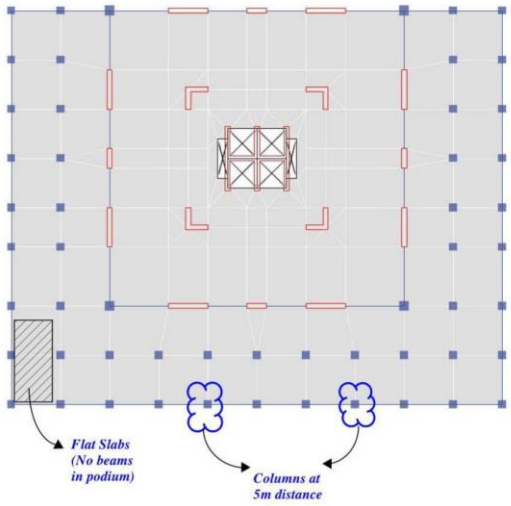


Figure 2.5

Table-7: Case II – (Option - iii)

Displacements (mm)	Wind X	362
	Wind Y	387
	Allowable (H/500)	306
	% reduction for Wind X	-25.8
Total moment	My for Wx (kN-m)	1788293
	Mx for Wy (kN-m)	1814857
Moment contribution (Wind X)	Outer core (kN-m)	581195
	%	32.50
	Inner core (kN-m)	69743
	%	3.9
	Retaining wall (kN-m)	706375
	%	39.5
	Podium columns (%)	24.1
Moment contribution (Wind Y)	Outer core (kN-m)	658793
	%	36.30
	Inner core (kN-m)	30852
	%	1.7
	Retaining wall (kN-m)	793092
	%	43.7
	Podium columns (%)	18.3
Stresses in podium diap.	S11 for Wx (MPa)	3.3
	S22 for Wy (MPa)	3.6
Moments in podium diap.	M11 for Wx (kN-m)	38
	M22 for Wy (kN-m)	41
Axial forces in podium diap.	F11 for Wx (kN/m)	256
	F22 for Wy (kN/m)	291

From Table-7 it is observed that with the increase of framing action in podium around 26% of displacement is reduced which is similar to that of Case – II (Option - i) i.e., beam-slab system. Simultaneously there is around 60% increase of strutting forces at interface diaphragm when compared to Case – II (Option – ii) model.

Case III - Podium-Tower with 20 m Podium Width

Option – (i) Slab with beams of 10 m span:

The assemblage is shown in Figure 2.6, Here width of podium is increased by10 m for previous case. Total width of podium from face of tower is 20 m.

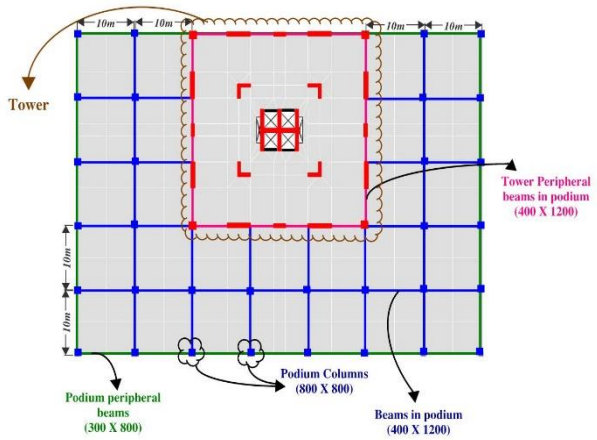


Figure 2.6

Table-8: Case III – (Option - i)

Displacements (mm)	Wind X	353
	Wind Y	377
	Allowable (H/500)	306
	% reduction for Wind X	-27.7
Total moment	My for Wx (kN-m)	1819357
	Mx for Wy (kN-m)	1872185
Moment contribution (Wind X)	Outer core (kN-m)	520336
	%	28.60
	Inner core (kN-m)	61858
	%	3.4
	Retaining wall (kN-m)	851459
	%	46.8
	Podium columns (%)	21.2
Moment contribution (Wind Y)	Outer core (kN-m)	634670
	%	33.90
	Inner core (kN-m)	35571
	%	1.9
	Retaining wall (kN-m)	962303
	%	51.4
	Podium columns (%)	12.8
Stresses in podium diap.	S11 for Wx (MPa)	2.85
	S22 for Wy (MPa)	3.25
Moments in podium diap.	M11 for Wx (kN-m)	21
	M22 for Wy (kN-m)	23
Axial forces in podium diap.	F11 for Wx (kN/m)	235
	F22 for Wy (kN/m)	267

Table-8 shows the lateral displacement of tower is reduced by around 28%, this is just 2% more than that of Case – II (Option – i) which was 26%. Though one more bay of 10 m width is added, there is not much change in tower drift. On the other hand, the axial forces are increased by around 45%. Retaining walls at the base are

sharing moments around 46% in X-direction and 51% in Y-direction.

Option – (ii) Flat slab with columns at 10 m distance:

This model has flat slabs in podium with 10 m column spacing as shown in Figure 2.7.

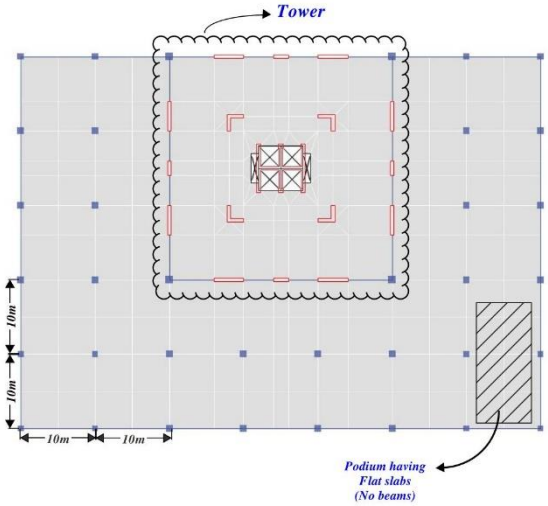


Figure 2.7

Table-9: Case III – (Option - ii)

Displacements (mm)	Wind X	382
	Wind Y	398
	Allowable (H/500)	306
	% reduction for Wind X	-21.7
Total moment	My for Wx (kN-m)	1819357
	Mx for Wy (kN-m)	1872185
Moment contribution (Wind X)	Outer core (kN-m)	764129.94
	%	42.00
	Inner core (kN-m)	78778.1581
	%	4.3
	Retaining wall (kN-m)	673162.09
	%	37.0
	Podium columns (%)	16.7
Moment contribution (Wind Y)	Outer core (kN-m)	748874
	%	40.00
	Inner core (kN-m)	33699.33
	%	1.8
	Retaining wall (kN-m)	926731.575
	%	49.5
	Podium columns (%)	8.7
Stresses in podium diap.	S11 for Wx (MPa)	2.2
	S22 for Wy (MPa)	2.3
Moments in podium diap.	M11 for Wx (kN-m)	30
	M22 for Wy (kN-m)	33
Axial forces in podium diap.	F11 for Wx (kN/m)	190
	F22 for Wy (kN/m)	163

From Table-9, analysis results show there is no change in contribution of podium in tower drift control when compared with Case - II (Option - ii). As there is no framing action in podium-tower, lateral drift is not reduced and less strutting forces are reported in diaphragm at interface level. This reveals that the podiums with flat slabs having columns at far distances has less framing action and no contribution in tower drift control beyond its first bay.

Option – (iii) Flat Plate with Columns at 5 m design:

As there was less framing action in previous model, we are trying to induce more framing action by maintain column distances at 5 m as shown in Figure 2.8

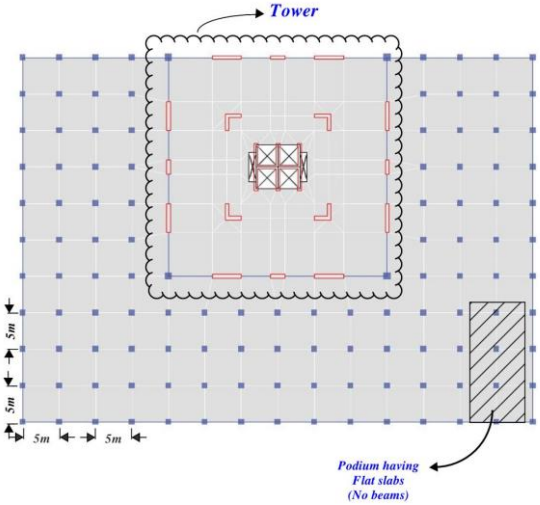


Figure 2.8

Table-10: Case III – (Option - iii)

Displacements (mm)	Wind X	354
	Wind Y	380
	Allowable (H/500)	306
	% reduction for Wind X	-27.5
Total moment	My for Wx (kN-m)	1819357
	Mx for Wy (kN-m)	1872185
Moment contribution (Wind X)	Outer core (kN-m)	564000.67
	%	31.00
	Inner core (kN-m)	65496.852
	%	3.6
	Retaining wall (kN-m)	764129.94
	%	42.0
	Podium columns (%)	23.4
Moment contribution (Wind Y)	Outer core (kN-m)	651520.38
	%	34.80
	Inner core (kN-m)	33699.33
	%	1.8
	Retaining wall (kN-m)	939836.87
	%	50.2
	Podium columns (%)	13.2
Stresses in podium diap.	S11 for Wx (MPa)	3.9
	S22 for Wy (MPa)	4.7
Moments in podium diap.	M11 for Wx (kN-m)	37
	M22 for Wy (kN-m)	47
Axial forces in podium diap.	F11 for Wx (kN/m)	354
	F22 for Wy (kN/m)	406

From Table-10, it is observed that podium is contributing around 27.5% in drift control, just 1.5% increase from that of Case – II (Option – iii).

Simultaneously there is around 30% increase in strutting forces at interface level diaphragm. Retaining walls at base has 50% of moment contribution. There is still a need for such configuration that reduces strutting forces.

Option – (iv) Flat Plate with Columns at varying Distance:

Podium columns are spaced by varying distances, first two bays are at 5 m and third one at 7.5 m making total width of podium as 17.5 m from face of tower as shown in Figure 2.9.

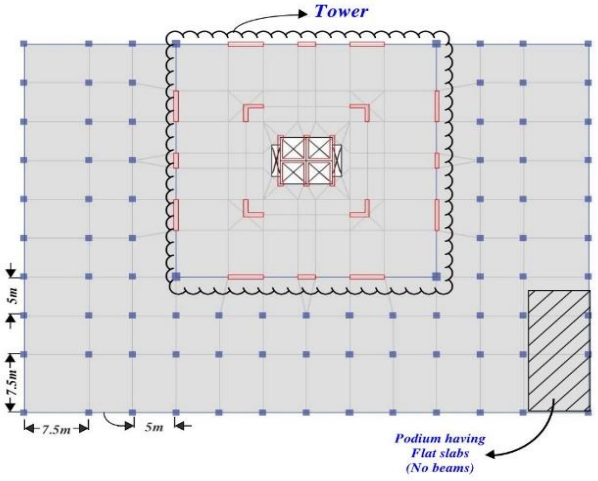


Figure 2.9

Table-11: Case III – (Option - iv)

Displacements (mm)	Wind X	358
	Wind Y	383
	Allowable (H/500)	306
	% reduction for Wind X	-26.6
Total moment	My for Wx (kN-m)	1812716
	Mx for Wy (kN-m)	1850703
Moment contribution (Wind X)	Outer core (kN-m)	543814.8
	%	30.00
	Inner core (kN-m)	67070.492
	%	3.7
	Retaining wall (kN-m)	696082.944
	%	38.4
	Podium columns (%)	27.9
Moment contribution (Wind Y)	Outer core (kN-m)	662551.674
	%	35.80
	Inner core (kN-m)	35163.357
	%	1.9
	Retaining wall (kN-m)	886486.737
	%	47.9
	Podium columns (%)	14.4
Stresses in podium diap.	S11 for Wx (MPa)	3.55
	S22 for Wy (MPa)	3.8
Moments in podium diap.	M11 for Wx (kN-m)	40
	M22 for Wy (kN-m)	47
Axial forces in podium diap.	F11 for Wx (kN/m)	326
	F22 for Wy (kN/m)	348

It is observed from Table-11, that there is decrease in contribution (tower drift control) by 0.9% and around 15% reduction in strutting forces when compared with previous Option – iii. This option with columns at varying distances is quiet productive in displacement and in-plane forces but the allowable displacement limit is still not achieved.

Case IV - Podium-Tower with 30 m Podium Width

Option – (i) Slab with beams of 10 m span:

Further proceeding the case study by adding more 10 m wide podium to the existing one. Total width of podium is 30 m with 3 bays of 10 m width as shown in Figure 2.10.

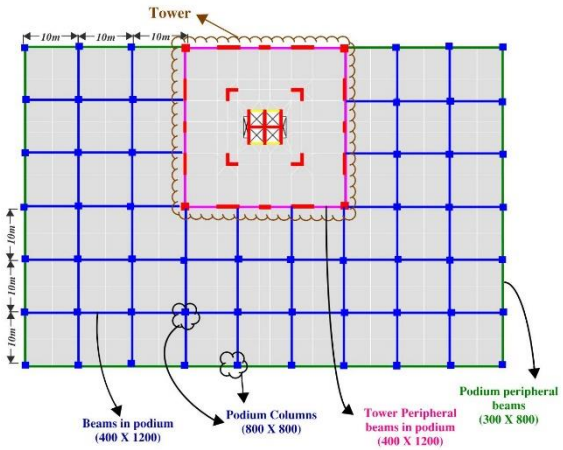


Figure 2.10

Table-12: Case IV – (Option - i)

Displacements (mm)	Wind X	345
	Wind Y	371
	Allowable (H/500)	306
	% reduction for Wind X	-29.3
Total moment	My for Wx (kN-m)	1846422
	Mx for Wy (kN-m)	1926114.0
Moment contribution (Wind X)	Outer core (kN-m)	553926.6
	%	30.00
	Inner core (kN-m)	51699.816
	%	2.8
	Retaining wall (kN-m)	899207.514
	%	48.7
	Podium columns (%)	18.5
Moment contribution (Wind Y)	Outer core (kN-m)	659694.045
	%	34.25
	Inner core (kN-m)	34670.052
	%	1.8
	Retaining wall (kN-m)	1088254.41
	%	56.5
	Podium columns (%)	7.5
Stresses in podium diap.	S11 for Wx (MPa)	3.38
	S22 for Wy (MPa)	3.88
Moments in podium diap.	M11 for Wx (kN-m)	21
	M22 for Wy (kN-m)	25
Axial forces in podium diap.	F11 for Wx (kN/m)	269
	F22 for Wy (kN/m)	337

From Table-12, it is observed that around 29% of tower displacement is reduced. Only 1.3% more than Case – III (Option – i), which was around 27.7%. Increase in size of podium has very nominal contribution in tower displacement; on the other hand, as framing action is increased around 21% strutting forces are increased.

Option – (ii) Flat slab with columns at 10 m distance:

Revising the previous model by eliminating beams in podium structure and making it as flat slab-column frame as shown in Figure 2.11

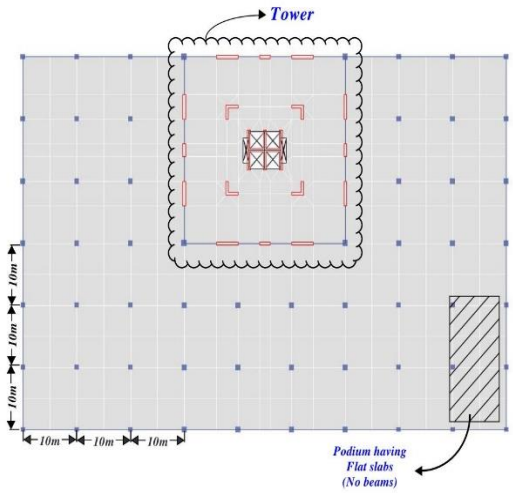


Figure 2.11

Table-13: Case IV – (Option - ii)

Displacements (mm)	Wind X	380
	Wind Y	396
	Allowable (H/500)	306
	% reduction for Wind X	-22.1
Total moment	My for Wx (kN-m)	1846422
	Mx for Wy (kN-m)	1926114.0
Moment contribution (Wind X)	Outer core (kN-m)	406212.84
	%	22.00
	Inner core (kN-m)	75703.302
	%	4.1
	Retaining wall (kN-m)	853046.964
	%	46.2
	Podium columns (%)	27.7
Moment contribution (Wind Y)	Outer core (kN-m)	494433.4638
	%	25.67
	Inner core (kN-m)	34670.052
	%	1.8
	Retaining wall (kN-m)	1016988.192
	%	52.8
	Podium columns (%)	19.7
Stresses in podium diap.	S11 for Wx (MPa)	2.89
	S22 for Wy (MPa)	2.7
Moments in podium diap.	M11 for Wx (kN-m)	35
	M22 for Wy (kN-m)	34
Axial forces in podium diap.	F11 for Wx (kN/m)	247
	F22 for Wy (kN/m)	217

From Table-13, it is observed that there is negligible contribution of podium on tower displacement when compared with Case – II (Option – ii), this is because flat slabs framing action depends upon spacing of columns, as columns are at far distance framing action is less and also strutting forces are reduced by around 36% when compared with previous Option - i.

Option – (iii) Flat Plate with Columns at 5 m design:

This model has column spacing of 5 m and remaining is same that of previous Option – ii model. Figure 2.12 shows the podium-tower assemblage.

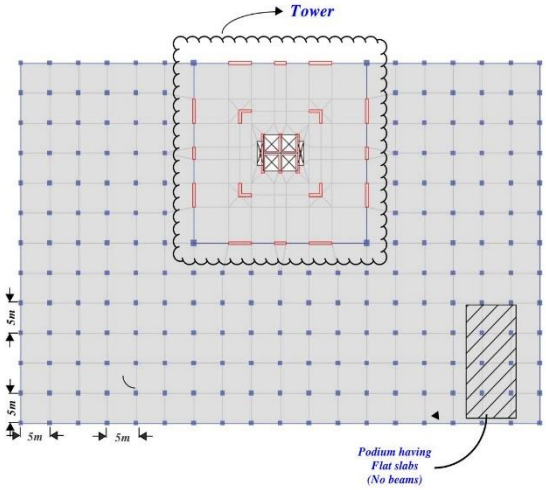


Figure 2.12

Table-14: Case IV – (Option - iii)

Displacements (mm)	Wind X	349
	Wind Y	374
	Allowable (H/500)	306
	% reduction for Wind X	-28.5
Total moment	My for Wx (kN-m)	1846422
	Mx for Wy (kN-m)	1926114.0
Moment contribution (Wind X)	Outer core (kN-m)	535462.38
	%	29.00
	Inner core (kN-m)	55392.66
	%	3.0
	Retaining wall (kN-m)	817964.946
	%	44.3
	Podium columns (%)	23.7
Moment contribution (Wind Y)	Outer core (kN-m)	609422.4696
	%	31.64
	Inner core (kN-m)	34670.052
	%	1.8
	Retaining wall (kN-m)	1020840.42
	%	53.0
	Podium columns (%)	13.6
Stresses in podium diap.	S11 for Wx (MPa)	4.96
	S22 for Wy (MPa)	5.51
Moments in podium diap.	M11 for Wx (kN-m)	41
	M22 for Wy (kN-m)	45
Axial forces in podium diap.	F11 for Wx (kN/m)	431
	F22 for Wy (kN/m)	486

The analysis results in Table-14. Shows that there is around 6% decrease in tower drift from Case – IV (Option – ii). Overall podium contribution in tower displacement is around 28.5% but need more to meet the allowable limit. Similarly, as we know the framing action is more than the previous model due to less column distance, there is huge increase in strutting forces by around 56%. Contribution of retaining wall in moments at base is 53%.

Option – (iv) Flat Plate with Columns at varying Distance:

As shown in the Figure 2.13, spacing of columns is varying. First two bays are of 5 m width; last two bays are of 7.5 m width.

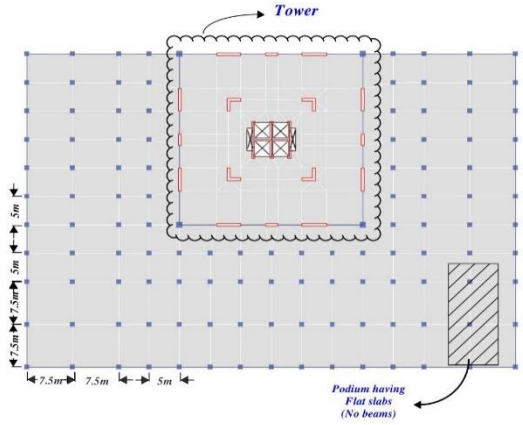


Figure 2.13

Table-15: Case IV – (Option - iv)

Displacements (mm)	Wind X	353
	Wind Y	378
	Allowable (H/500)	306
	% reduction for Wind X	-27.7
Total moment	My for Wx (kN-m)	1833139
	Mx for Wy (kN-m)	1895550.0
Moment contribution (Wind X)	Outer core (kN-m)	579271.924
	%	31.60
	Inner core (kN-m)	65993.004
	%	3.6
	Retaining wall (kN-m)	747920.712
	%	40.8
	Podium columns (%)	24.0
Moment contribution (Wind Y)	Outer core (kN-m)	664579.83
	%	35.06
	Inner core (kN-m)	36015.45
	%	1.9
	Retaining wall (kN-m)	1004641.5
	%	53.0
	Podium columns (%)	10.0
Stresses in podium diap.	S11 for Wx (MPa)	4.3
	S22 for Wy (MPa)	4.7
Moments in podium diap.	M11 for Wx (kN-m)	43
	M22 for Wy (kN-m)	48
Axial forces in podium diap.	F11 for Wx (kN/m)	363
	F22 for Wy (kN/m)	414

From analysis results as shown in Table-15, it is observed that around 15% of strutting forces are reduced by changing column positions at varying spans, but there is also decrease in tower displacement control by 2%.

Case V - Podium-Tower with 40 m Podium Width

Option – (i) Slab with beams of 10 m span:

In this case width of podium is further increased by 10 m, overall width of podium from face of tower is 40 m, column spacing is 10 m and slab is with beams as shown in Figure 2.14.

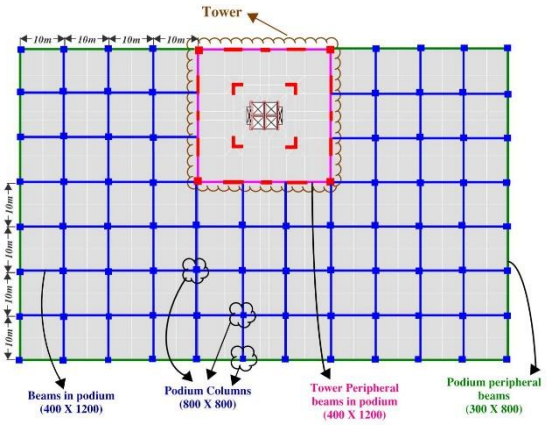


Figure 2.14

Table-16: Case V – (Option - i)

Displacements (mm)	Wind X	340
	Wind Y	365
	Allowable (H/500)	306
	% reduction for Wind X	-30.3
Total moment	My for Wx (kN-m)	1875986
	Mx for Wy (kN-m)	1962242
Moment contribution (Wind X)	Outer core (kN-m)	514020.164
	%	27.40
	Inner core (kN-m)	52527.608
	%	2.8
	Retaining wall (kN-m)	947372.93
	%	50.5
	Podium columns (%)	19.3
Moment contribution (Wind Y)	Outer core (kN-m)	588672.6
	%	30.00
	Inner core (kN-m)	35320.356
	%	1.8
	Retaining wall (kN-m)	1212665.556
	%	61.8
	Podium columns (%)	6.4
Stresses in podium diap.	S11 for Wx (MPa)	3.5
	S22 for Wy (MPa)	4.5
Moments in podium diap.	M11 for Wx (kN-m)	23
	M22 for Wy (kN-m)	26
Axial forces in podium diap.	F11 for Wx (kN/m)	309
	F22 for Wy (kN/m)	393

From analysis results as tabulated in Table-16, it is observed that podium is contributing by around 30% in tower displacement which is more than previous all cases, but this is an increase by just 1.7% from previous Case – IV (Option – i). Simultaneously the strutting forces are increased by 15%.

Option – (ii) Flat slab with columns at 10 m distance

Now in this model beams in podium are removed as shown in Figure 2.15

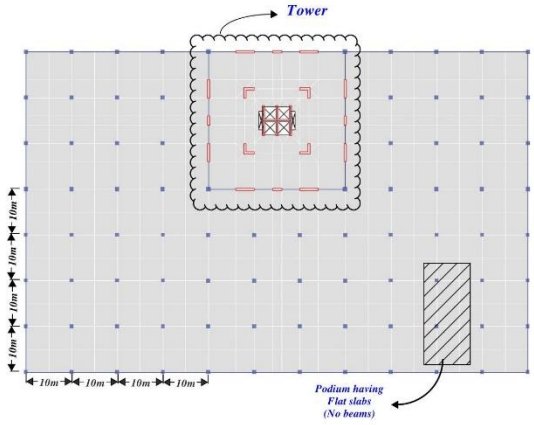


Figure 2.15

Table-16: Case V – (Option - ii)

Displacements (mm)	Wind X	378
	Wind Y	395
	Allowable (H/500)	306
	% reduction for Wind X	-22.5
Total moment	My for Wx (kN-m)	1875986
	Mx for Wy (kN-m)	1962242
Moment contribution (Wind X)	Outer core (kN-m)	761650.316
	%	40.60
	Inner core (kN-m)	71287.468
	%	3.8
	Retaining wall (kN-m)	769154.26
	%	41.0
	Podium columns (%)	14.6
Moment contribution (Wind Y)	Outer core (kN-m)	704444.878
	%	35.90
	Inner core (kN-m)	35320.356
	%	1.8
	Retaining wall (kN-m)	1110628.972
	%	56.6
	Podium columns (%)	5.7
Stresses in podium diap.	S11 for Wx (MPa)	3
	S22 for Wy (MPa)	3.1
Moments in podium diap.	M11 for Wx (kN-m)	33
	M22 for Wy (kN-m)	35
Axial forces in podium diap.	F11 for Wx (kN/m)	235
	F22 for Wy (kN/m)	260

It is observed from Table-16 that the tower drift is reduced by 22.5%, which is just 1% more than that of Case – II (Option – i). It is noted that increase in size of podium from 10 m width to 40 m width has effective contribution with its first bay only, further increase in number of bays with columns at 10 m distance has negligible contribution in tower displacement. Strutting forces are also reduced by 44% when compared with previous Option – i

Option – (iii) Flat Plate with Columns at 5 m design:

This model has columns at 5 m distance as shown in Figure 2.16, from this large sized podium model it is understood that in flat slabs framing action is more if columns are near.

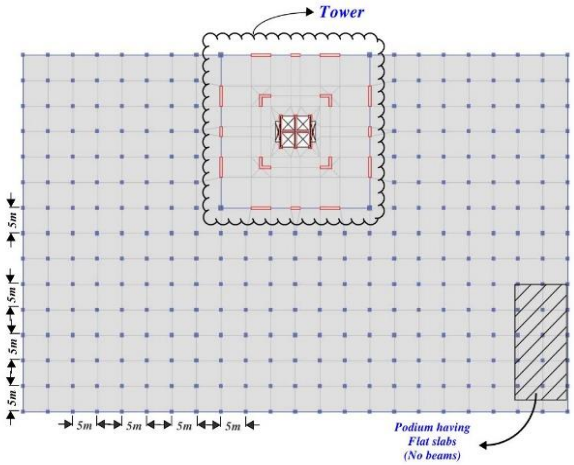


Figure 2.16

Table-17: Case V – (Option - iii)

Displacements (mm)	Wind X	343
	Wind Y	369
	Allowable (H/500)	306
	% reduction for Wind X	-29.7
Total moment	My for Wx (kN-m)	1875986
	Mx for Wy (kN-m)	1962242
Moment contribution (Wind X)	Outer core (kN-m)	510268.192
	%	27.20
	Inner core (kN-m)	50651.622
	%	2.7
	Retaining wall (kN-m)	874209.476
	%	46.6
	Podium columns (%)	23.5
Moment contribution (Wind Y)	Outer core (kN-m)	588672.6
	%	30.00
	Inner core (kN-m)	33358.114
	%	1.7
	Retaining wall (kN-m)	1008592.388
	%	51.4
	Podium columns (%)	16.9
Stresses in podium diap.	S11 for Wx (MPa)	4.49
	S22 for Wy (MPa)	6.5
Moments in podium diap.	M11 for Wx (kN-m)	37
	M22 for Wy (kN-m)	40
Axial forces in podium diap.	F11 for Wx (kN/m)	378
	F22 for Wy (kN/m)	546

From Table-17 it is observed that displacement is controlled by around 30%, which is just 1.2% more than the model in Case – IV (Option – iii). It shows that the contribution in displacement is increased by around 6% to 7% when compared with (Option – ii) of all cases. At the same time strutting forces are increased by around 55%. This is clearly because of more framing action.

Option – (iv) Flat Plate with Columns at varying Distance:

The assemblage of podium-tower is as shown in Figure 2.17. Columns in podium are at varying distances. First two bays are at 5 m distance, next two bays are at 7.5 m and last bay is at 10 m. Total width of podium is 35 m.

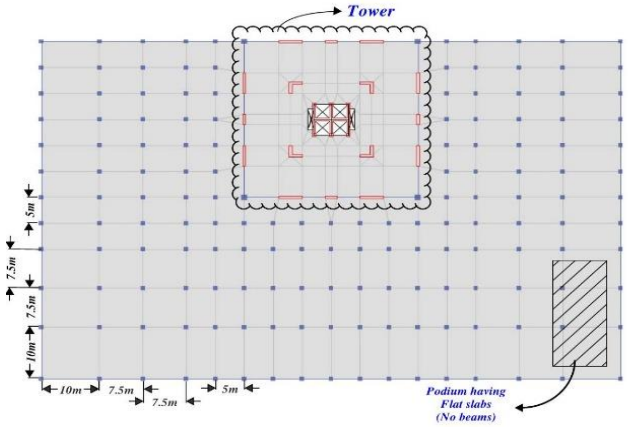


Figure 2.17

Table-18: Case V – (Option - iv)

Displacements (mm)	Wind X	347
	Wind Y	373
	Allowable (H/500)	306
	% reduction for Wind X	-28.9
Total moment	My for Wx (kN-m)	1862704
	Mx for Wy (kN-m)	1940678
Moment contribution (Wind X)	Outer core (kN-m)	541488.0528
	%	29.07
	Inner core (kN-m)	63331.936
	%	3.4
	Retaining wall (kN-m)	745081.6
	%	40.0
	Podium columns (%)	27.5
Moment contribution (Wind Y)	Outer core (kN-m)	641588.1468
	%	33.06
	Inner core (kN-m)	36872.882
	%	1.9
	Retaining wall (kN-m)	1036322.052
	%	53.4
	Podium columns (%)	11.6
Stresses in podium diap.	S11 for Wx (MPa)	4.6
	S22 for Wy (MPa)	4.9
Moments in podium diap.	M11 for Wx (kN-m)	39
	M22 for Wy (kN-m)	43
Axial forces in podium diap.	F11 for Wx (kN/m)	350
	F22 for Wy (kN/m)	418

From analysis results as shown in Table-18, it is observed that strutting forces are slightly reduced but there is also increase in tower displacement by 2%. This assemblage is having very nominal effect on displacement. Therefore, it can be suggested that size of podium can be restricted and some structural elements can be introduced in podium to limit tower displacement and reduce strutting forces.

Case VI – Podium with Outriggers in 9th and 10th floors at Podium-Tower Junction:

Outriggers are improvised form of frames which are very deep beams of single storey height between two columns. These are very effective in controlling drifts of tall buildings. As the study is about interface diaphragm, so the outriggers are introduced on 9th and 10th storeys of podium at podium-tower junction as shown in Figure 2.18. Size of podium is restricted to 17.5 m width.

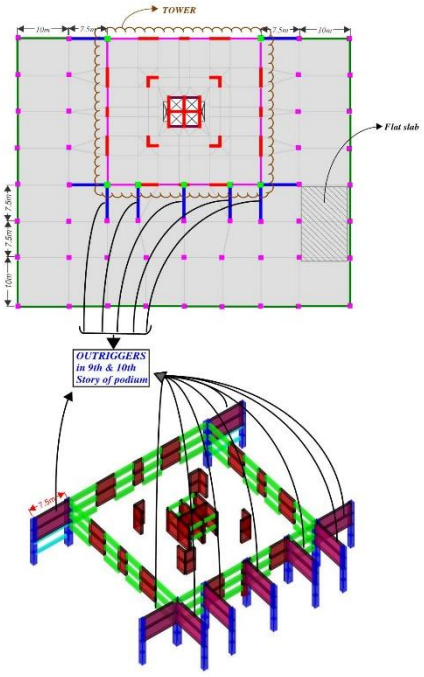


Figure 2.18

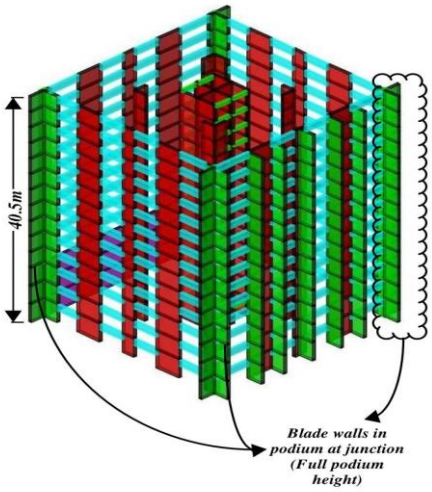
The analysis results from Table-19 revealed that the outriggers are very effective in controlling tower drift as it percentage contribution is around 32%, which is even not satisfying the allowable limit of displacement for lateral wind load. On the other hand, this podium configuration with outriggers has reported tremendous increase in in-plane strutting forces at interface level slab, which is 50% more than that of same podium size without outriggers as discussed in Case – III (Option – iv).

Table-19: Case VI

Displacements (mm)	Wind X	330
	Wind Y	344
	Allowable (H/500)	306
	% reduction for Wind X	-32.4
Total moment	My for Wx (kN-m)	1831418
	Mx for Wy (kN-m)	1867895.00
Moment contribution (Wind X)	Outer core (kN-m)	431452.6
	%	23.56
	Inner core (kN-m)	67799.3
	%	3.7
	Retaining wall (kN-m)	765826.3
	%	41.8
	Podium columns (%)	30.9
Moment contribution (Wind Y)	Outer core (kN-m)	413598.0
	%	22.14
	Inner core (kN-m)	29010.7
	%	1.6
	Retaining wall (kN-m)	1021458.6
	%	54.7
	Podium columns (%)	21.6
Stresses in podium diap.	S11 for Wx (MPa)	7.5
	S22 for Wy (MPa)	5.8
Moments in podium diap.	M11 for Wx (kN-m)	22
	M22 for Wy (kN-m)	33
Axial forces in podium diap.	F11 for Wx (kN/m)	610
	F22 for Wy (kN/m)	504

Case VII – Podium with Extended Blade Walls at Podium-Tower Junction

This case is studied by introducing structural walls in podium at podium-tower junction to minimize strutting forces in podium-tower interface level diaphragm and also meet the allowable tower displacement. These are extended walls from either columns or existing walls as shown in Figure 2.19. As these are extended, we can call it as extended blade walls. These walls are extended up to 3.5 m length away from tower in perpendicular direction to the face of podium casted right from base to last storey of podium.



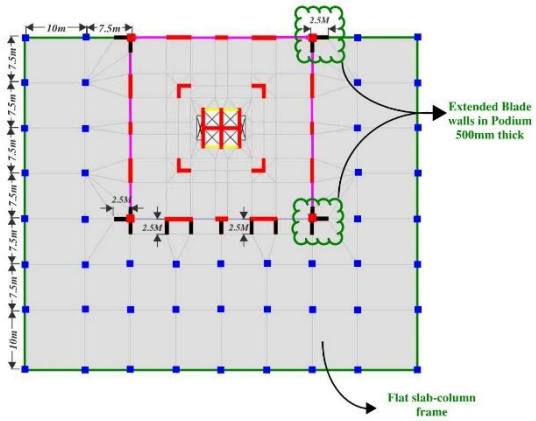


Figure 2.19

Table-20: Case VII

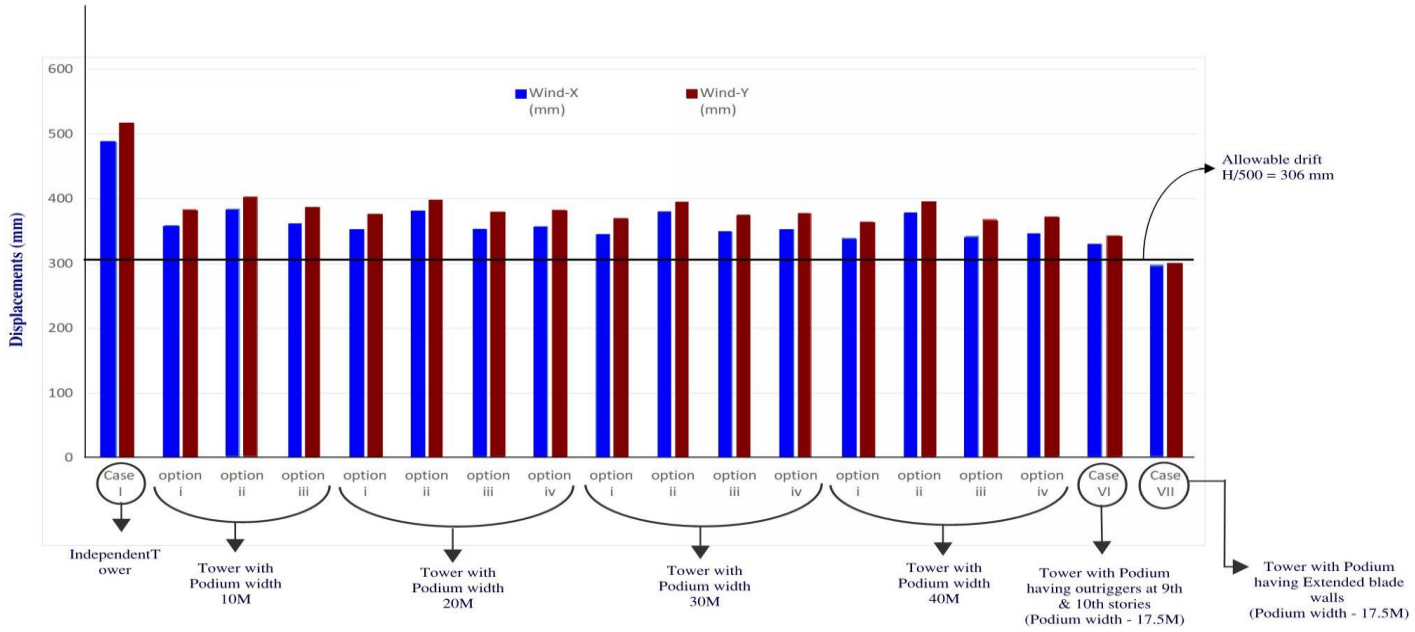
Displacements (mm)	Wind X	299
	Wind Y	301
	Allowable (H/500)	306
	% reduction for Wind X	-41.7
Total moment	My for Wx (kN-m)	1833706
	Mx for Wy (kN-m)	1857792.00
Moment contribution (Wind X)	Outer core (kN-m)	387518.2
	%	21.13
	Inner core (kN-m)	61510.6
	%	3.4
	Retaining wall (kN-m)	645814.7
	%	35.2
	Podium columns (%)	14.5
	Blade walls (%)	25.8
Moment contribution (Wind Y)	Outer core (kN-m)	297726.6
	%	16.03
	Inner core (kN-m)	26575.0
	%	1.4
	Retaining wall (kN-m)	974819.1
	%	52.5
	Podium columns (%)	3.1
	Blade walls (%)	27
Stresses in podium diap.	S11 for Wx (MPa)	2.33
	S22 for Wy (MPa)	2.2
Moments in podium diap.	M11 for Wx (kN-m)	30
	M22 for Wy (kN-m)	32
Axial forces in podium diap.	F11 for Wx (kN/m)	155
	F22 for Wy (kN/m)	135

The analysis results from Table-20 are satisfying both parameters, drift at top of tower and strutting forces at interface diaphragm. Tower displacement is under allowable limit and diaphragm forces are less comparatively with all the cases studied so far.

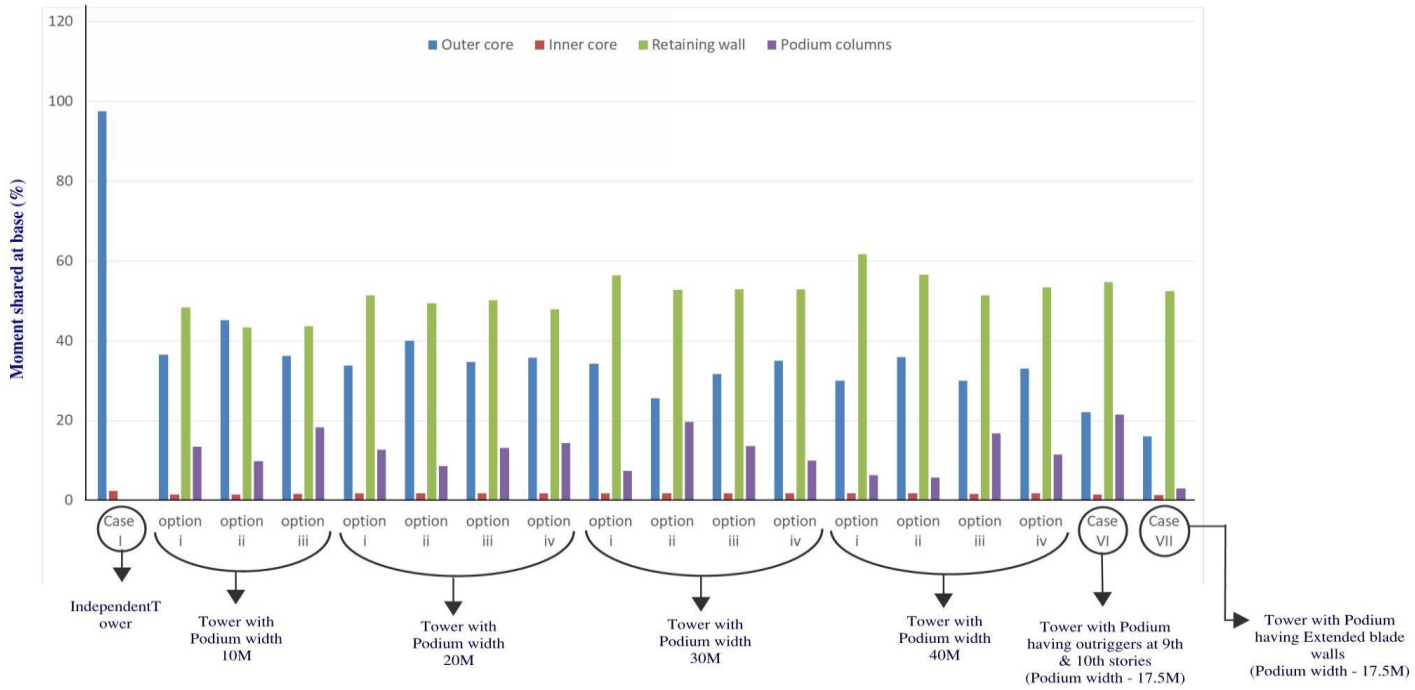
3. COMPARATIVE RESULTS

The comparative results after performing sensitivity analysis of podium-tower interaction emphasizing on podium structure are discussed in subsequent sections.

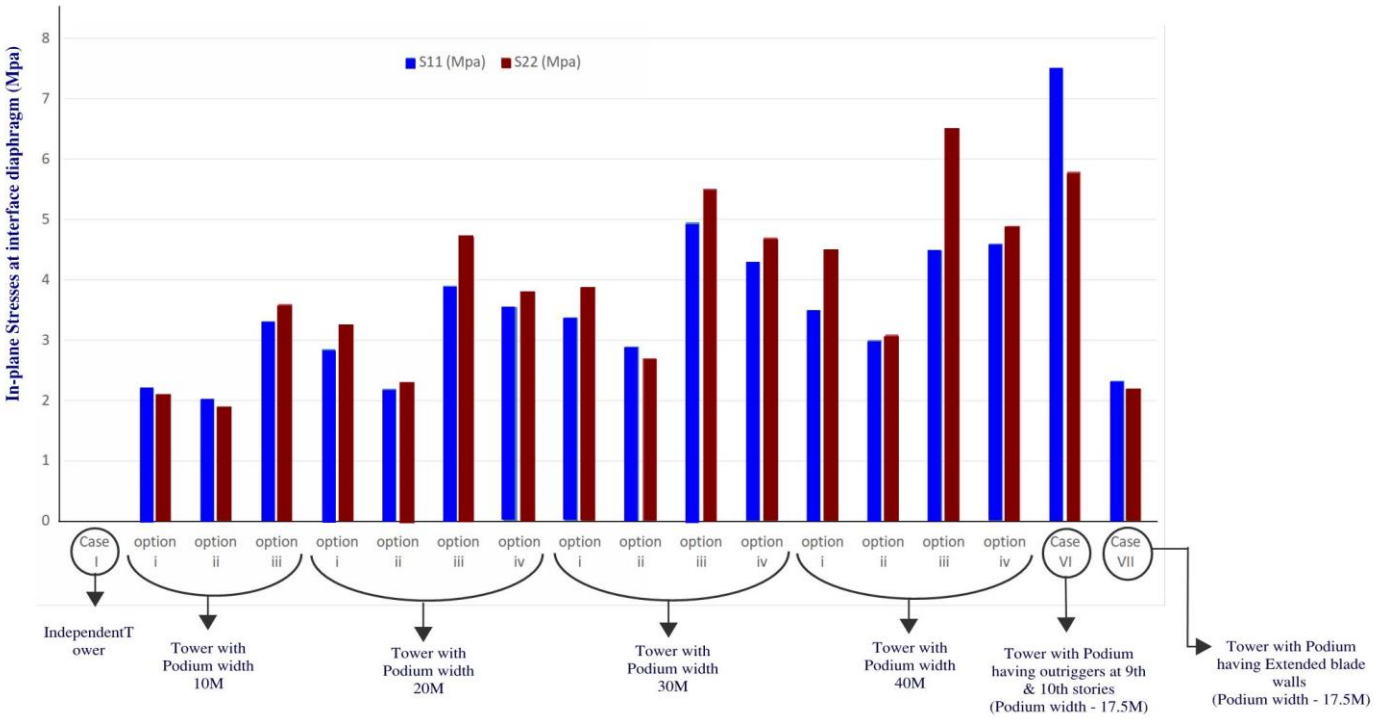
3.1 Comparison of displacements at top of tower



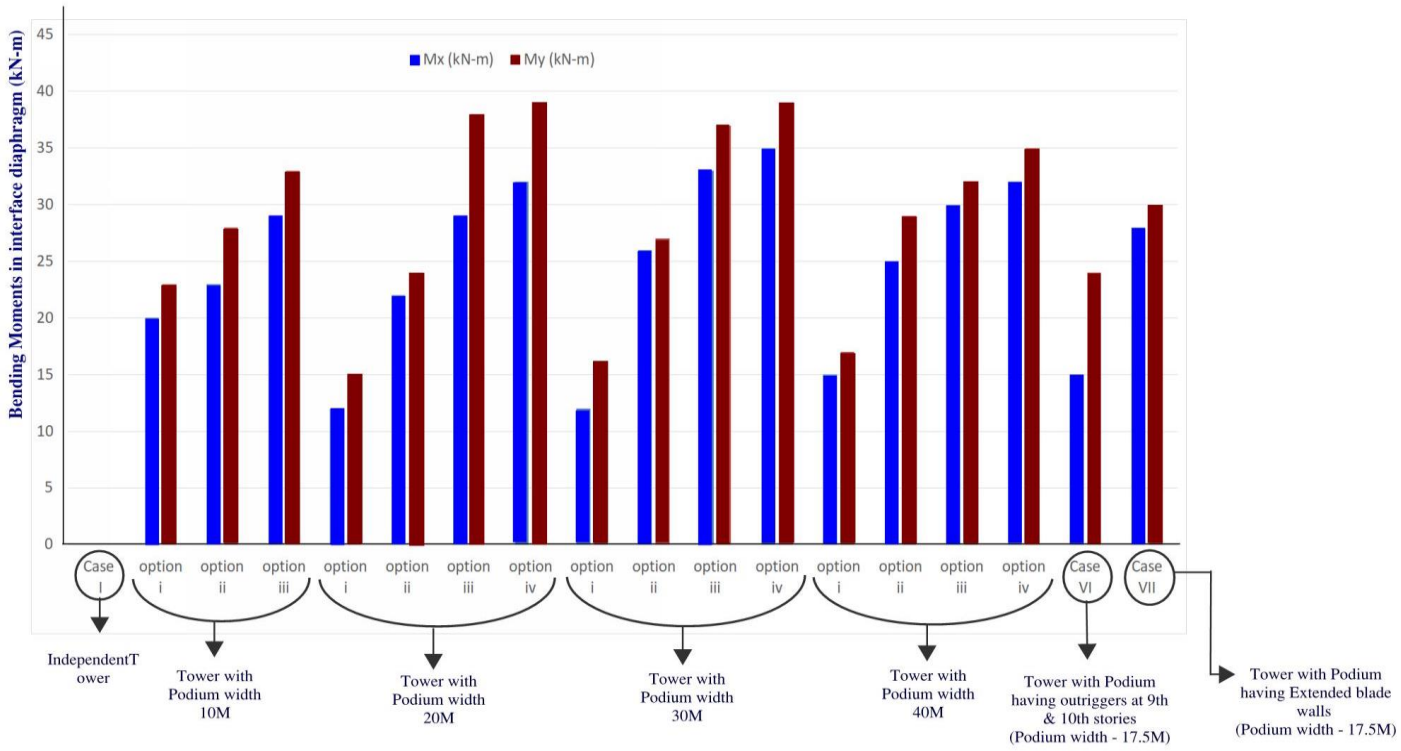
3.2 Moments shared at base of building



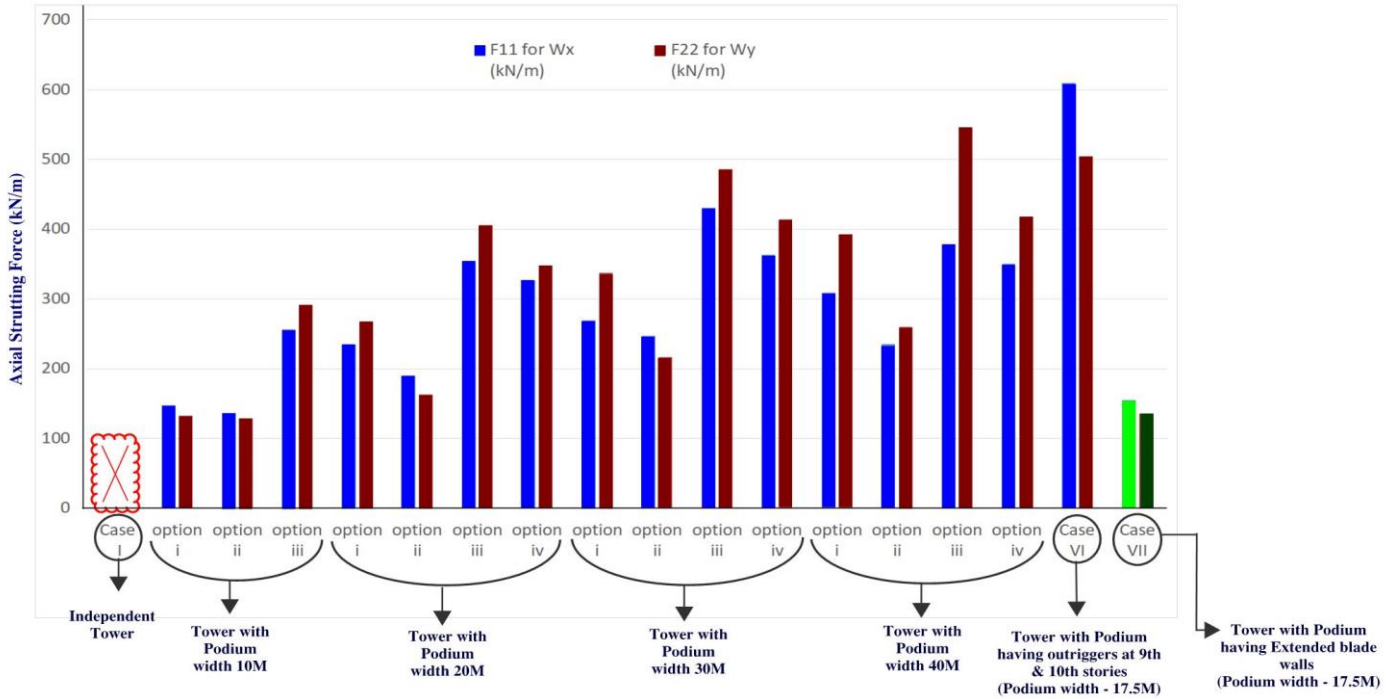
3.3 Comparison of stresses at interface level



3.4 Bending moments in interface diaphragm



3.5 Comparison of axial strutting forces in slab at podium-tower interface



4. CONCLUSIONS

The conclusions drawn from the numerical studies on podium structures are shown below. The results of linear analysis are varying from non-linear analysis, but the percentage difference of these results from model to model in linear analysis are almost similar to that of the non-linear analysis. Therefore, the specific conclusions are drawn from non-linear analysis, as it is recommended for tall buildings.

i. Podiums do contribute in reducing tower displacements. Almost 90% of this contribution is associated with its first bay around the tower.

ii. The increase in size of podium has nominal impact on tower drift. For Wind-Y tower displacement is 516 mm. Addition of first bay of podium reduced it to 384 mm (about 26.2%) and addition of next four bays reduced it to 360 mm (about 30.3%) which is 4% more reduction for 40 m wide podium.

iii. The strutting forces in podium diaphragm increase with increase in framing action. When columns are at 10 m distance the strutting forces are 260 kN/m and for 5 m distance it is 546 kN/m which is about 50% more.

iv. The flat slabs have less framing action than beam-slabs. Therefore, the flat slab system contributes less in control of tower displacement and also reports less strutting forces than the beam-column systems.

v. The outriggers in podium has reduced 32% of tower drift but increased strutting forces by 50%. This is due to increase in framing action.

vi. The extended blade walls in podium at podium-tower junction are very effective in controlling the tower drift to allowable limit (41.7% of displacement is reduced) and minimizing the framing actions at the same time, resulting in very less strutting forces of 135 kN/m at interface diaphragm.

vii. The moments shared by retaining walls at the base due to lateral loads is around 50%, which is more than any other structural element in the building for all cases.

viii. The podium columns in assemblage with outriggers exhibit more moment contributions at base than all other cases, which is around 22%.

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Investigation and Approach of G+8 Building with Contrast the Results by using Staad.Pro and Etabs

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Abstract: ***Structural analysis (calculating load coming on every member) is one of the most difficult and time consuming process. One single error can lead to life and money loss. STAAD. Pro and ETABS helps in analysis and designing (choosing size of member for coming load) of structures with very less time. Etabs is good for the designing a reinforced concrete structure. The user interface is easy and the analysis values of RC structures are better and we get economical steel data from etabs. Staad Pro is good for the analysis of steel structures frames as the codes and user interface is better integrated in staad pro. In this project we analyzing the G+8 building for finding the shear forces, Base shear, Bending moments, deflection and reinforcement. This project mainly deals with the comparative analysis of the results obtained by designing of a regular and a plan irregular (as per IS 1893) multi storey building structure designed separately using STAAD. Pro and Etabs softwares.***
Keywords: Sructural analysis, Regular and irregular, frame work, staad.pro, etabs.

I. INTRODUCTION

During an earthquake, failure of structure starts at elements of weak point. This weakness develops because of stoppage in mass, strength and also geometry of structure. The structures having this deduction are described as uneven frameworks. Uneven structures add a large portion of city framework. Upright irregularities are just one of the substantial variables of failings of structures throughout earthquakes. For instance a structure with soft floor was among one of the most significant frameworks which collapsed. So, the result of up and down abnormalities in the seismic effectiveness of structures winds up being really essential. Height-wise adjustments in stiffness in addition to mass render the vibrant attributes of these structures various from the regular framework. IS 1893 definition of Backwards and forwards unequal frame work. The abnormality in the structure frameworks could be due to irregular blood circulations in their mass, toughness along with tightness along the altitude of framework. When such frameworks are created in high seismic areas, the analysis and additionally design winds up being far more challenging. There are 2 types of irregularities.

1) Plan irregularities
2) Vertical Irregularities

A. Plan Irregularities

To offer first rate all-natural light and air float and to have an exceptional out of doors view from all the spaces, the designers set up very complex strategy shapes with re-entrant corners, floor slab reduce-outs, and additionally asymmetry These abnormalities are desirable to confined degree, however name for specific factor to remember in evaluation in addition to format, that's generally in no way made. In case of RC systems, now not just the method should be of ordinary shape, the arrangement of lateral load withstanding vertical additives ought to additionally be symmetrical.

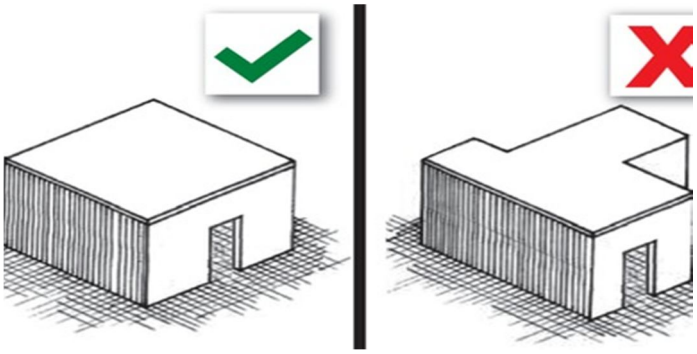

Figure1.1: Plan irregularities

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B. Vertical Irregularities

Vertical Abnormalities are especially of five kinds-.

1) *Stiffness Irregularity:* Soft Storey-A tender ground is one in which the lateral pressure is much less than 70 percent of the storey above or less than eighty percentage of the commonplace side stiffness of the three flooring above.
2) *Stiffness Abnormality:* Extreme Soft Storey-An immoderate smooth storey is one wherein the lateral pressure is much less than 60 percent of that in the floor above or much less than 70 percentage of the typical tightness of the 3 flooring over.
3) Mass irregularities
4) Vertical geometric irregularity



Figure1.2: Mass irregularities

II. OBJECTIVE OF THE STUDY

The following objectives are set in this study:

A. To accomplish modeling as well as assessment of G+ 8 R.C. framed frameworks utilizing STAAD-PRO & ETABS.
B. To Design ass per IS-456 & IS-1893:2002, a regular and irregular multi-storey structure.
C. To calculate shear forces, bending moments and reinforcing details for the buildings structural components (beams and columns) and compare the results.
D. To determine the economic section of the G+8 structure with both software.

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III. MODELLING OF G+8 STRUCTURE

In the recent time, Civil and Structural softwares analysis is more affectively used in analysis and design of different civil engineering. In this work we are using Staad Pro and Etabs softwares and analyzed structures as per IS 1893:2002. The following steps are adopted:

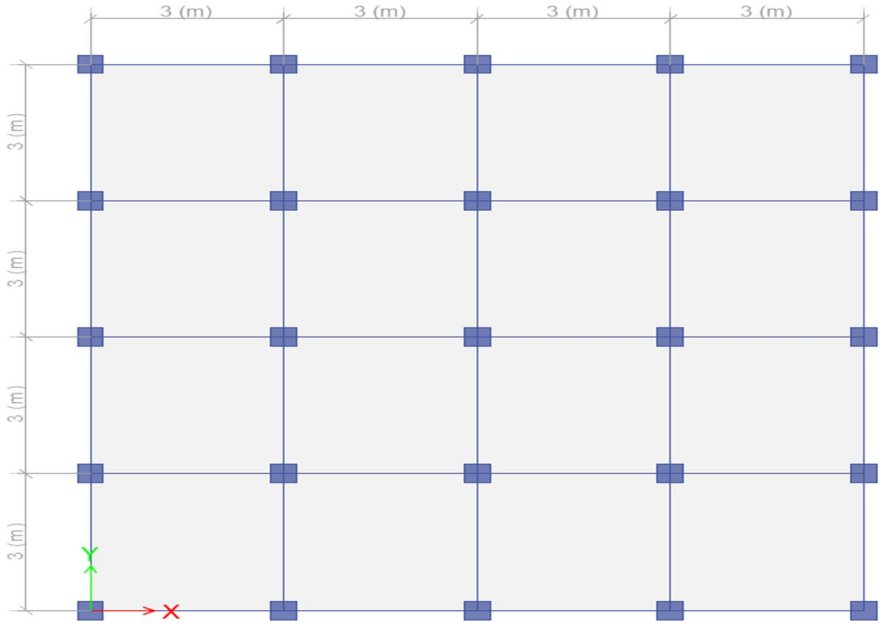
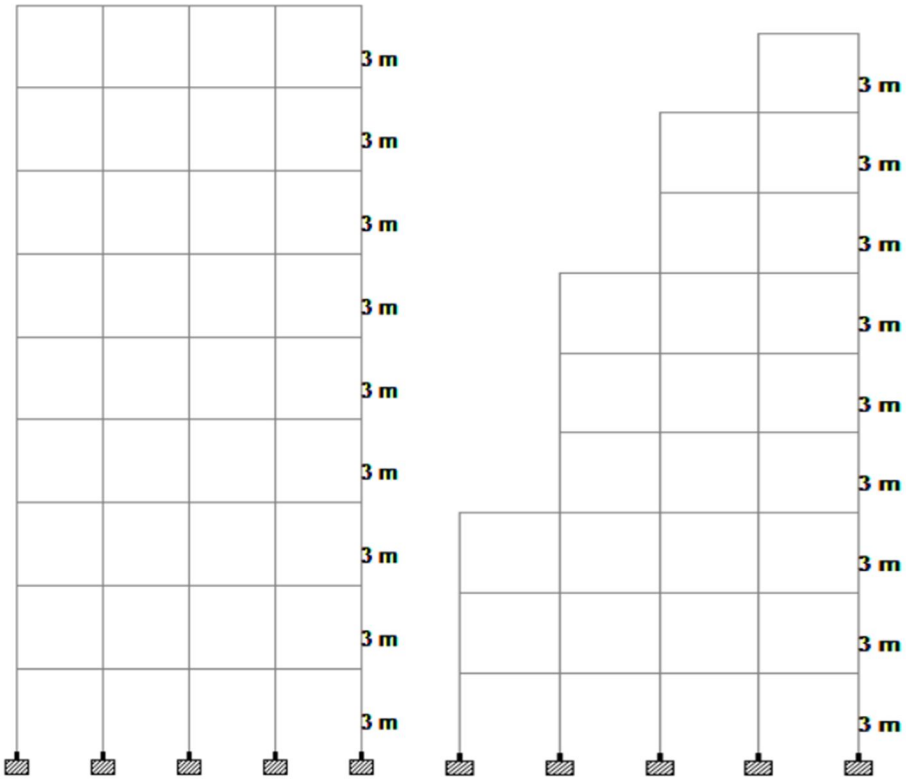


Figure2.1: Plan of G+8 Building



Regular Structure Irregular Structure

Figure2.2: Elevation of 2-Models

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A. Preliminary Data

Type of frame :Ordinary RC moment resisting frame fixed at the base, Seismic zone :II , Number of storeys:9, Floor height:3m , Plinth height:1.5m, Depth of Slab:125 mm, Spacing between frames:3m along both directions, Live load on floor level:3 KN/m^2, Live load on roof level:1.5 KN/m^2, Floor finish:1.0 KN/m^2, Terrace water proofing:1.5 KN/m^2, Thickness of infill wall :230mm (Exterior walls),Thickness of infill wall:150mm (Interior walls), Density of concrete:25 KN/m^2, Density of infill:20 KN/m^2,Type of soil: Rocky , Response spectra :As per IS 1893(Part1):2002, Damping of structure:5 %

B. Material Detail and Section Properties

Beam of lighting: 230 mmx400mm, Columns: 400mmx400mm, Material homes of the shape resemble M20 grade of concrete, FE415 metal and also 13800 N/mm2 of modulus of elasticity of block stonework within the homes.

Live load on floor level and roof level are taken from IS-875 (Part-) considered RC framed buildings as residential usage.

IV. RESULTS AND DISCUSSION

A. General

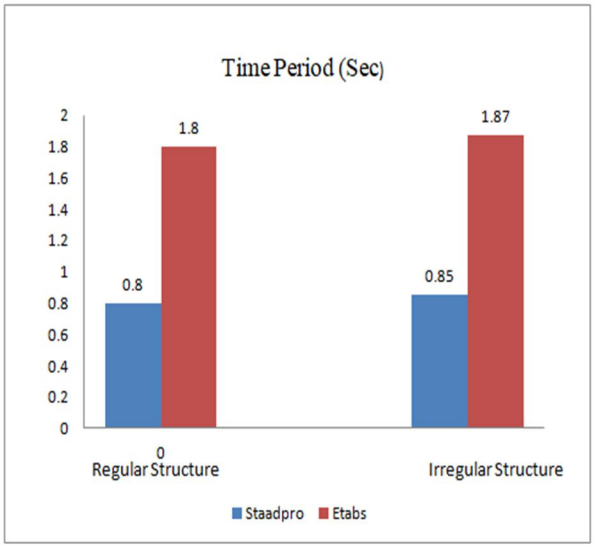
The results obtained in this work were discussed in this paper. The building models are subjected to dead load , live load, seismic forces and load combinations in order to understand the behavior of the G+8 building and their responses are observed. Time period and base shear for static loads were parameters studied. Similarly, bending moment, shear force and descriptions of reinforcement are studied.

B. Comparison of Base shear and Time period

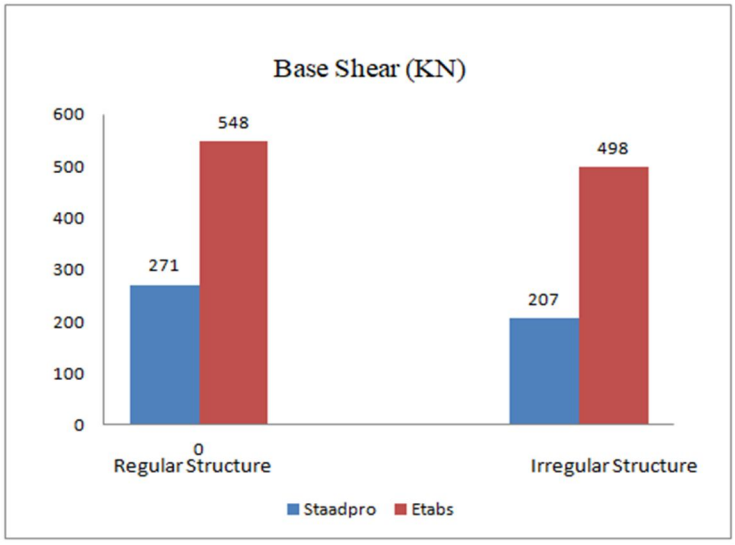
The static analysis is done for three forms of models. The Table1 indicates variations within the Base shear and Time period for the 2models.

Table1 Comparison of Base shear and Time period

Model	Softwares	Base Shear (KN)	Time Period (Sec)
Regular	Staad Pro	272.40	0.80
Irregular		270	0.85
Regular	Etabs	549	1.80
Irregular		499	1.87



Comparison of Time Period



Comparison of Base Shear

Comparison of Base shear and Time period

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C. Bending Moment, Shear force, Axial force Comparision for Regular Structure

Table 2 Comparison of bending moment and shear force

Load Combinations	STAADPRO		ETABS	
	Bending Moments	Shear Force	Bending Moments	Shear Force
1.5(D.L+L.L)	22.40	44.05	11.7	32.4
1.2(D.L+L.L+EQX)	17.91	35.23	9.8	25
1.2(D.L+L.L+EQZ)	38.03	49.36	33.1	44.6
1.2(D.L+L.L-EQX)	17.93	35.25	11.5	28.8
1.2(D.L+L.L-EQZ)	40.52	49.6	32.2	45.25
1.5(D.L+EQX)	19.4	38.94	10.5	27.4
1.5(D.L+EQZ)	44.91	56.8	39.6	52.3
1.5(D.L-EQX)	19.31	38.9	12.7	32.3
1.5(D.L-EQZ)	47.29	56.69	38.6	53
0.9D.L+1.5EQX	11.61	23.3	8.6	16
0.9D.L+1.5EQZ	37.18	41.3	35.6	40.5
0.9D.L-1.5EQX	11.58	23.26	10.8	20.8
0.9D.L-1.5EQZ	39.68	41.19	34.6	41.8

Table 3 Axial Force of sample Column (Regular Structure) for Different Load Combinations

Load combinations	STAAD PRO	ETABS
	Axial force	Axial force
1.5(D.L+L.L)	989.50	964.80
1.5(D.L+L.L+EQX)	695.59	593.20
1.5(D.L+L.L+EQZ)	695.59	950.50
1.5(D.L+L.L-EQX)	887.74	950.50
1.5(D.L+L.L-EQZ)	887.74	593.30
1.5(D.L+EQX)	757.65	641.70
1.5(D.L+EQZ)	757.65	1088
1.5(D.L-EQX)	997.90	1088
1.5(D.L-EQZ)	997.90	641.70
0.9D.L+1.5EQX	405.60	296.60
0.9D.L+1.5EQZ	405.60	743.20
0.9D.L-1.5EQX	647.60	743.20
0.9D.L-1.5EQZ	647.60	296.50

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D. Reinforcement Details For Beam And Column For Regular Structure

Table 4: Beam Concrete Design for Regular Structure In Staad Pro

Section(mm)	0	750	1500	2250	3000
Top Reinforcement	325.5	174.84	0	174.84	304.13
Bottom Reinforcement	174.84	174.84	174.84	174.84	174.84

Table 5: Beam Concrete Design for Regular Structure In Etabs(Required bars)

Section	Left	Middle	Right
Top Reinforcement(mm^2)	627	266	634
Bottom Reinforcement(mm^2)	333	266	356

Table 6: Column Reinforcement Details for Regular Structure

	STAAD PRO	ETABS
Required steel Area(mm^2)	701	1280
Provided steel Area (mm^2)	904.8	1280

E. Bending Moment And Shear Force Comparision For Irregular Structure

Table 7: Comparison of Bending moment and Shear force (Irregular Structure)

Load Combinations	STAADPRO		ETABS	
	Bending Moments	Shear Force	Bending Moments	Shear Force
1.5(D.L+L.L)	23.66	44.92	12.12	32.3
1.2(D.L+L.L+EQX)	18.93	35.94	9.9	25.01
1.2(D.L+L.L+EQZ)	26.59	41.32	26.36	39.4
1.2(D.L+L.L-EQX)	18.92	35.93	11.5	28.6
1.2(D.L+L.L-EQZ)	24.96	39.69	26.5	40.3
1.5(D.L+EQX)	20.6	39.81	10.6	27.5
1.5(D.L+EQZ)	30.17	46.53	31.3	45.6
1.5(D.L-EQX)	20.59	39.8	12.7	32.02
1.5(D.L-EQZ)	28.29	44.6	31.4	46.6
0.9D.L+1.5EQX	12.36	23.84	6.5	16.6
0.9D.L+1.5EQZ	21.94	30.61	27.5	34.4
0.9D.L-1.5EQX	12.35	23.88	8.6	20.5
0.9D.L-1.5EQZ	21.22	29.45	27.2	35.2

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Table 8: Axial Force of sample Column (Irregular Structure) for Different Load Combinations

Load Combinations	STAADPRO	ETABS
	Axial Force	Axial Force
1.5(D.L+L.L)	314.22	323.7
1.2(D.L+L.L+EQX)	215.5	184.7
1.2(D.L+L.L+EQZ)	227.2	330.19
1.2(D.L+L.L-EQX)	287.2	333.15
1.2(D.L+L.L-EQZ)	275.5	187.7
1.5(D.L+EQX)	238.3	198.3
1.5(D.L+EQZ)	252.9	383.84
1.5(D.L-EQX)	327.9	202.15
1.5(D.L-EQZ)	313.2	380.5
0.9D.L+1.5EQX	125	81.9
0.9D.L+1.5EQZ	139.7	264.11
0.9D.L-1.5EQX	214.6	267.8
0.9D.L-1.5EQZ	200	85.6

F. Reinforcement Details For Beam And Column For Irregular Structure

Table 9 : Beam Concrete Design for Irregular Structure In Staad Pro

Section(mm)	0	750	1500	2250	3000
Top Reinforcement	197	173.83	0	173.83	210.3
Bottom Reinforcement	0	173.83	173.83	173.83	0

Table 10: Beam Concrete Design for Irregular Structure In Etabs (Required bars)

Section	Left	Middle	Right
Top Reinforcement(mm^2)	495	188	517
Bottom Reinforcement(mm^2)	218	224	238

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Table 11: Column Reinforcement Details for Regular Structure

	STAAD PRO	ETABS
Required steel Area(mm^2)	225.45	1280
Provided steel Area (mm^2)	904.8	1280

V. CONCLUSION

The analytic study is carried out in order to compare the behaviour of regular structure with irregular structure by using STAAD.PRO & ETABS. The structures are designed using IS: 456:2000 and IS 1893:2002 codes. From the study the following conclusions are obtained.

Compared to the ETABS software, STAAD.Pro software is more flexible to work. This is because ETABS has many input requirements that in the initial stage might be difficult to understand.

From the Beams, Columns design results, we can conclude that Staad pro gave less required area than Etabs.

The frame elements of regular structure showed maximum bending moments, shear forces and axial force among the two structures considered (Regular and Irregular structure).

In building design using both STAAD.Pro and Etabs analysis the quantity of provided steel is same.

Economic section are developed using Staad.pro and Etabs through the comparative analysis and design analysis of G+8 building.

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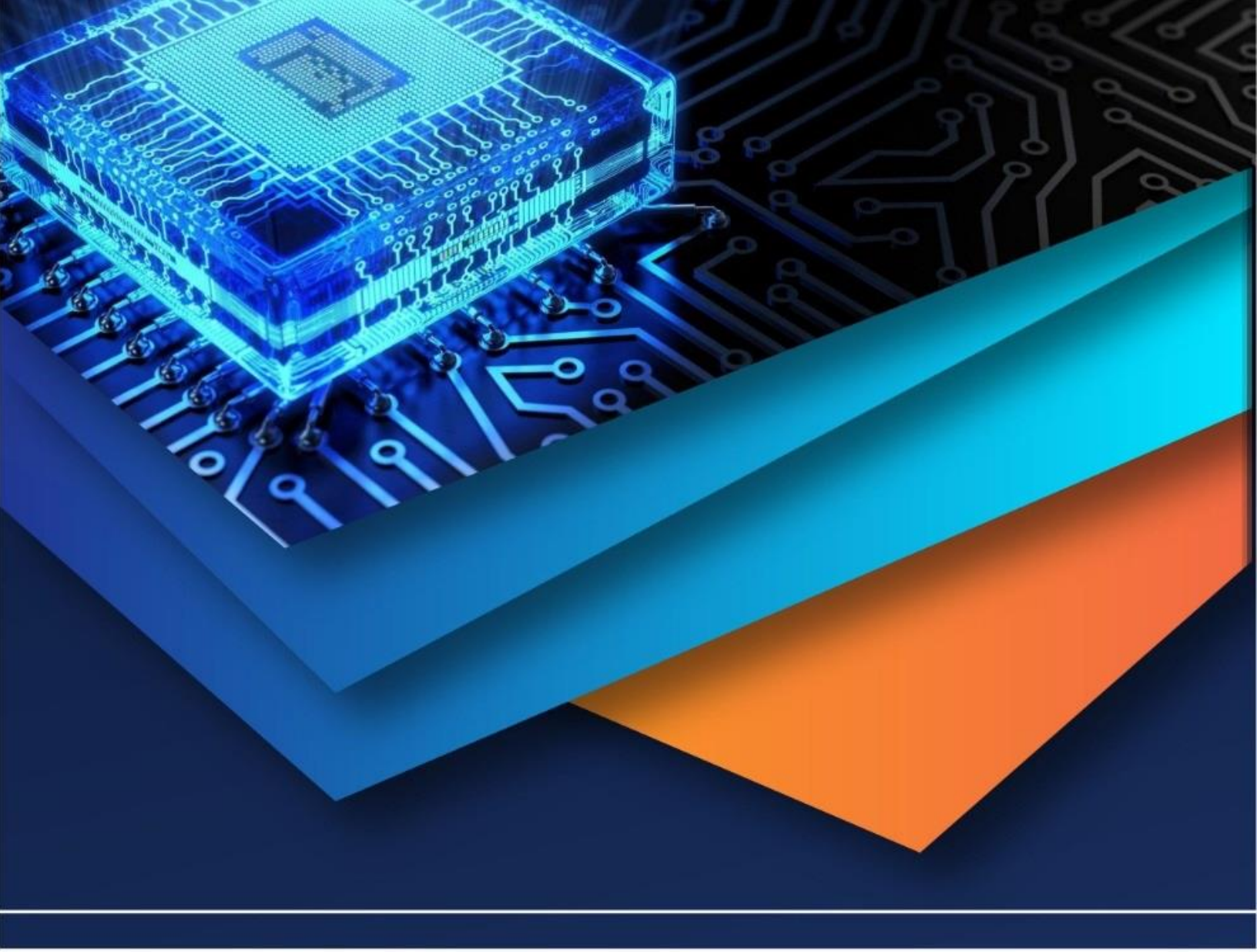

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Performance of the Building in Different Seismic Zones

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[1, 2]*Civil Engineering Department, Malla Reddy Engineering College, Hyderabad*

Abstract: ***Earthquake, any sudden shaking of the ground caused by the passage of seismic waves through earth's rocks. Seismic waves are produced when some form of energy stored in Earth's crust is suddenly released Hundreds of thousands of people have been killed by earthquakes despite scientists being able to predict and forewarn in advance and engineers construct earthquake-safe buildings.Non-linear analysis is necessary to evaluate the seismic demand of the proposed or existing structure, as linear analysis is inadequate in assessing the seismic demand under severe earthquakes. Pushover analysis is an analysis method to efficiently evaluate the post yield behaviour of the structure. In this article non-linear static analysis (pushover analysis) has been done to understand the behaviour of G+10 multi-storeyed residential building located in different seismic zones (II, III, IV, V) of India having similar geometrical properties using ETABS 2013. The behaviour of multi storied building has been investigated in terms of force-displacement relationships, inelastic behaviour of structure and sequential hinge formations etc. Plastic hinge formation gives real behaviour of the structure.***
Keywords: Non-linear static analysis, different seismic zones, shear, displacement, drift, hinge formation.

I. INTRODUCTION

An earthquake is a trembling or a shaking movement of the ground, caused by the slippage or rupture of a fault within the Earth's crust. A sudden slippage or rupture along a fault line results in an abrupt release of elastic energy stored in rocks that are subjected to great strain. This energy can be built up and stored over a long time and then released in seconds or minutes. Strain on the rocks results in more elastic energy being stored which leads to far greater possibility of an earthquake event. The sudden release of energy during an earthquake causes low-frequency sound waves called seismic waves to propagate through the Earth's crust or along its surface.

Hundreds of thousands of people have been killed by earthquakes despite scientists being able to predict and forewarn in advance and engineers construct earthquake-safe buildings.

Earthquake analysis and design principles are developed due to the earthquake consequences and damage of the structures. Earthquake analysis methods are divided into following four categories

1) Seismic coefficient method (Equivalent linear static analysis)
2) Response spectrum method (Linear dynamic analysis)
3) Pushover method (Non-linear static analysis)
4) Time history analysis (Non-linear dynamic analysis)

Linear static analysis or seismic coefficient method is a conventional elastic design method which doesn't give realistic values when the earthquake is severe.

Non-linear analysis is necessary to capture the response of structures under moderate to extreme earthquakes.

Nonlinear dynamic analysis (Time history analysis) requires site specific ground motion studies. The evaluations of dynamic earthquake parameters are inevitable and on the other hand it is computational, complex, time consuming and not feasible for most of the practical applications.

It is generally believe that the conventional elastic design analysis method cannot capture many important aspects that control the seismic performance of the building.

The capacity of building to undergo inelastic deformations governs the structural behavior of building during seismic ground motions.

For that reason, the evaluation of building should consider the inelastic deformation demanded due to seismic loading.

To estimate seismic demands for building, the structural engineering profession is now using the nonlinear static procedure, known as pushover analysis. It is a commonly used technique, which provides acceptable results.

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II. BUILDING MODELLING ANALYSIS

A G+10 reinforced concrete building is modelled, analysed and studied. The study is carried out in all the seismic zones of India and conclusions are drawn. The input data required for the design of G+10 building are presented in the tables below. Table 1 show the building details such as plan size, total height of the building, floor height and location details such as zone, soil type etc. The factors such as importance factor, response reduction factor values are taken from IS 1893 (Part 1): 2002. Table 2 shows the material properties and section properties. Table 3 shows the loading details on the building for designing.

Table 1 Building & location details

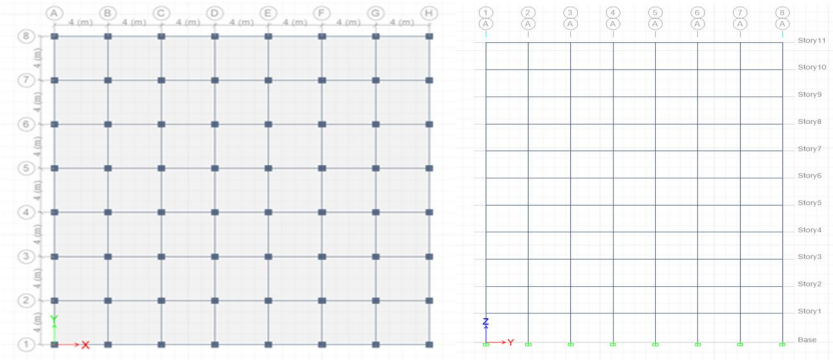
Building type	G+10
Plan size	28m x 28m
Building height	33.2mm
Zone	II, III, IV & V
Soil type	Medium
Damping	5%
Storey height	Ground floor 3.2m, remaining floors 3m.
Bay width	4m
Bays in X and Y direction	7
Support condition	Fixed
Importance Factor, I	1
Response Reduction Factor, R	5(SMRF)

Table 2 Material details and section properties

Beam	300 mm x 400 mm
Column	500mm x 500mm
Slab	150mm
Concrete	M30
Steel	Fe415

Table 3 Loading details for the design

Live load	3 KN/m
Wall load on beams	11.4 KN/m
Floor finishing load	1.2 KN/m
Equivalent lateral loads	As Per IS 1893 (Part I):2002



Plan Elevation

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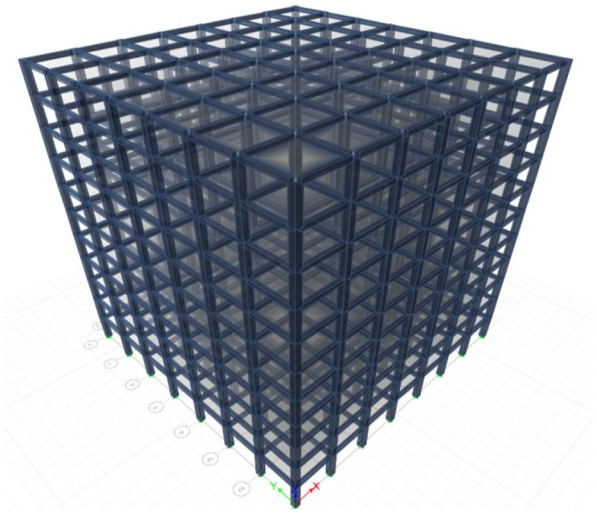


ISO Metric View

III. OBJECTVES AND NEED OF STUDY

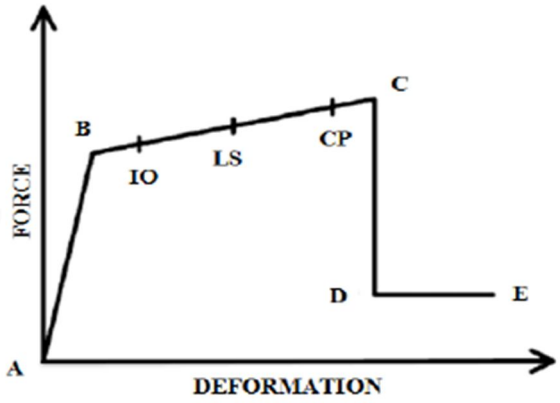
A. Pushover Analysis

The pushover analysis of a structure is a static non-linear analysis under permanent vertical loads and gradually increasing lateral loads. The equivalent static lateral loads approximately represent earthquake induced forces. A plot of the total base shear versus top displacement in a structure is obtained by this analysis that would indicate any premature failure or weakness. The analysis is carried out upto failure, thus it enables determination of collapse load and ductility capacity. On a building frame, and plastic rotation is monitored, and lateral inelastic forces versus displacement response for the complete structure is analytically computed. This type of analysis enables weakness in the structure to be identified. The decision to retrofit can be taken in such studies.

B. Purpose Of The Structure

Pushover analysis is an analysis method to efficiently evaluate the post yield behaviour of the structure.
Pushover Analysis in the recent years is becoming a popular method of predicting seismic forces and deformation demands for the purpose of performance evaluation of existing and new structures.

C. Building Performance Level



1) Point A is the original state (OL) of Structure.
2) Point B represents yielding. No deformation occurs in the hinge up to point B.
3) Point C represents the ultimate capacity/Limit for pushover analysis.
4) Point D represents a residual strength limit in the structure. After this limit Structure initialize collapsing.
5) Point E represents total failure of the structure. After this point hinges breakdown.

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a) *Operational level (OL):* As per this performance level building are expected to sustain no permanent damages. Structure retains original strength and stiffness. Major cracking is seen in partition walls and ceilings as well as in the structural elements.

b) *Immediate occupancy level (IO):* Buildings meeting this performance level are expected to sustain no drift and structure retains original strength and stiffness. Minor cracking in partition walls and structural elements is observed.

c) *Life Safety Level (LS):* This level is indicated when some residual strength and stiffness is left available in the structure. Among the non-structural elements failing hazard mitigates but many architectural and mechanical and mechanical systems get damaged.

d) *Collapse Prevention Level (CP):* Buildings meeting this performance level are expected to have little residual strength and stiffness, but the load bearing structural elements function such as load bearing walls and columns. Building is expected to sustain large permanent drifts, failure of partitions infill and parapets and extensive damage to non-structural elements. At this level the building remains in collapse level.

IV. RESULTS & DISCUSSIONS

A. General

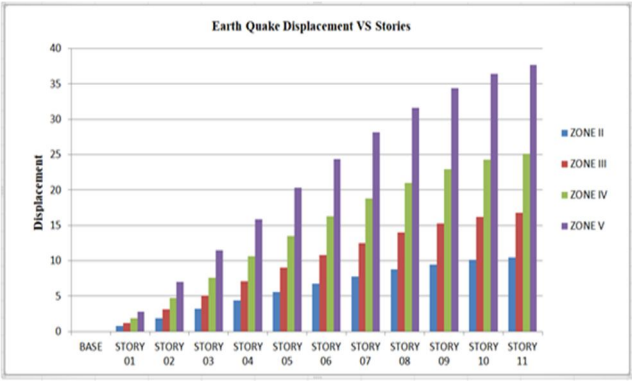
The selected building models are analyzed using pushover analysis. Pushover analysis was performed first by considering response spectrum analysis for defining gravity load case for different seismic zones (II, III, IV& V) and then a lateral pushover analysis was performed in a displacement control manner for zone V.

B. Results from Response Spectrum

Seismic analysis carried out by the help of ETABS and the results of Story Shear, story displacement and story drift from Response spectrum analysis.

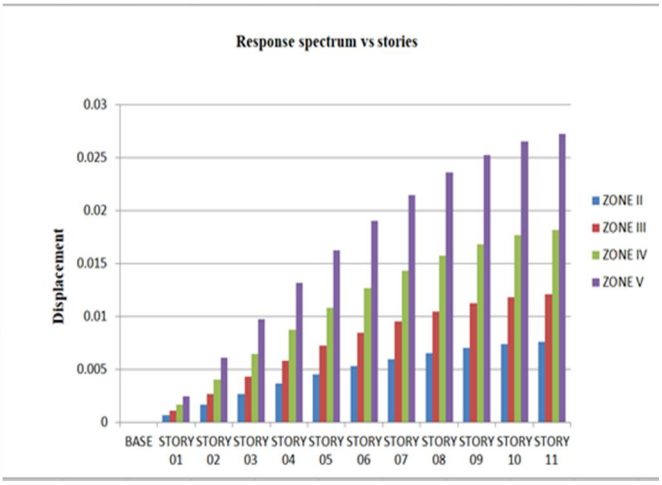
C. Displacement Values for Earth Quake

STORIES	ZONE II	ZONE III	ZONE IV	ZONE V
BASE	0	0	0	0
STORY 01	0.8	1.2	1.9	2.8
STORY 02	1.9	3.1	4.7	7
STORY 03	3.2	5.1	7.6	11.5
STORY 04	4.4	7.1	10.6	15.9
STORY 05	5.6	9	13.5	20.3
STORY 06	6.8	10.8	16.3	24.4
STORY 07	7.8	12.5	18.8	28.2
STORY 08	8.8	14	21	31.6
STORY 09	9.5	15.3	22.9	34.4
STORY 10	10.1	16.2	24.3	36.4
STORY 11	10.5	16.8	25.1	37.7



D. Displacement values for Response Spectrum

STORIES	ZONE II	ZONE III	ZONE IV	ZONE V
BASE	0	0	0	0
STORY 01	0.000688	0.0011	0.00165	0.002475
STORY 02	0.001691	0.002705	0.004057	0.006086
STORY 03	0.002703	0.004324	0.006486	0.009729
STORY 04	0.00365	0.00584	0.00876	0.01314
STORY 05	0.004513	0.00722	0.01083	0.01625
STORY 06	0.005286	0.008457	0.01269	0.01903
STORY 07	0.005966	0.009545	0.01432	0.02148
STORY 08	0.006547	0.01047	0.01571	0.02357
STORY 09	0.007016	0.01123	0.01684	0.02526
STORY 10	0.00736	0.01178	0.01766	0.0265
STORY 11	0.007573	0.01212	0.01817	0.02726



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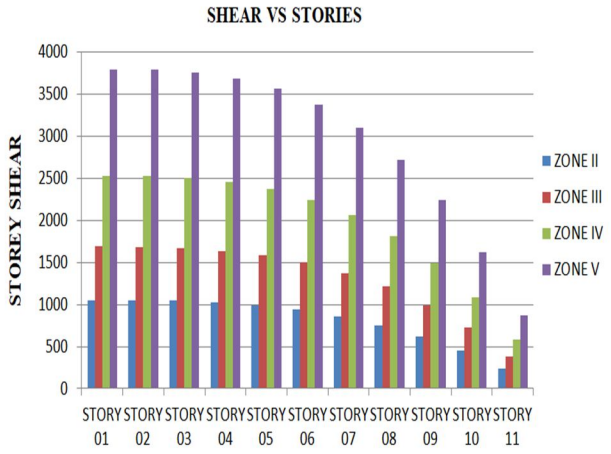
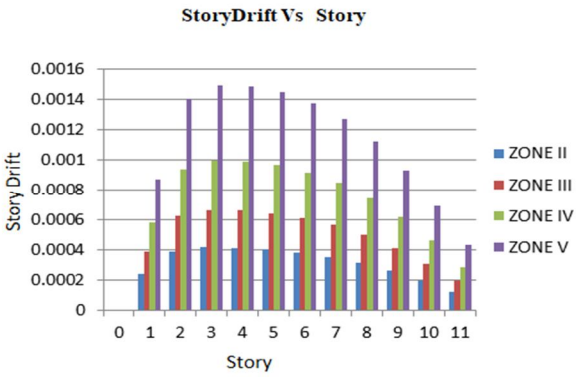
E. Storey Shear

STORY SHEAR	ZONE II	ZONE III	ZONE IV	ZONE V
SYORY 01	1053.543	1685.669	2528.504	3792.756
SYORY 02	1051.179	1681.886	2522.83	3784.244
SYORY 03	1042.334	1667.734	2501.601	3752.401
SYORY 04	1022.857	1636.571	2454.857	3682.286
SYORY 05	988.6075	1581.772	2372.658	3558.987
SYORY 06	935.4429	1496.709	2245.063	3367.594
SYORY 07	859.2212	1374.754	2062.131	3093.197
SYORY 08	755.8006	1209.281	1813.921	2720.882
SYORY 09	621.039	993.6624	1490.494	2235.74
SYORY 10	450.7944	721.271	1081.907	1622.86
SYORY 11	240.9249	385.4798	578.2196	867.3295



F. Storey Drift

STORY	ZONE II	ZONE III	ZONE IV	ZONE V
0	0	0	0	0
1	0.000242	0.000388	0.000582	0.000872
2	0.000389	0.000623	0.000934	0.001402
3	0.000414	0.000663	0.000994	0.001491
4	0.000413	0.000661	0.000992	0.001488
5	0.000402	0.000643	0.000965	0.001447
6	0.000382	0.000611	0.000917	0.001375
7	0.000352	0.000564	0.000845	0.001268
8	0.000311	0.000498	0.000747	0.001121
9	0.000258	0.000413	0.000619	0.000929
10	0.000192	0.000307	0.000461	0.000692
11	0.00012	0.000192	0.000287	0.000431



V. RESULTS FROM PUSHOVER ANALYSIS:

Performance point in the zones IV for the considered building. Performance point is explained in the form of Spectral displacement Vs. Spectral acceleration graphs. Performance point gives the global behaviour of the building. The results will obtain in the form of capacity and demand curves. Formation of plastic hinges gives real behaviour of structure and their elements. Capacity curve was shown in green colour where as demand curve was shown in red colour. The intersecting point of both the curves gives performance

Table3 Target displacement results:

Displacement (mm)	420.5
Shear (kN)	17497.7248

Table4 Performance point results:

Displacement(mm)	261.1
Shear (kN)	14.89
Structural displacement, Sa	0.131
Structural acceleration, Sd(mm)	214.2
T secant(sec)	2.541
Damping ratio, Beff	0.1485

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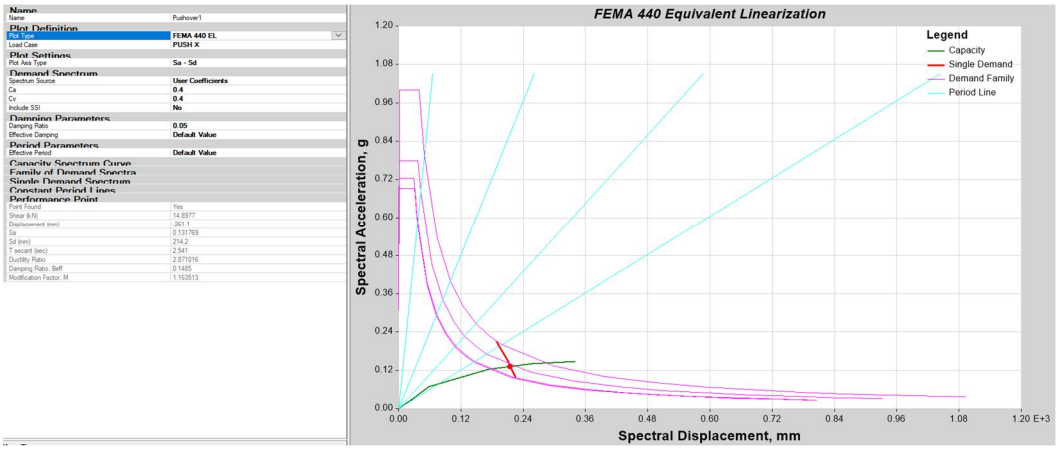
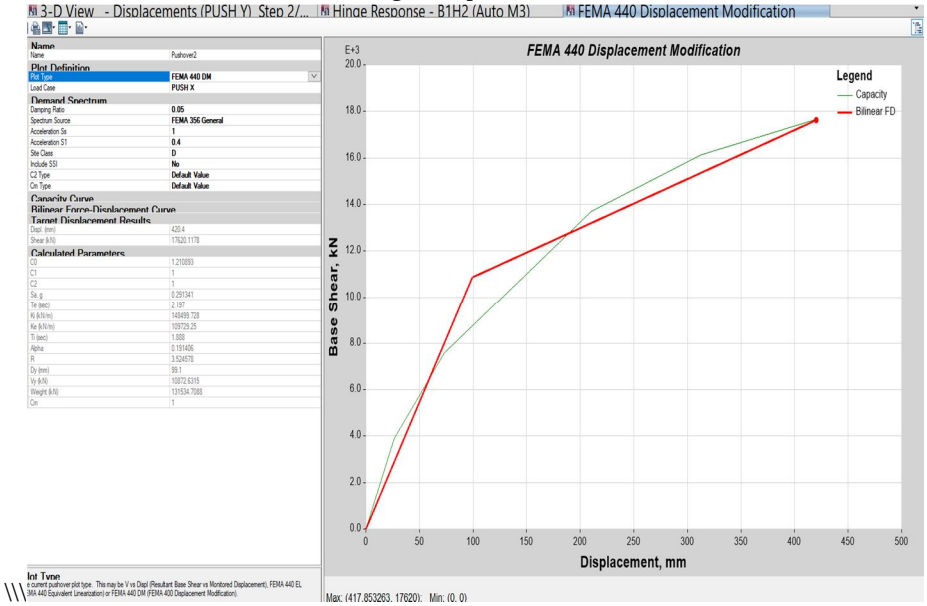
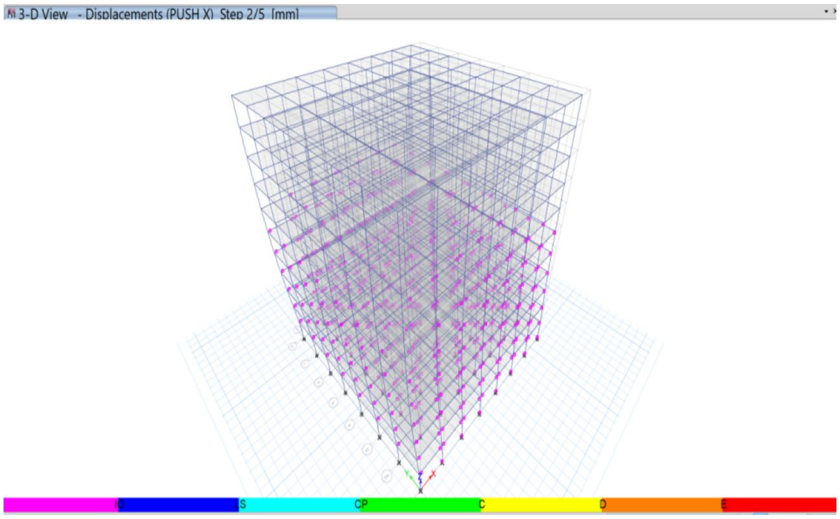
Capacity Curve And Demand Curve



Target Displacement



Hinge Results



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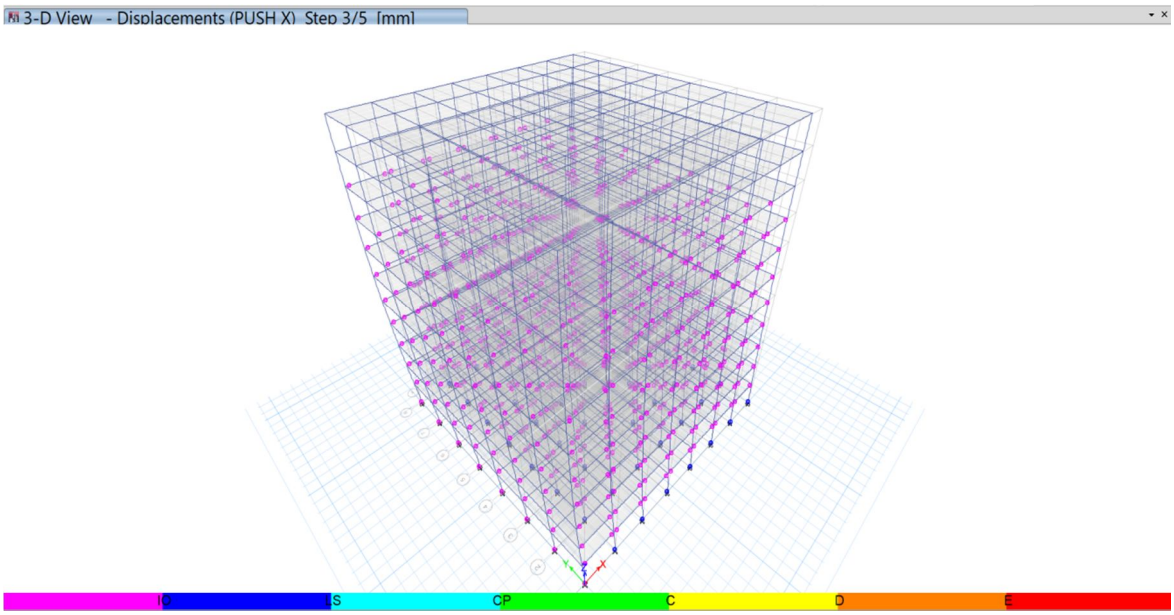

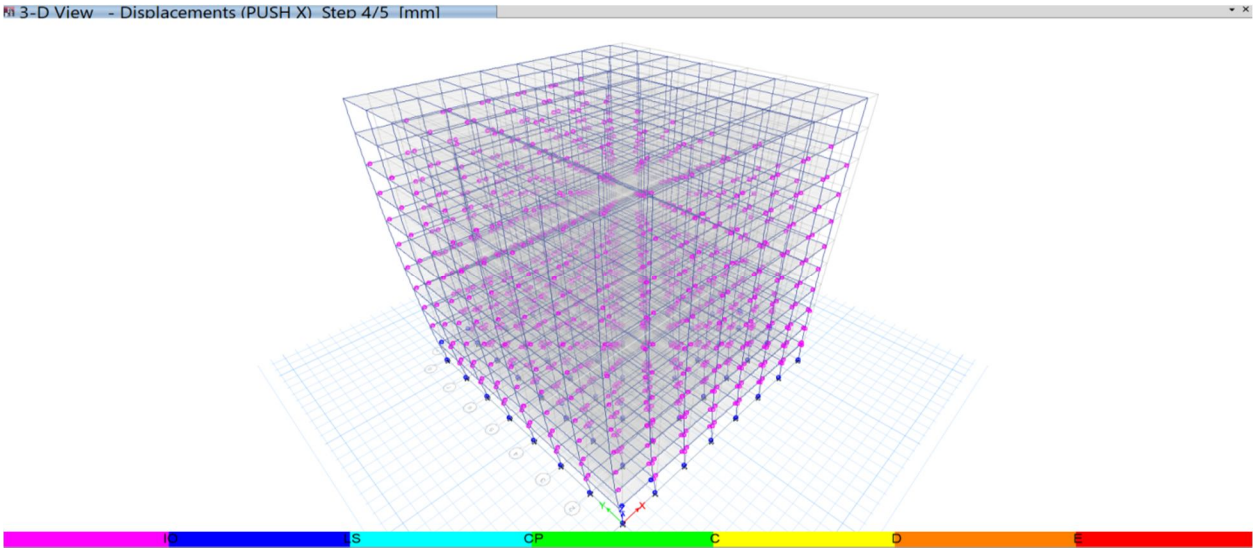

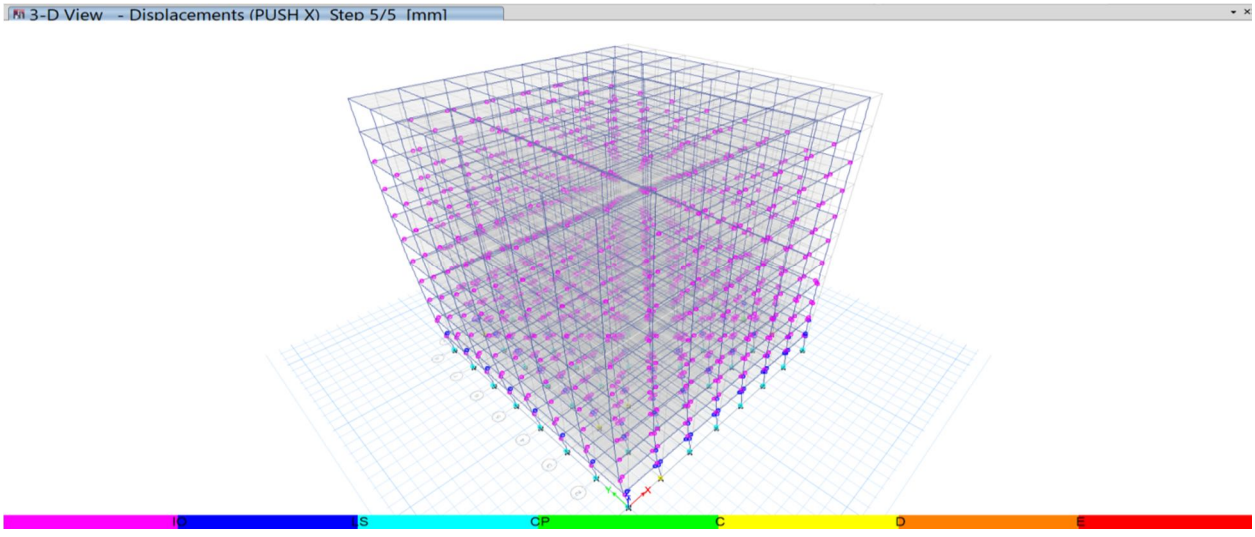

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VI. CONCLUSIONS

The pushover analysis is a simple way to explore the nonlinear behavior of the buildings. The results obtained in terms of pushover demand, capacity spectrum and plastic hinges the real behavior of structure.

From the pushovr analysis results the target displacement of the building is 420mm, then building performance point is 261mm so that my building is in safe .

From the the hinge results my building status is A> B & B>IO

Story displacement : The displacement of building models increases with the increasing of seismic Zones. The displacement is very high at roof and very low at the base. The displacement for ZONE II is 10.5mm and ZONE IV is 37.7. This means base shear increases by more than 27% if seismic ZONE changes from II to V.

Story displacement results from Resonse Spectrum analysis increases with the increasing of seismic zones. The dispalcement for ZONE II is 0.007573mm and ZONE V is 0.02726mm.

It is concluded that the storey drift increases with the increasing of seismic zone factor. And the maximum storey drift is available at ZONE V for the max. The storey drift at 3rd floor for ZONE II is 0.000414 and storey drift for ZONE V is 0.001491m. This means the storey drift is increased when compared to ZONE II to ZONE V.

The Storey Shear is decreased as the building height increased and reduced at top floor in all the building models subjected to seismic loads considered. The storey shear is maximum at the base.The storey shear for ZONE II at the first floor1053 and at top floor 240 & for ZONE V at first floor 3792 and at top floor 867 This means the storey shear is increases when compare to ZONE II to ZONE V.

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Analysis and Design of RCC Structures against Blast Loads

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***Abstract*- Structural safety and integrity has become a great challenge to engineers. With advancement in technology the problem to design the structure for most complex loads have been solved easily. Though, the design of important and high rise structures have been restricted to seismic loads only. In recent years, terrorism has shown its impacts on buildings. Due to these effects the importance to design the structure against blast loads also increased. Blast explosions releases large pressures and heat into air. This phenomenon though it lasts for only milli seconds but have adverse effects on the structures. This paper shows blast resistant analysis and design of a G+7 commercial structure with and without shear walls for a charge weight of 50kg and 100kg TNT at 30m distance in ETABS 2016.**

Index terms- Blast loads, Standoff Zone, Time History, Shear walls

1. INTRODUCTION

Blast can be defined as an explosion which is a very fast chemical reaction during which rapid amount of hot gases and energy gets released. This phenomenon lasts only some milliseconds and results in production of high temperatures and pressures. When a detonation takes place a blast wave containing large amount of energy gets released and moves faster than the speed of the sound. Blast wave is assumed to be spherical and the energy reduces as the wave prolongs further. Blast loads are dynamic loads and have to calculate carefully similar to earthquake and wind loads. Blast loadings are short duration loads hence they can be taken as impulse forces.

2. EXPLOSIVES

Understanding the types and charge weights of the explosives are important for better designing of a structure to resist explosion loads. Explosives are taken in terms of TNT equivalent since it resembles blast characteristics of most of the solid explosives. The overall damage of the structure can be predicted based on the size of the explosion, distance between the explosion and the structure.

Table-1 Estimated quantities of charge weights of explosives in various vehicles

Vehicle type	Charge mass/kg
Compact car trunk	115
Trunk of a large car	230
Closed van	680
Closed truck	2.27
Truck with trailer	13.610

Table-2 various explosives in TNT equivalent

Types of Explosives	TNT equivalent in kg
TNT	1000
RDX	1185
Nitroglycerin	1480
Gelatin	1000
C4	1340
Nitroglycerin dynamite	600

3. STAND OFF DISTANCES

It is one of the most important parameter for the design of blast resistant structures. The distance between point of detonation (source) and the point under consideration (target) is known as standoff distance or standoff zone. From previous studies it has been proved that by an increase in the distance the blast energy

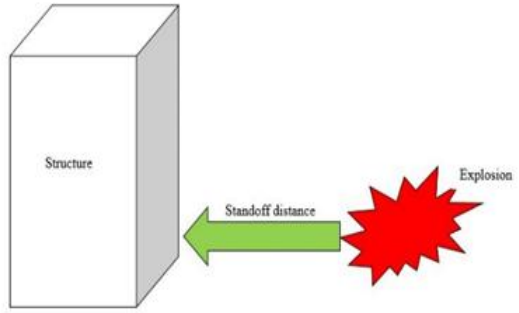


Fig.1 standoff distance

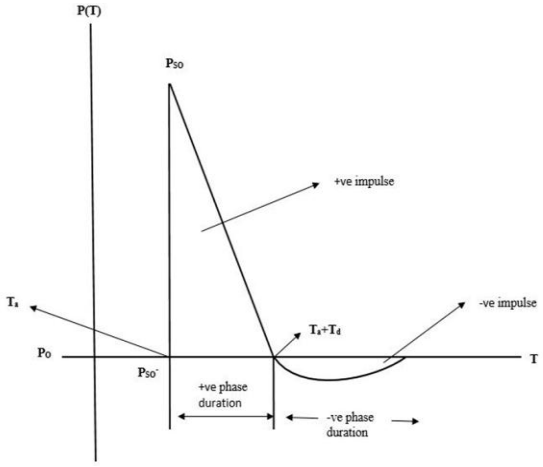
4. BLAST PHENOMENON

When an explosion occurs the pressure initially equal to ambient pressure (Po) will undergo to an instantaneous increase to a peak pressure (Pso) at the arrival time (Ta).

After reaching the peak value, the pressure decreases with an exponential rate until it reaches ambient pressure this phase is called positive phase duration (+ve).

After positive duration the pressure become smaller than the ambient pressure. This phase is known as negative phase duration (-ve).

The negative phase is longer than the positive phase and is neglected in design since their values are very small.



During negative phase the structures are subjected to suction force.

The minimum pressure is denoted as (Pso-) and its duration as (To-).

The pressures below the ambient pressures are considered if the overall performance of the structure is of concern.

5. BLAST LOADINGS

Blast loads are calculated from scaling laws as per IS 4991:1968.

To understand the effect of distance on blast characteristics scaling laws are used. These laws scales the parameters which were defined through experiments in order to be used for varying values of distance and charge energy release.

$$\textit{Scaled distance } x = \frac{\textit{Actual distance}}{W^{1/3}}$$

$$\textit{Scaled Time } t_0 = \frac{\textit{Actual Time}}{W^{1/3}}$$

Here,

W = yield of explosion in equivalent weight of reference explosive measured in tonnes i.e.,(weight of the charge in TNT).

x = scaled distance for entering the table1 from IS: 4991 for reading peak values.

t0 = scaled time read from table 1 from IS:4991 against scaled distance.

Actual distance is measured from the ground zero to the point under consideration and actual time is time after explosion.

6. BLAST ANALYSIS AND DESIGN

Blast analysis can be performed using a time history analysis in which the blast load is applied using a triangular function. The function should start with zero initially and ramp up over a small time step then vary linearly from full value to again zero.

Blast pressures act upon a unit area of the member by multiplying these pressures with the corresponding areas gives the required blast loads for a particular stand off distance.

Blast load obained is applied as point loads at one side only.

6.1 MODELLING OF THE STRUCTURE:

The structure is modelled in ETABS 2016 software which is a G+7 commercial building. Initially the structure is designed as per IS456:2000.Dead loads and loads are calculated as per IS875 part-1&2.

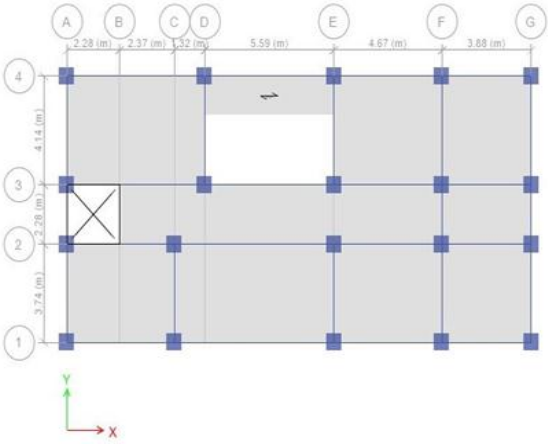


Fig. 3 plan view

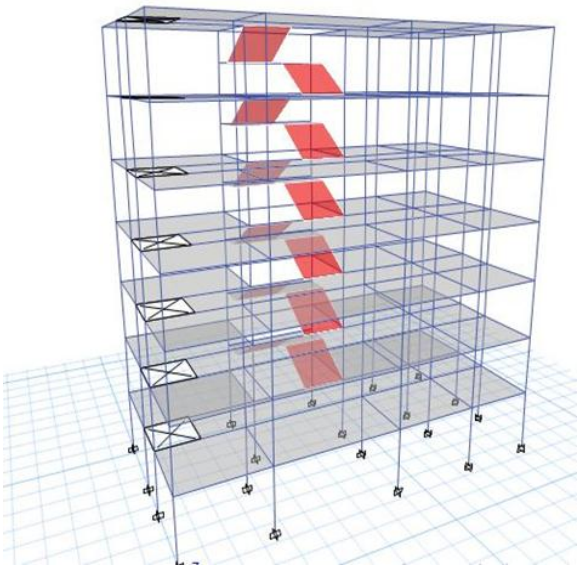


Fig.4 3D view

6.2 MATERIALS AND PROPERTIES OF THE STRUCTURE:

Material	Concrete M30
Steel	FE415
Beam size	250*400mm
Plinth beam	230*230mm
Column sizes	Ground storey: 650*650mm Other storeys: 530*530mm
Slab thickness	200mm
Height of each storey	3m
Dead loads	Slab:1.12 kn/m^2
	Beam(inner walls):3.5 kn/m^2 Beam(outer walls):4 kn/m^2
Live loads	Slab:10 kn/m^2
Load combinations	1.5(Dead load + Live load). 1.2(Dead load + Live load). 1.5(Dead + Live + Blast loads).

6.3 CALCULATION OF BLAST LOADS:

Assume a source point from where the blast occurs which is taken as (0, 1.5, 0) from the center of the building

Using two point formula the distance between source and the target is calculated which is as follows.

$X=\sqrt{(x_2-x_1)^2+ (y_2-y_1)^2+ (z_2-z_1)^2}$

Table-3 Distance between source and target for 30m

SLAB	COORDINATE POINTS			DISTANCE BETWEEN SOURCE AND TARGET
1	30	1.5	0	30
	30	1.5	3.74	30.23
	30	1.5	2.28	30.08
	30	1.5	4.14	30.24
2	30	4.5	0	30.14
	30	4.5	3.74	30.38
	30	4.5	2.28	30.23
	30	4.5	4.14	30.43
3	30	7.5	0	30.59
	30	7.5	3.74	30.82
	30	7.5	2.28	30.67
	30	7.5	4.14	30.87
4	30	10.5	0	31.32
	30	10.5	3.74	31.54
	30	10.5	2.28	31.42
	30	10.5	4.14	31.57
5	30	13.5	0	32.31
	30	13.5	3.74	32.52
	30	13.5	2.28	32.39
	30	13.5	4.14	32.57
6	30	16.5	0	33.54
	30	16.5	3.74	33.74
	30	16.5	2.28	33.61
	30	16.5	4.14	33.79
7	30	19.5	0	34.98
	30	19.5	3.74	35.18
	30	19.5	2.28	35.08
	30	19.5	4.14	35.22

Using the above distances scaled distances are calculated and peak reflected pressures are calculated from table-1 of IS 4991:1968.

Here, the blast loads are calculated for the front face of the building

Since, most severe loadings on any face of the structure is produced when the structure is oriented with face normal to the direction of propagation of the shock front. However, as the orientation for any explosion cannot be known before. Hence, every face of the structure is considered to be a front face.

Table-4 Blast pressures for 100kg TNT

SLAB	SCALED DISTANCE (x) m	Pro (KN/m2)	AREA (m2)	FORCE (KN)	Td (milli seconds)
1	64.6	79.42	4.3	341	13.14
	65.12	78.44	6.9	541	13.18
	64.8	87.24	9.5	829	13.16
	65.15	78.44	6.17	484	13.21
2	64.93	78.44	4.3	337	13.18
	65.45	77.46	6.9	534	13.26
	65.12	78.44	9.5	745	13.21
	65.55	76.68	6.17	473	13.27
3	65.9	76.48	4.3	328	13.33
	66.39	75.5	6.9	521	13.37
	66.07	75.39	9.5	716	13.35
	66.5	74.68	6.17	460	13.38
4	67.47	72.56	4.3	312	13.46
	67.95	71.58	6.9	494	13.49
	67.64	72.82	9.5	692	13.46
	67.88	72.83	6.17	447	13.48
5	69.6	70.6	4.3	303	13.58
	70.06	69.62	6.9	480	13.57
	69.78	69.32	9.5	658	13.57
	70.16	38.7	6.17	424	13.57
6	72.25	65.7	4.3	282	14.2
	72.69	64.71	6.9	446	13.95
	72.41	65.03	9.5	618	13.98
	72.49	64.4	6.17	397	13.96
7	75.36	60.79	4.3	261	14.31
	75.79	59.81	6.9	412	14.39
	75.57	60.05	9.5	570	14.35
	75.87	59.65	6.17	368	14.4

The blast loads are applied at the joints of the structure. Application of blast load caused the failure of Hence, the size of the beam and columns are revised and the structure is redesigned. The revised sizes are as follows.

SLAB	SCALED DISTANCE (x) m	Pro (KN/m2)	AREA (m2)	FORCE (KN)	Td (milli seconds)
1	83.33	52	4.3	224	12.04
	83.97	52	6.9	359	11.76
	83.55	52	9.5	494	11.76
	84	52	6.17	321	11.77
2	83.72	52	4.3	224	11.77
	84.38	51	6.9	352	11.78
	83.97	52	9.5	494	11.76
	84.52	51	6.17	315	11.79
3	84.97	51	4.3	219	11.8
	85.61	50	6.9	345	11.82
	85.19	50	9.5	475	11.81
	85.75	50	6.17	308	11.83
4	87	49	4.3	211	11.87
	87.61	48	6.9	331	11.96
	87.27	48	9.5	456	11.91
	87.69	48	6.17	296	11.97
5	89.75	46	4.3	198	12.25
	90.33	45	6.9	310	12.33
	89.97	46	9.5	437	12.28
	90.47	45	6.17	278	12.36
6	93.16	42	4.3	181	12.78
	93.72	41	6.9	283	12.82
	93.36	42	9.5	399	12.79
	93.86	41	6.17	253	12.83
7	97.16	39	4.3	168	13.13
	97.72	39	6.9	269	13.19
	97.44	39	9.5	370	13.16
	97.83	39	6.17	241	13.2

Beam sizes:
Plinth beam: 450*650mm
Others: 500*650mm
Column sizes:
Ground and 1st storey: 750*750mm
Other storeys: 650*650mm

7. ANALYSIS AND RESULTS

The structure is considered as SDOF and Nonlinear dynamic time history analysis was done with a step size of 100 and output time as 0.05sec.
The structure is also analyzed with shear walls placing at different positions and compared

7.1 ANALYSIS WITHOUT SHEAR WALLS:

For 100kg TNT:
The maximum displacement is 0.94mm for 0.05sec at top storey.

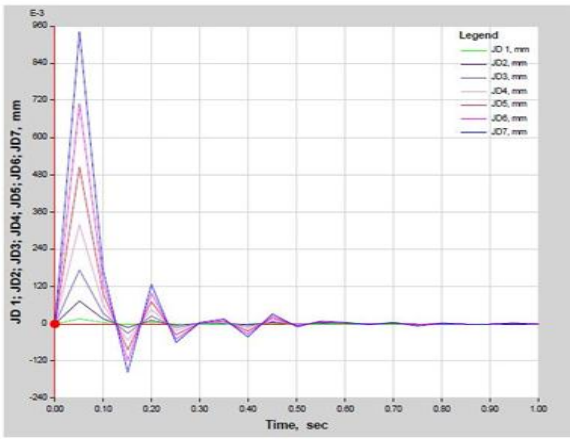


Fig.5 Time history displacements plots for 100kg TNT

The story force is 12915.6KN at ground and 2183.92KN at top storey.

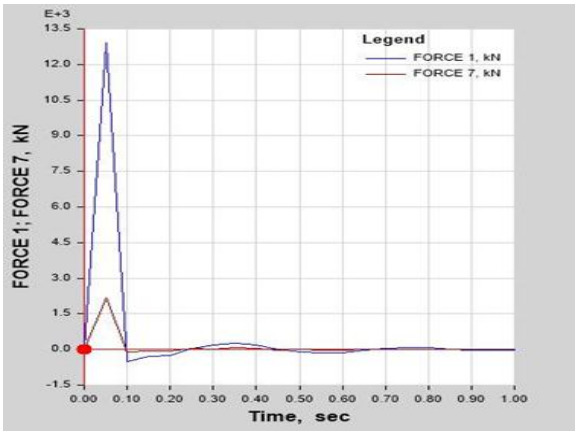


Fig.6 Time history storey forces for 100kg TNT

This graph shows joint displacements for different storey levels upto a time of 1 sec which is least at storey 1 and highest at storey 7 and also as the time increases the displacements are decreased.

The above graph shows storey forces for storey 1 and 7 with storey 1 having the highest peak and lowest peak for storey 7.It can be understood that the blast wave decreases as it propagates from bottom to top storeys.

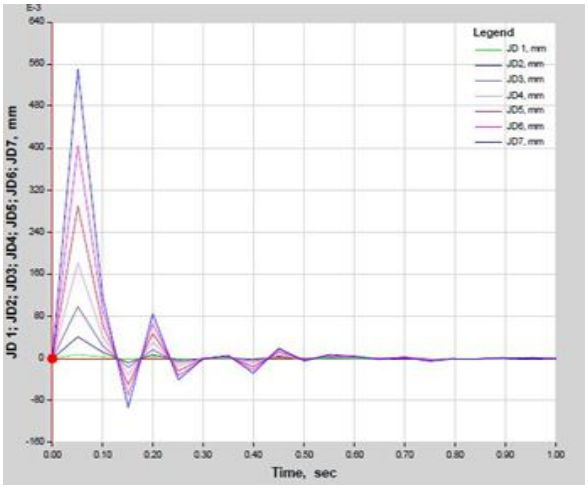


Fig.7 Time history displacement plot for 50kg TNT

For 50kg TNT:

The maximum displacement is 0.550mm for 0.05sec at top storey.

The storey forces are 13447.38KN at ground and 2283.57KN at top storey for 0.05sec.

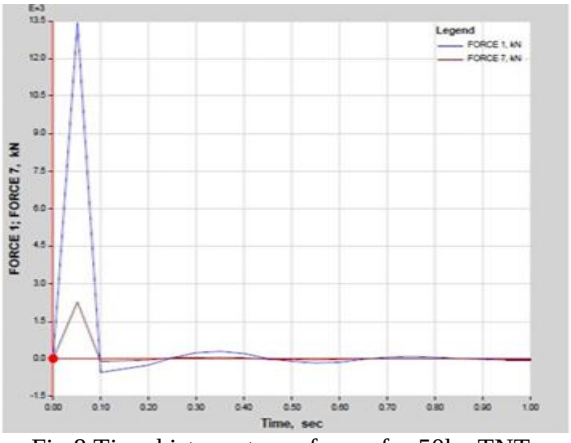


Fig.8 Time history storey forces for 50kg TNT

This graph shows joint displacements for different storey levels up to a time of 1 sec which is least at storey 1 and highest at storey 7 and also as the time increases the displacement peaks are decreased and when compared to 100 kg TNT the blast wave remains for very short time.

The above graph shows storey forces for storey 1 and 7 with storey 1 having the highest peak and lowest peak for storey 7.It can be understood that the blast wave decreases as it propagates from bottom to top storeys. When compared to 100 kg TNT storey forces are more in this case.

7.2 ANALYSIS WITH SHEAR WALLS:

In this paper analysis of the Structure is studied under three

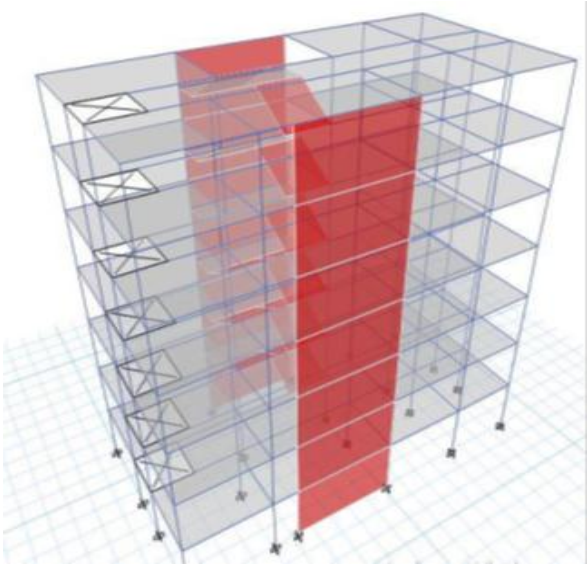
Different positions of shear walls.

Thickness of the shear wall is taken as 230mm.

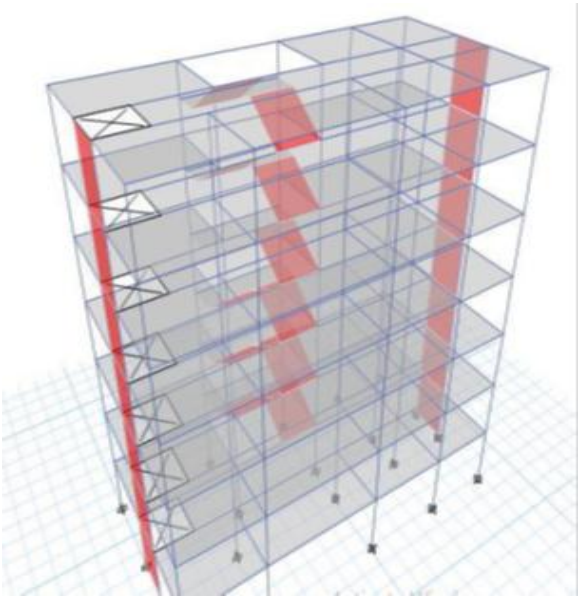
Case (a): Shear walls placed diagonally at the corners of the structure



Case (b): Shear walls placed at opposite sides of the structure along x-direction



Case (c): Shear walls placed at opposite sides of the structure along y-direction



For 100kg TNT:

Case (a): The maximum displacement is 0.631mm at top storey for 0.05sec.

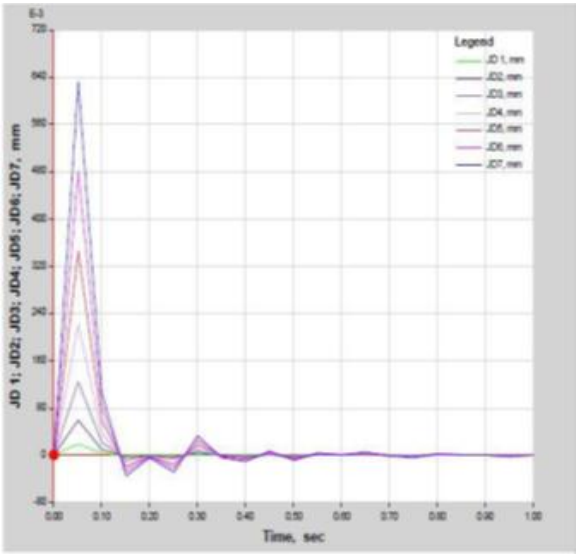


Fig.9 Time history displacement plot with Shear wall for 100kg TNT

The above graph shows joint displacements for different storey levels up to a time of 1sec when shear walls are placed diagonally at the corners of the structure which is least at 1st storey and highest at storey 7.

Case (b): The maximum displacement is 4.017mm at top storey for 0.05sec

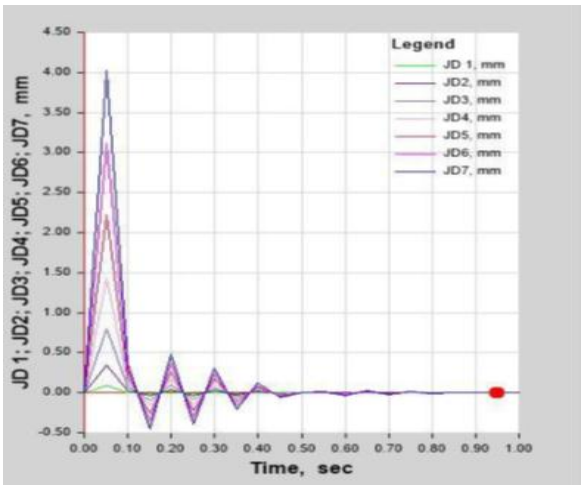


Fig.10 Time history displacement plot with Shear wall for 100 kg TNT

The above graph shows joint displacements for different storey levels up to a time of 1 sec when shear walls are placed along x-direction of the structure which is least at 1st storey and highest at storey 7.when compared case(a) this shows displacement peak of high value.

Case (c): The maximum displacement in this case is 0.576mm at top storey for 0.05 sec

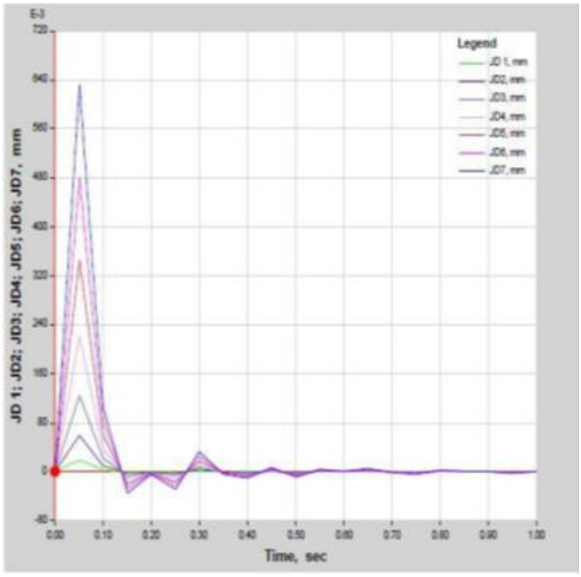


Fig.11 Time history displacement plot with shear wall for 100kg TNT

This graph shows joint displacements for different storey levels up to a time of 1 sec when shear walls are placed along y- direction of the structure which is least at 1st storey and highest at storey7.when compared case(a) and case(b) this shows displacement peak of less value.

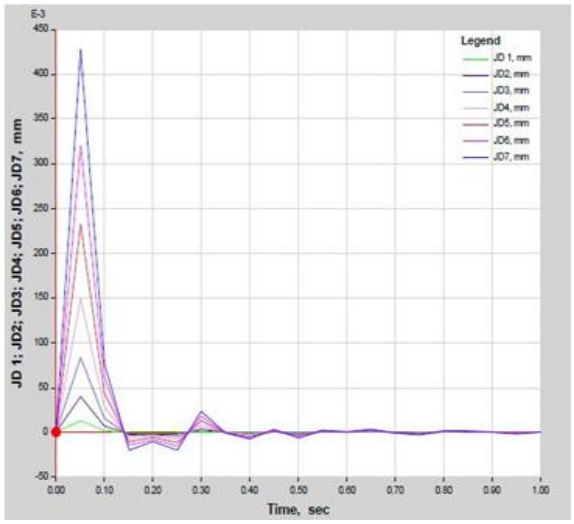


Fig.12 Time history displacement plot with Shear walls for 50kg TNT

Case (a): The maximum displacement is 0.428mm at top storey for 0.05sec.

The above graph shows joint displacements for different storey levels up to a time of 1 sec when shear walls are placed diagonally at the corners of the structure which is least at 1st storey and highest at storey 7.

Case (b): The maximum displacement is 2.593mm at top storey for 0.05sec.

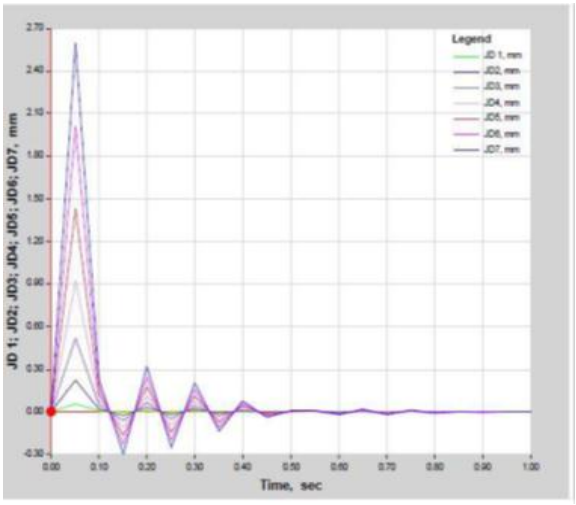


Fig.13 Time history displacement plot with shear walls for 50kg TNT

The above graph shows joint displacements for different storey levels up to a time of 1 sec when shear walls are placed along x-direction of the structure which is least at 1st storey and highest at storey 7.when compared case (a).

Case (c): The maximum displacement is 0.308mm at top storey for 0.05sec.

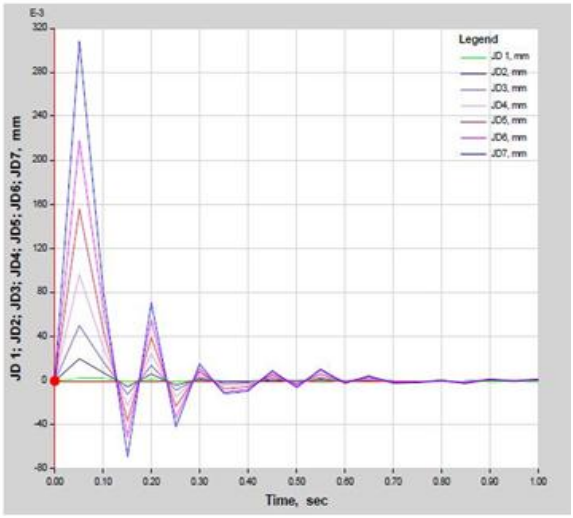


Fig.14 Time history displacement plot with Shear walls for 50kg TNT

This graph shows joint displacements for different storey levels up to a time of 1 sec when shear walls are placed along y-direction of the structure which is least at 1st storey and highest at storey7.when compared case(a) and case(b) this shows displacement peak of less value.

7. CONCLUSION

From time history analysis it is observed that displacements decreases with decrease in the storey levels and storey forces are more at bottom level which decreases with increase in storey height.

By placing shear walls small amount of displacement and forces have been reduced.

For the given plan with 50kg and 100kg TNT at 30m the best position of placing shear wall is along the y-direction of the structure.

It has also been observed that as the charge weight increases the impact on the structure also increases.

Increasing the size of the members also showed significant effect on the structure in resisting blast loads.

Hence, from above observations it can be concluded that by providing moment resisting frames such as shear walls and maintaining appropriate standoff distances maximum damage to the structure can be avoided and also gives time for the occupants to escape from the building.

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EXPERIMENTAL STUDY ON NORMAL AND ACCELERATED CURING ON SCC

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Abstract:Self-compacting concrete (SCC) was first developed in Japan in the late 1980's as a concrete that can flow through congested reinforcing bars with elimination of compaction, and without undergoing any significant segregation and bleeding. In recent times, this concrete has gained wide use in many countries for different applications and structural configurations. The difference of strength at failure for accelerating and normal curing is 1.77MPa for 3days. The difference of strength at failure for accelerating and normal curing is 6MPa for the 7days. The difference of strength at failure for accelerating and normal curing is 7.5MPa for the 28days The percentage increase in strength between accelerated curing and normal curing for 3 days 15.93%. The percentage increase in strength between accelerated curing and normal curing for 7 days 33.33%. The difference at strength failure for accelerating and normal curing is 6MPa. The percentage increase in strength between accelerated curing and normal curing for 28 days 28.30 %. The difference at strength failure for accelerating and normal curing is 7.5MPa Split tensile strength for normal curing is 1.27MPa and for the accelerated curing is 1.54MPa. The percentage increase in strength between accelerated curing and normal curing for 3 days 21.25%. Split tensile strength for normal curing is 1.98MPa and for the accelerated curing is 2.54MPa. The percentage increase in strength between accelerated curing and normal curing for 7days 28.28%. Split tensile strength for normal curing is 2.26MPa and for the accelerated curing is 2.84MPa. The percentage increase in strength between accelerated curing and normal curing for 28 days 25.26 %.

Keywords: *SCC, Accelerated Curing, Normal Curing.*

Introduction

SELF-COMPACTING CONCRETE

Such innovative concrete requires high slump which can be achieved by the addition of super plasticizer. To avoid segregation on super plasticizer addition, the sand content is increased by 4% to 5%. When the volume of coarse aggregate in the concrete is excessive, the opportunity of contact between coarse aggregate particles increases greatly, causing interlocking and the possibility of blockage on passing through spaces between steel bars is also increased.

Ground Granulated Blast Furnace Slag (GGBS):

Ground granulated blast-furnace slag is a non-metallic powder consisting of silicates and aluminates of calcium and other bases. The molten slag is rapidly chilled by quenching in water to form glassy sand like material. The chemical composition of blast furnace slag is similar to that of cement clinker. The performance of slag depends on the chemical composition and fineness of grinding. The quality of slag is governed by IS: 12089-1987 (Specification for Granulated Slag for Manufacture of Portland Slag Cement).

Super plasticizer (SP):

Super plasticizer (SP) is a chemical compound used to increase the workability, without using any additional water. The super plasticizer used in the present work is the commercially available brand, plaxem

Accelerated curing:

Accelerated curing is any method by which high early age strength is achieved in concrete. These techniques are especially useful in the prefabrication industry, wherein high early age strength enables the removal of the formwork within 24 hours, thereby reducing the cycle time, resulting in cost-saving benefits.[1] The most commonly adopted curing techniques are steam curing at atmospheric pressure, warm water curing, boiling water curing and autoclaving.

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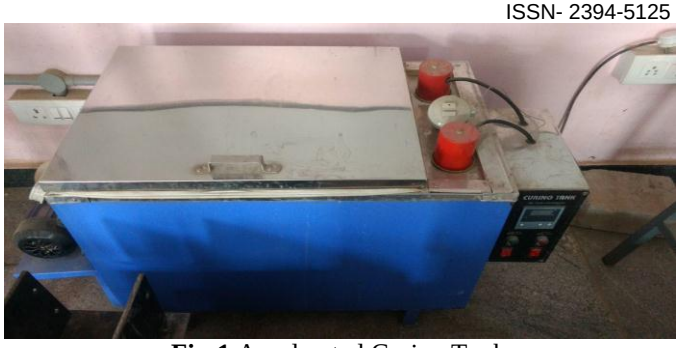

Fig:1 Accelerated Curing Tank

Normal curing:

Curing is the maintaining of an adequate moisture content and temperature in concrete at early ages so that it can develop properties the mixture was designed to achieve. Curing begins immediately after placement and finishing so that the concrete may develop the desired strength and durability. Portland cement consists of several complex chemical compounds. In preparation of concrete.

As the early strength of concrete is supportive towards the ultimate strength of concrete achieved, we should do proper curing according to the environment condition, type of member etc. The most effective method for curing concrete depends on the materials used, method of construction, and the intended use of the hardened concrete. For most jobs, curing generally involves applying curing compounds, or covering the freshly placed and finished concrete with impermeable sheets or wet burlap. In some cases, such as in hot and cold weather, special care using other precautions is needed.



Fig: 2 Normal Curing on Concrete

Objectives:

- Faster construction
- Reduction in Site manpower
- Better surface finish
- Easy placing
- Improved durability
- Due to high early age strength enables the removal of the formwork within 24 hours.

Scope of present work:

- The effect of different curing methods on mechanical properties of self-compacted concrete is studied i.e. effect on Compressive, Splitting tensile.
- Effect of natural climate factors such as sunlight, ambient temperature and humidity during self-curing on the properties may be studied.
- GGBS can replace a significant part of the necessary filler when used into a self-compacting concrete composition.

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- The elimination of vibrating equipment improves the environment protection near construction precast sites where is being placed, reducing the exposure of workers to noise and vibration.

Table:1 Shows the Properties of Cement

S.No:	Characteristics	Values obtained	Standard values
1	Normal consistency	33mm	33 to 35 mm
2	Initial setting time	40 min	Not be less than 30 mins
3	Final setting time	300 min	Not be greater than 600mins.

Table 2 Test results on fresh SCC Mixes

Test	Property	Range of values	GGBS based SCC	Result
T5 slump flow	Filling ability	2-5sec	3	Ok
V-funnel	Viscosity	6-12sec	8	Ok
L-box	Passing ability	0.8-1.0	0.90	Ok
U –box	Passing ability	0-30mm	25	Ok

Compressive strength test:

The compressive strength (in MPa), of the specimen is calculated by dividing the maximum load carried by the cube specimen during the test by the cross-sectional area of the specimen.

The compressive strength was determined at different ages 7 and 28 days. Some materials fracture at their compressive strength limit; others deform irreversibly, so a given amount of deformation may be considered as the limit for compressive load. Compressive strength is a key value for design of structures.



Fig 3 Compression testing machine

Split tensile strength of concrete:

The tensile strength of concrete is one of the basic and important properties. Splitting tensile strength test on concrete cylinder is a method to determine the tensile strength of concrete. Tensile testing is most often carried out at a material testing laboratory. The ASTM D638 is among the most common tensile testing protocols. The ASTM D638 measures plastics tensile properties including ultimate tensile strength, yield strength, elongation and Poisson's ratio.

The concrete is very weak in tension due to its brittle nature and is not expected to resist the direct tension. The concrete develops cracks when subjected to tensile forces. Thus, it is necessary to determine the tensile strength of concrete to determine the load at which the concrete members may crack.

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Fig 4 Split tensile strength of concrete

Mix Proportioning:

The mix proportion obtained for the present work by adopting the said method

Mix constituent	GGBS based SCC(kg/m3)
Cement	200
Powder	403.95
Fine aggregate	743
Coarse aggregate	961
Total water	224.90
Super plasticizer	10.87

Table 3 Mix proportioning (kg/m3)

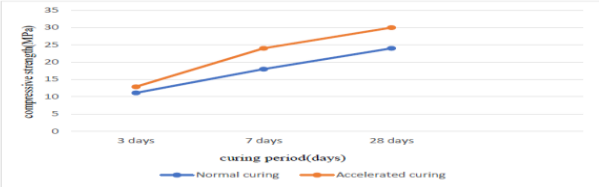
RESULTS AND DISCUSSION

Compressive strength:

In this method of mix proportioning of SCC, the quantity of the powder used in the concrete is mainly dependent on the consistency and the specific gravity of the powder itself. It is observed that the consistency is more than that of GGBS. Whereas the Compressive strength of GGBS based SCC after 3days, 7 days and 28 days are 11.11MPa, 18 MPa and 22.5 MPa, for normal curing Whereas the Compressive strength of GGBS based SCC for accelerating curing after 3days, 7 days and 28 days are 12.88MPa, 24 MPa and 30 MPa. Which clearly indicates that the GGBS based SCC with accelerating curing gives better strength than normal curing-based SCC.

Table 4 : Compressive strength test results

	Compressive strength (MPa)		
	3 days	7 days	28 days
Normal curing	11.11	18	24
Accelerated curing	12.88	24	30



Graph 1 Comparison between normal curing and accelerated curing in compressive strength**.**

The difference of strength at failure for accelerating and normal curing concrete is 1.77MPa for 3days
The difference of strength at failure for accelerating and normal curing is 6MPa for the 7days
The difference of strength at failure for accelerating and normal curing is 7.5MPa for the 28days.

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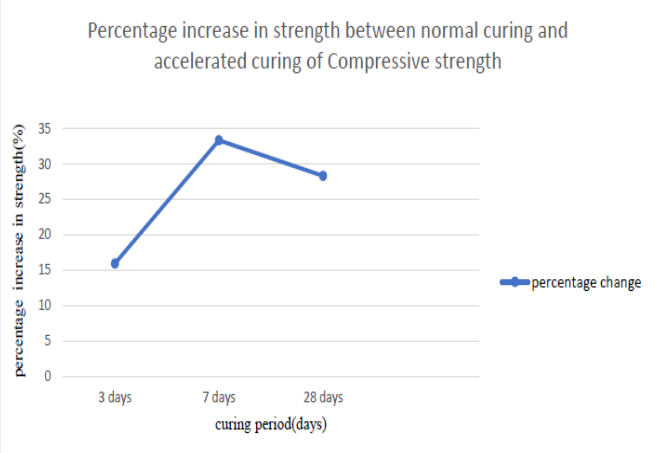
Table 5: Comparison Compressive strength

Compressive strength(MPa)	3 days		7 days		28days	
Normal curing	11.11		18		22.5	
Accelerated curing	12.88	15.93%	24	33.33%	30	28.30%

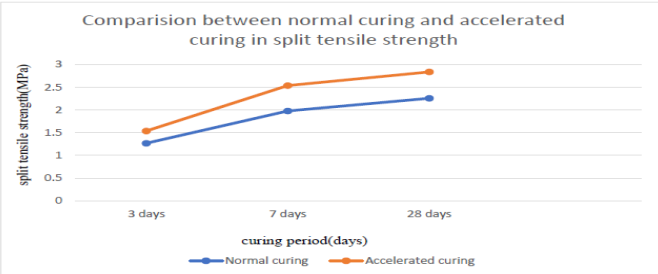


Graph 2 Percentage increase in strength between normal curing and accelerated curing of Compressive strength

From the graph 2 percentage increase in strength between accelerated curing and normal curing for 3 days 15.93%
The percentage increase in strength between accelerated curing and normal curing for 7 days 33.33%
The percentage increase in strength between accelerated curing and normal curing for 28 days 28.30 %
Split Tensile strength:
The Split tensile strength of GGBS based SCC is 21.25%, 28.28% and 25.26% more than that of based SCC for 3 days, 7 days and 28 days of curing period respectively.

Table 6 Split tensile strength test values

	Split tensile strength (MPa)		
	3 days	7 days	28 days
Normal curing	1.27	1.98	2.26
Accelerated curing	1.54	2.54	2.84



Graph 3 Comparison between normal curing and accelerated curing in split tensile strength

From the graph 3 compressive strength for normal curing is 22.5 MPa and for the accelerated curing is 30MPa
The percentage increase in strength between accelerated curing and normal curing for 28 days 28.30 %
The difference at strength failure for accelerating and normal curing is 7.5MPa.

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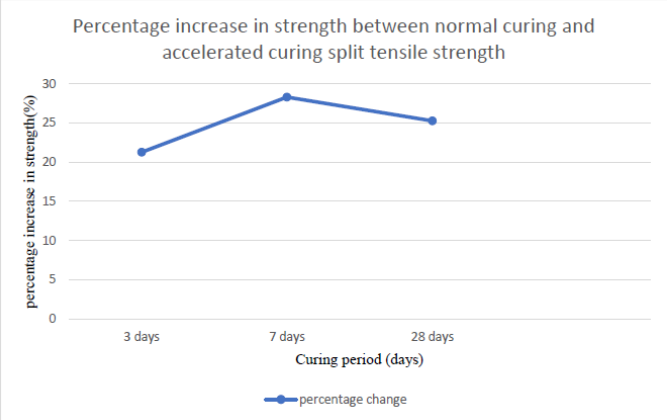
Table 6 Comparison Split tensile strength

split tensile strength(MPa)	3 days		7 days		28days	
Normal curing	1.27		1.98		2.26	
Accelerated curing	1.54	21.5%	2.54	28.28%	2.84	25.26%



Graph 4 Percentage increase in strength between normal curing and accelerated curing split tensile strength

From the graph 4 The percentage increase in strength between accelerated curing and normal curing for 3 days 21.5%
The percentage increase in strength between accelerated curing and normal curing for 7 days 28.28%
The percentage increase in strength between accelerated curing and normal curing for 28 days 25.26%.

CONCLUSIONS

- The difference of strength at failure for accelerating and normal curing is 1.77MPa for 3days
- The difference of strength at failure for accelerating and normal curing is 6MPa for the 7days
- The difference of strength at failure for accelerating and normal curing is 7.5MPa for the 28days
- Compressive strength for normal curing is 11.11 MPa and for the accelerated curing is 12.88 MPa.
- The percentage increase in strength between accelerated curing and normal curing for 3 days 15.93%
- The difference at strength failure for accelerating and normal curing is 1.77MPa
- Compressive strength for normal curing is 18 MPa and for the accelerated curing is 24 MPa.
- The percentage increase in strength between accelerated curing and normal curing for 7 days 33.33%
- The difference at strength failure for accelerating and normal curing is 6MPa
- Compressive strength for normal curing is 22.5 MPa and for the accelerated curing is 30MPa
- The percentage increase in strength between accelerated curing and normal curing for 28 days 28.30 %
- The difference at strength failure for accelerating and normal curing is 7.5MPa
- The percentage increase in strength between accelerated curing and normal curing for 3 days 15.93%
- The percentage increase in strength between accelerated curing and normal curing for 7 days 33.33%

- The percentage increase in strength between accelerated curing and normal curing for 28 days 28.30 %
- Compressive strength for normal curing is 22.5 MPa and for the accelerated curing is 30MPa
- The percentage increase in strength between accelerated curing and normal curing for 28 days 28.30 %
- The difference at strength failure for accelerating and normal curing is 7.5MPa

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- Split tensile strength for normal curing is 1.27MPa and for the accelerated curing is 1.54MPa
- The percentage increase in strength between accelerated curing and normal curing for 3 days 21.25 %
- The difference at strength failure for accelerating and normal curing is 0.27MPa
- Split tensile strength for normal curing is 1.98MPa and for the accelerated curing is 2.54MPa
- The percentage increase in strength between accelerated curing and normal curing for 7days 28.28%
- The difference of strength at failure for accelerating and normal curing is 0.56MPa
- Split tensile strength for normal curing is 2.26MPa and for the accelerated curing is 2.84MPa
- The percentage increase in strength between accelerated curing and normal curing for 28 days 25.26 %
- The difference at strength failure for accelerating and normal curing is 0.58MPa
- The percentage increase in strength between accelerated curing and normal curing for 3 days 21.5%
- The percentage increase in strength between accelerated curing and normal curing for 7 days 28.28%
- The percentage increase in strength between accelerated curing and normal curing for 28 days 25.26%

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INVESTIGATIONAL ANALYSIS ON SELF COMPACTION CONCRETE USING NANO MATERIALS

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ABSTRACT: Now a day's Self-Compacting Concrete is the most common used concrete for construction now a day, Preparation of Self Compacting Concrete by addition of SP gives good results. Self-Compacting Concrete helps in reduction of man work at site. The void space in the concrete will not be reduced by using the SCC. For this purpose, partial replacement of Cement by NS Powder into the SCC helps in reducing the Void Space and concrete density will be increase. So, by the increase in concrete density and Strength of the concrete will also increases.

The present work deals with additions of nano-silica powder to Cement as a partial replacement to Cementous material as dosage by pf 2.5%,3%,3.5% respectively by the gauged cement and based on early research M20 grade concrete has been taken for the present study. Optimum Composition containing of SCC+ nano-silica powder was taken, in which compressive strength were increased to 6% respectively compared to the Nominal concrete. The advance of nano material is clearly seen in the Scanning Electron Microscope images showed in this journal paper. And the analysis has been taken and the presence of nano-silica and with particle shape and size are mentioned, nano-silica Powder is introduced into the concrete improves the interfacial surface transition zone area in between the Cementous material particles. The density of the concrete optimum specimens was decreased by 0.5% relative to the Nominal Concrete.

Therefore, Imbedding nano-silica powder to nominal Cement show a significant increase in compressive strength. SEM (scanning Electron Microscope) analysis evidence the direct involvement of nano-silica in the region of specimen.

KEYWORDS: self-compaction concrete, compressive strength, nominal concrete, void space, (SEM) Scanning electron Microscope, density, nano-silica Powder.

I. INTRODUCTION

Nominal Concrete is a composite material mixture of cement, fine aggregates, coarse aggregates and water sometimes its mixed with admixtures like accelerators and retarders. Self- compaction concrete was first introduced in the year of early 1988 to achieve self-compaction by its using its own weight and reducing the void space in between the particles and increasing the durability in concrete structures. Since then, the advancement in innovation and investigations have been carried out in Self-compaction concrete, this type of concrete has been used in practical in large, mass concrete structures in Japan, Investigations was carried out to establishing the standard mix-design method and self-compatibility methods. Self-Compaction Concrete has higher compressive strength due to closely packed particles present in the concrete, due to this nature the construction industry focusing on the time and optimized solution for the faster in casting and achieving better results comparing with nominal concrete and have greater impact in the concrete era. Therefore, keeping economics in picture SCC in cumulative is more economical, strength and durability building structures. The use of large portion of cement results in increases in CO_2 emissions and risk in duplation of ozone layer and increases in green house effects. By using nano silica partially to reduce the cement content in concrete mix. In the previous literature implies the European Federation of Specialist Construction Chemicals and Concrete

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systems. SCC can be defined as well as concrete that is able to flow under its own self weight under the gravitational force and completely fill the formwork without any voids, even in the high and heavy dense reinforcement without any external compaction like pin vibrator or surface vibrator ect., and maintaining the homogeneity of the concrete in every section

of casting. SCC It is also called Super-Workable Concrete and high workability Concrete SCC and can be controlled by appropriate and specific dosage of plasticizer and superplasticizer.
In this study imbedding nano-silica in to the concrete, partially replacing cement to the nano silica and concrete prepared. In this study the properties of nano-silica are mentioned the results are compared with that nominal or traditional concrete. The compression has been done by the Compressive strength of both nominal and SCC. and concrete with addition of nano- silica were determined and compared with results of nominal or traditional concrete of M20. The principle stresses are compressive cube samples were obtained and tested in compressive testing machine in order to meet the minimum compressive strength of prepared specimen. economic benefits are likely to more in Self Compacting Concrete when compared to nominal or normal concrete. Self-Compaction Concrete is economical due to the flowable in nature and it is easily compacted due to the super plasticizer in it and feasible technical solution present in it. The use of SCC result in less maintenance and durable life for the structure. To achieve these effective results from conventional or nominal concrete to self-compaction concrete.

CONCRETE AND SUSTAINABILITY

Concrete is a unique material and it is very easily casted and mounded in different shapes and sizes in construction. The current construction there is a biggest hassle with the well compaction concrete as we know 5% of voids reduces 30% of actual strength of the concrete so it's a biggest challenge for the skilled labor so by adopting this kind of technique like SCC we can achieve the complete compaction and in other hand we can achieve the targeted strength and practices are based on the consumption of building materials, resulting not wasting the resources, The sustainable development of the cement concrete structures.
Degree of dispersion of cement in water that is water cement ratio is largely depends on the flowable of concrete and excess of water can occur segregation in concrete, hydration of cement behavior and properties of the hardened cement. Factors such as water cement ratio, has early hydration, water reducing admixture agents and mineral admixture agents are added determine the degree of flocculation in the cement paste. As we understand the high strength concrete depends upon water cement ratio. The strength w/c ratio rule holds good for concrete strength that we can determine by workability test. Low water cement ratio is also required for low permeability of concrete and to give good strength results and to give good hold like short creating and which is vital for high durability. low water cement ratio ensures high strength and low permeability or high durability according to the IS code. to ensure the workability of concrete low water cement ratio will require high cement content as well as strength but very low in workability due to the more of compaction is required and more voids can be occurred.

SELF CONSTRICTING CONCRETE

The British Standard describes "SCC is the concrete that is capable to flow under its own weight and compacted by gravity, fill the formwork corners and reinforcement given covering to the section like beams and columns ducts, etc., Marinating the homogeneity of the concrete. SCC exhibits following properties in its plastic state. It has the ability to flow into every corner of the formwork and completely all spaces in the dense reinforcement and while maintaining homogeneity and ability of concrete mix to pass through obstacles like narrow sections in form work like curved section zig Zac section, closely spaced reinforcement without getting blocked by interlocking of course aggregate particles. Segregation resistance of self-compaction concrete is its capability to retain homogeneity in the distribution of ingredient in fresh concrete mix in both static and dynamic moving condition i.e., workability during mixing, transportation and placing and finishing.
The mechanism behind the SCC when water is added into the cement the past becomes cohesive in nature the particals attracts each other. The super plasticizer is used. It's a special type of chemical that reputation action takes place and the Cementous particles and that losses its cohesive in nature and the cement particles ripples to each other, then the sticky nature changes into the form cohesionless past this phenomena occurs due to the agents are added into the Cementous particles due to this the cement starts loses its shape and starts flow like a liquid this is called flowing or compacting by its own weight this turn into self-compaction concrete.

NANO TECHNOLOGY IN CONCRETE

Nanotechnology is rapidly becoming the Industrial revolution of 21st century. It is known that "Nano" is a Greek word and means 'dwarf'. It's a common word for everything which is smaller than 1Micron or 1 Million of a millimeter where 1 Micron is 1000 Nanometer. Nano technology helps in provide the filling in between the Cementous material that can increase the density in the form of siliceous material and strength to the concrete by adding the agent. Cement is primary structural material by addition of Nano Technology it helps as a smart

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functional material. Nano-silica has been added in order to increase the compressive strength, low permeability and reduces shrinkage. Cement particle size range bigger than few nano-meters to a maximum of about one hundred micro meter. In the case of Nano silica its ranges from 5 micro meter. the Properties of ordinary Portland cement like low shrinkage value, nano-silica powdered form reacts with liberated Calcium hydroxide from the hydration of cement that is OPC to form additional hydrated products like calcium silicate hydrate. Calcium silicate hydrate is main product of OPC it is primarily responsible for strength of bougs compounds comes in picture in cement-based materials. Chemical composition of OPC contains 17 to 27% of Silica. So, by addition of 2 to 3% of Nano Silica powder may help in increase in the strength of the concrete. Incorporation Nano silica powder in concrete mix leads to several benefits such as improves in Compressive strength, durability of concrete, chemical attack resistance, segregation resistance, permeability and water absorption. of cement's reaction with water as a function of temperature, water/cement ratio, and grain size because the reactions occur in the Nano-scale pores of the cement.

II. OBJECTIVE OF PRESENT STUDY

The objective of present study is to find out the influence of the imbedded of Nano silica partially replacing cement. Nano silica is added in different dosages to study the variation in the compressive strength of concrete. 2%, 3% of Nano silica are adopted as replacement by weight according to the mix design of M20 grade. Cube moulds are casted for the purpose of testing. Specific objective of the study is:

To find the workability aspects of Self Compacting Concrete and Nano Silica Powder concrete.

To decrease the permeability and to reduce the shrinkage in self compacting concrete and finding out the right workability for construction work.

To reduce the shrinkage in Self Compacting Concrete.

- To know the influence of Nano Silica Powder on the Strength Characters of Self Compacting Concrete.

Scope

The scopes of present work is increase the density as well as increase the compressive strength of the self-compaction concrete by adding nano-silica. Effect of Nano silica on the compressive strength of the self-compacting are studied and further modifications can be done. Mix design of M20 grade is chosen to increase its strength and reduce shrinkage. Comparison of compressive strength between ordinary self- compaction concrete with SCC of Nano silica powdered form is down.

Experimental Procedure

The present procedure deals with the evolution of self- compaction concrete using Nano-silica powder. It also involves the study of properties of concrete compressive strength. Cement is partially replaced with Nano-Silica powder of dosages in standard grade of M20, which was designed in accordance with IS:10262-2009 (For Nominal Concrete) and Nansu Method following EFNARC Guidelines for SCC. We have chosen mix design of M20 Grade, in order to increase the compressive strength of the self-compacting concrete. The study involves Casting and Testing of specimen's cubes. The concrete lab available at St. Martin's Engineering College is used for the project. The workability test equipment's are used for filling ability and passing ability.

Procurement of Materials

- Cement
- Fine Aggregates
- Coarse Aggregates
- Water
- Admixture (super plasticizer)
- Nano-Silica Powder

Table:1 Properties of Fine Aggregates

S.No.	Property	Result
1	Specific gravity	2.61
2	Fineness modulus	2.8
3	Bulk density(loose)	15.75KN/m^3
4	Grading of sand	ZONE-II

Coarse Aggregate

Coarse aggregates of nominal size 20 mm,12 mm, 10mm and 8mm, obtained from the local quarry confirming

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to IS: 10262:2009. The properties of coarse aggregates are shown in Table No.2.

Observation and Calculations:
Fineness of cement = W1+W2+W3/ avg x10= weight retain on sieve/total weight

Table 4 Fineness of Cement

S.No	Weight of cement (gms)	Weight of residue formed (gms)	Fineness of cement (%)
1	300	20	6.67
2	300	30	10
3	300	30	10

Table:2 Properties of Coarse Aggregate

S. No.	Property	Result
1	Specific Gravity	2.6
2	Bulk Density	15.8KN/m^3
3	Water Absorption	0.3%
4	Fineness Modulus	7.2

Admixture
Admixture plays a vital role which makes SCC possible. The admixture used in this experiment is conplast SP430 (a polycarboxylate based superplasticizer).

Features & Benefits:
- Reduces setting time depending on the dose and ambient temperature
- Improves the workability of the concrete
- Reduces water cement ratio less of segregation
- Helps to achieve high early strength, hence reduces setting time required for removal of shuttering in time
- Ordinary Portland cement can be used thereby reducing cost

Table:3 Total Number of Specimens to cast

S. No.	Mix Designation	No. of cubes	
1	Nominal Concrete	3	3
2	SCC(without nano silica)	3	3
3	SCC 2.5%	3	3
4	SCC 3%	3	3
5	SCC 3.5%	3	3
6	Total Specimens	15	15

Fineness of Cement= (10+6.67+10)/3 = 8.89%

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The finesse of cement is 8.89%, which is less than 10%.

Observations and Calculations:

Table:5 Normal Consistency

S. No.	Weight of cement (gms)	% of water Added ml	Penetration
1	250gms	27 X (250/100)	33
2		28 X (250/100)	25
3		29 X (250/100)	15
4		30 X (250/100)	10
5		31 X (250/100)	7

The percentage of water for normal consistency for the given sample of Cement is 31.67%.

Observation:

Quantity of cement = 250 gms.

Water for standard Consistency = 31.67%

Observation Table:

Table:6 Initial and Final Setting Time

The initial setting time of the cement sample is found to be 33 minutes

The final setting time of the cement sample is found to be 210 Minutes

Cement	% of water added	Time (sec)	Penetration (mm)
250gms	0.85x31% of weight of cement 0.85/100x(31) x(250) =66.93575	5	0
		10	0
		15	0
		20	0
		25	3
		30	5
		35	6
		40	10

TESTS ON FINE AGGREGATE

Sieve Analysis

The properties of fine aggregate are shown in Tables below. Weight of sand = 1000gms

Weight of pan = 814gms Weight of pan +sand = 1814gms

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Table:7 Sieve Analysis Results

S.No.	Sieve Size (mm)	Percent Retained	Cumulative % Retained	Percentage Passing
1	4.75	4.91	4.91	95.09
2	2.36	3.24	8.15	91.85
3	1.18	8.47	16.62	83.38
4	600 microns	26.03	42.60	57.38
5	300 microns	32.50	75.10	24.90
6	150 microns	21.20	96.30	3.70

Fine aggregate is allowed to pass through the 4.75mm sieve and retain on 150microns sieve.

Table:8 Bulking of Fine Aggregate

Desription	Slump Value
Nominal Concrete	270mm
SCC	650mm
SCC 2.5%	55mm
SCC 3%	62mm
SCC 3.5%	59mm

Bulking of fine aggregate is 25.6%.

Table:9 Acceptance Criteria for Self-Compacting Concrete

Test	Units	EFNARC Guidelines
Slump test	Mm	**650-800**
U-Box (h2-h1)	Mm	0-30
L Box (H2/H1)	Mm	0.8-1
V Funnel	Sec	8-12

The influence of different combinations of Nano-silica powder (2%, 2.5% and 3% by weight) with normal concrete at a constant w/c ratio of 0.44 has shown a trend of decrease in workability (slump). The observed values are tabulated below.

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Table:10 Slump Cone Results

S.No.	% of water added to the weight of the sand	Height of moist sand in cm(hi)	Percentage of bulking of sand (hi-h)/h*100
1	2	20.5	12.02
2	4	22.5	22.9
3	6	23	25.6
4	8	22	22.02
5	10	21	14.75
6	12	19.7	7.65

Flow Table

Flow table test is performed to determine the consistency of flow the concrete mix on the table. To perform the test, the apparatus is first made wet and then placed on a level, firm surface. Then a cone is placed on the flow table, concrete is filled into the cone in two layers. As it is a self-compacting concrete, compaction is not needed. Wait for 30seconds and remove the cone gently at a height of 40mm, allowing the concrete to flow on the table. confirming to IS: 1199-1959. The measured diameter of flow of concrete are as follows:

Table:11 Flow Table Results

S.No	Description	Diameter of Flow	
1	SCC	48	48.5
2	SCC 2.5%	48	48.5
3	SCC 3%	47	48.4
4	SCC 3.5%	47.4	47.8

The L-Box should be filled by the concrete up to its 1/3rd

.The concrete flows through the L-Box by its self-weight. The time taken by the concrete to reach the end of L-Box is tabulated below

Table:12 L-Box

S.No.	Description	Filling Height (mm)		
		H1	H2	H2/h1
1	SCC	58	58	1.0

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2	SCC 2.5%	65	51.25	0.78
3	SCC 3%	77	73.15	0.92
4	SCC 3.5%	75	70	0.93

Table 13 V-Funnel

S.No	Description	Flow Time(sec)
1	SCC	12
2	SCC 2.5%	11.7
3	SCC 3	10.1
4	SCC 3.5%	9.8

Table 14 U-Box

S.No	Description	Filling Height(cms)
1	SCC	30
2	SCC 2.5%	26
3	SCC 3%	26
4	SCC 3.5%	24

COMPRESSIVE STRENGTH VALUES

Compressive strength = $\frac{load}{area}$ *100

Table 15 Compressive Strength Values

S.No	Mix Designation	Characteristic Compressive Strength(N/mm^2)	
		7 days	28 days
1	Nominal Concrete	14.23	20.31
2	SCC	15.67	24.22
3	SCC 2.5%	17.78	26.10
4	SCC 3	18.02	26.73
5	SCC 3.5%	18.43	27.42

Graphs are plotted for the obtained results and increase in the characteristic compressive strengths can be clearly read out. It was observed that the percentage increase in compressive strength was greater for 7 days

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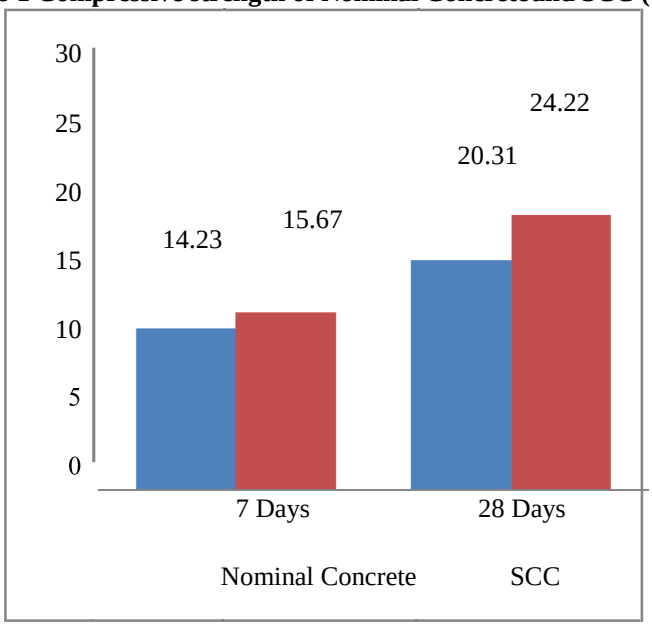
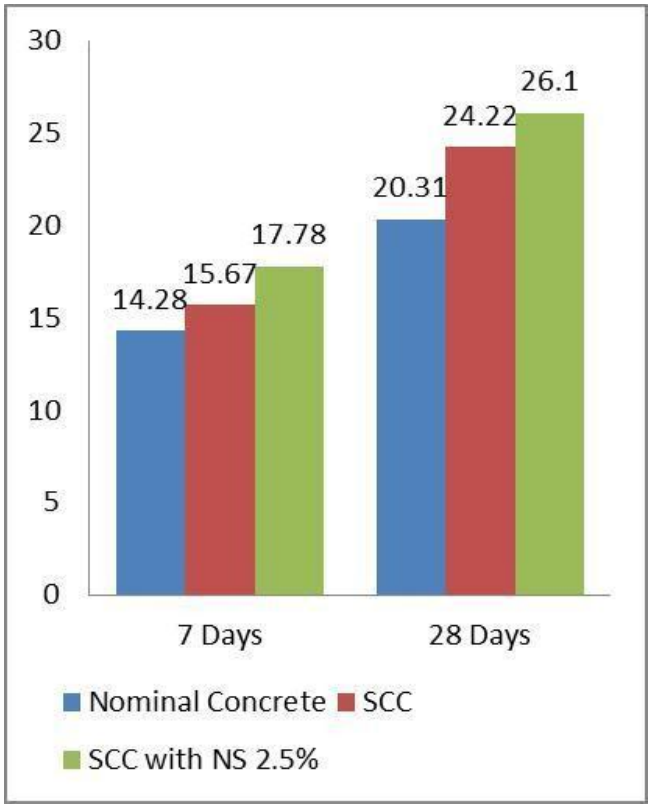
compared to 28 days. Hence from the experimental investigation results it can be inferred that Nano-silica improves early strength also.

Graph no 1 Compressive strength of Nominal Concrete and SCC (with out Ns)



Graph no 2 Compressive Strength of Nominal Concrete, SCC And SCC with Nano Silica 2.5%



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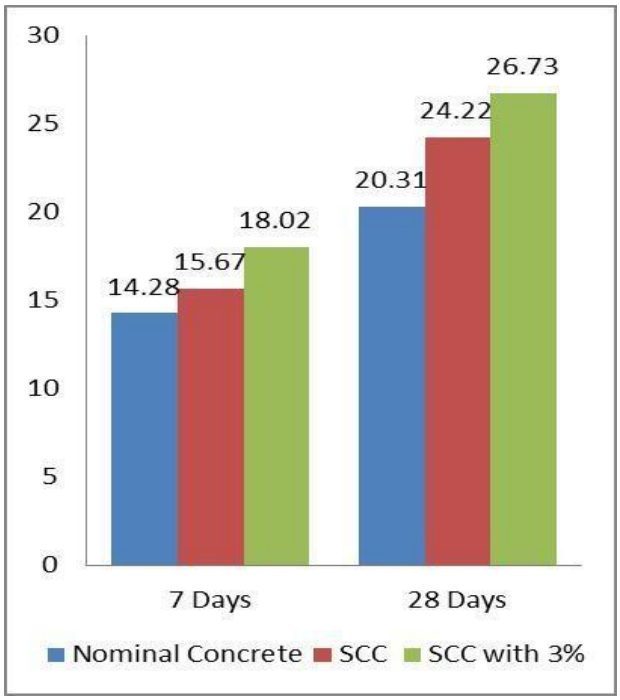
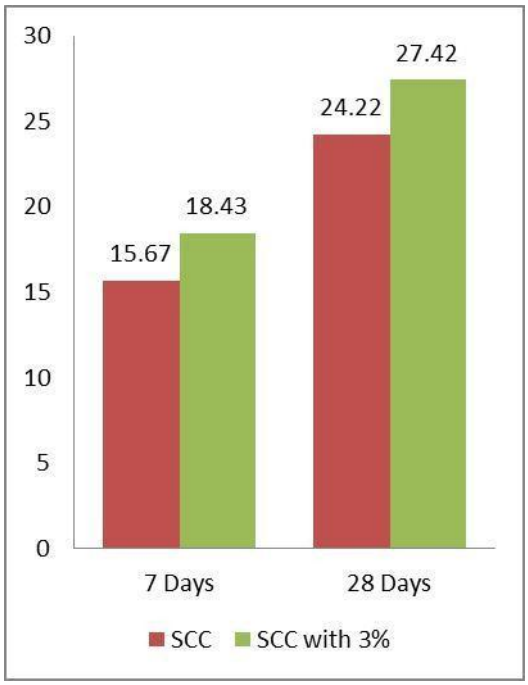
Graph no: 3 Compressive Strength of Nominal Concrete, SCC And SCC with Nano Silica 3%



Graph no:4 Compressive Strength of Nominal Concrete, SCC and SCC with 3.5%



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GRAPH NO 5 Compressive strength of Nominal Concret, SCC without NS, SCC with 2.5% NS, SCC with 3% NS And SCC with 3.5% NS.

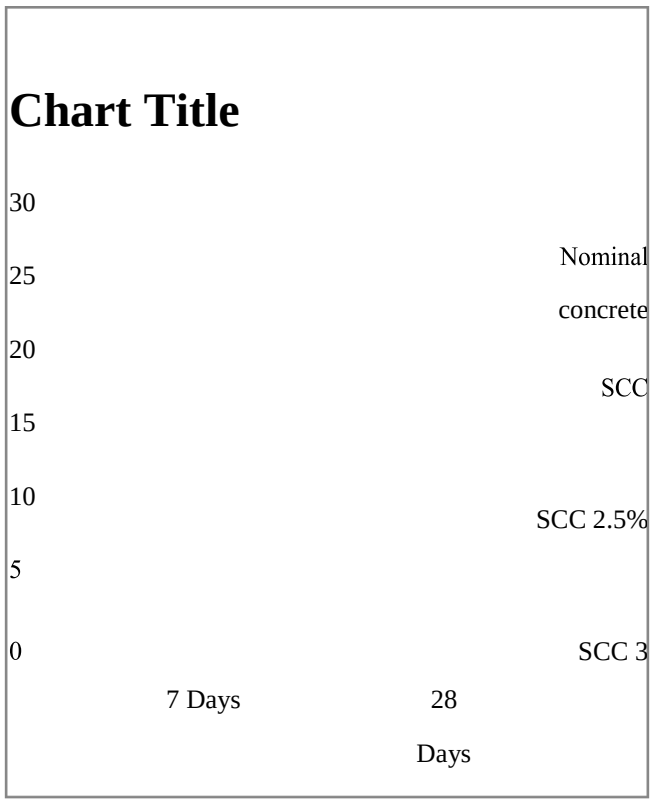

Table 16 Tensile strength of Concrete

S.No	Mix Designation	Tensile Strength 2 (N/mm)
1	SCC	3.30
2	SCC with NS 2.5%	3.95
3	SCC with NS 3%	3.12
4	SCC with NS 3.5%	2.96

III. COMPARISON OF RESULTS

Comparison of Workability Results

Table 17 Comparison of Slump Value

Description	Slump Value (mm)		Comparison
	Test 1	Test 2	Difference in Filling Ability
Nominal	17	17	0

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Concrete			
SCC	25	25	0
SCC 2.5%	55	61	6
SCC 3%	62	75	13
SCC 3.5%	59	68	9

Tolerance limit of Slump Cone was achieved

Table 18 Comparison of V-Funnel

Description	**Flow Time (Sec)**		**Comparison**
	Test 1	Test 2	Differencein Filling Ability
SCC	8	12	4
SCC 2.5%	10.7	11.7	1
SCC 3%	8.5	10.1	1.6
SCC 3.5%	8	9.8	1.8

Table 19 Comparison of L-Box

Description	**Filling Height (mm)**						**Comparison**
	Test1			Test 2			Difference inpassing ability
	H1	H2	H2/H1	H1	H2	H2/H1	
SCC	53	51	0.8	58	58	1.0	0.2
SCC 2.5%	53.33	51.25	0.82	65	51.25	0.78	0.04
SCC 3%	70.84	77	0.92	77	73.15	0.92	0
SCC 3.5%	74	71.72	0.95	75	70	0.93	0.02

Table 20 Comparison of U-Box

Description	**Filling Height (mm)**		**Comparison**
	Test 1	Test 2	Difference in Passing ability
SCC	30	30	1
SCC 2.5%	26	29	3
SCC 3%	26	28	2

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SCC 3.5%	24	22	2

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Table 22 Comparison of Compressive Strength Values of 28 Days

MIX Designation	Characteristic Compressive Strength`		Comparison
	Test 1	Test 2	Deference In Strength
Nominal Concrete	20.31	28.85	8.54
SCC	24.22	32.89	8.67
SCC 2.5%	26.10	31.36	5.26
SCC 3%	26.73	38.60	11.60
SCC 3.5%	27.42	37.54	10.12

Compressive Strength of 28 days shows a tremendous increase in the Strength by Comparing two different batches of same specimen samples.

COMPRESSIVE STRENGTH VALUES

Table 21 Comparison of Compressive Strength Values of 7 Days

Compressive Strength of 7 days shows a tremendous increase in the Strength by comparing two different batches of same specimen samples.

MIX Designation	Characteristic Compressive Strength`		Comparison
	Test 1	Test 2	Deference in strength
Nominal Concrete	14.23	27.12	12.89
SCC	15.67	28.52	12.85
SCC 2.5%	17.78	31.14	13.36
SCC 3%	18.02	36.22	18.2
SCC 3.5%	18.42	36.70	18.28

SAMPLE 1: CEMENT

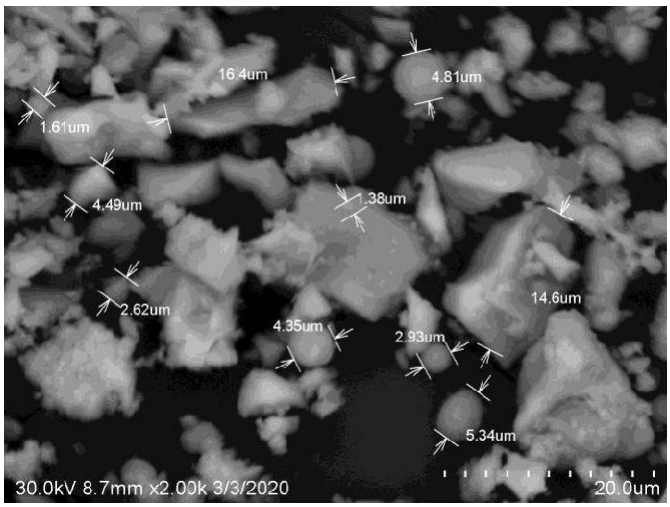

Figure 1:Cement

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PixelSize=49.60938 AcceleratingVoltage=30000 Volt Magnification=2000 WorkingDistance=8700 um EmissionCurrent=112000 nA Vacuum=60 MicronMarker=20000 ColorMode=Grayscale Condition=Vacc=30kV Mag=x2.00k WD=8.7mm

Cement sample is tested at vacuum pressure of 60. At a Magnification of 2000. Voltage Acceleration of 30000 Volt is same for all samples.49.60938 was the PixelSize for the image. This image shows us the size of cement particles ranging from 1.38 to 16.4um and circular and irregular

PixelSize=49.60938 AcceleratingVoltage=30000 Volt Magnification=2000 WorkingDistance=8500 um Vacuum=60 ColorMode=Grayscale
Condition=Vacc=30kV Mag=x2.00k WD=8.5mm

Fig 3 shows Nano Silica powder + cement sample is tested at vacuum pressure of 60. At a Magnification of 2000. Voltage Accelerating of 30000 Volt is same for all samples.49.60938 was the Pixel Size for the image. This image shows us the size of particles ranging from 9.05um to 5.31um and irregular shapes. This image till us the bounding of both particles and filling void space in the cement particle. which shows us the density of product by which the strength of the product may increase. shapes.it shows us the void space in between the cement particles.

Sample 2: NANO SILICA POWDER

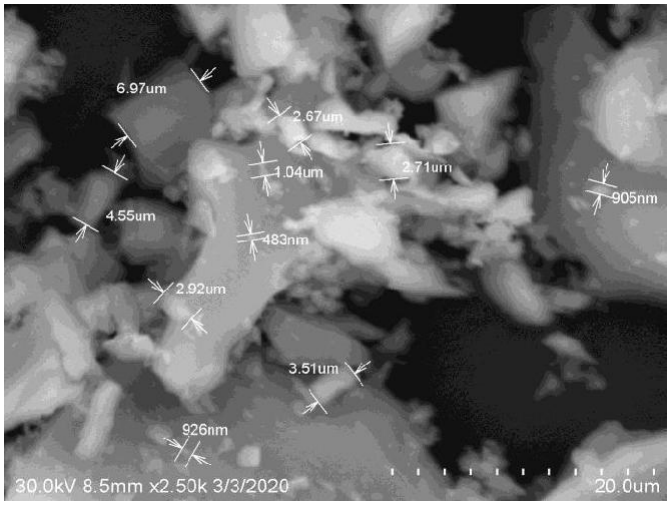

Figure 2:Nano Silica Powder

PixelSize=39.6875 AcceleratingVoltage=30000 Volt Magnification=2500 WorkingDistance=8500 um EmissionCurrent=108000 nA Vacuum=60 ColorMode=Grayscale
Condition=Vacc=30kV Mag=x2.50k WD=8.5mm

Nano Silica powder sample is tested at vacuum pressure of
60. At a Magnification of 2000. Voltage Acceleration of 30000 Volt is same for all samples.39.6875 was the PixelSize for the image. This image shows us the size of nano particles ranging from 9.05um to 1.14um and irregular shapes.

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SAMPLE 3: CEMENT +NANO SILICA

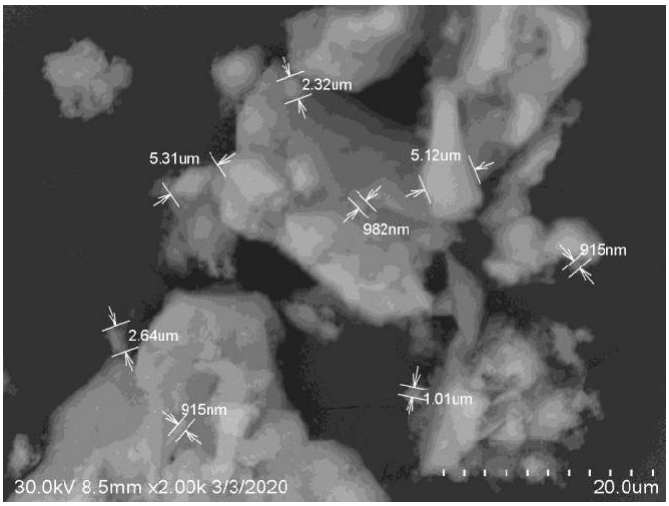

Figure 3:Nano Silica Powder+Cement

IV. CONCLUSIONS

The main conclusions of this project are:

- As we compare with nominal concrete Compressive strength with NS dosage of 7% has increased for 7 and 28 days respectively compared to normal.
- As we compare with nominal concrete The workability of the concrete along with Nano- silica powder has decreased.
- As we compare with nominal concrete ,Due to Decrease in the quantity of cement, the concrete becomes economical and eco-friendly.
- Trial and error method was been used to design the SCC mix because there is no standard method for SCC in any institutes and concrete mix plants.
- As we compare with nominal concrete SCC do not depend in a single test, but it depends in all of the four tests and it must pass all of them to be called Self-compacting concrete.
- As we compare with nominal concrete When compared with normal concrete self compaction concrete shows a significant increase due to well compacted as density increases in concrete strength also increases.
- SEM results shows that Nano-Silica helps in filling the voids spaces between the cement particles and helps in increasing the density of the concrete.
- If the density of the concrete increases then the compressive strength of the concrete also increases.

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JOURNAL OF CRITICAL REVIEWS

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COMPARATIVE STUDY OF BLACK COTTON SOIL STABILIZATION USING COPPER SLAG AND FLY ASH FOR PAVEMENT CONSTRUCTION

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Abstract: Soil is the basic foundation for any civil engineering structures. It is required to bear the loads without failure. In some places, soil may be weak which cannot resist the oncoming loads. In such cases, soil stabilization is needed. Numerous methods are available in the literature for soil stabilization. But sometimes, some of the methods like chemical stabilization; lime stabilization etc. adversely affects the chemical composition of the soil. In this study, fly ash and copper slag were mixed with Black cotton soil to investigate the relative strength gain in terms of unconfined compression, bearing capacity and compaction. The effect of fly ash and copper slag on the geotechnical characteristics of clay-fly ash and clay-lime mixtures was investigated by conducting standard Proctor compaction tests, unconfined compression tests, CBR tests and permeability test. The tests were performed as per Indian Standard specifications. The black cotton soil used for these experiments was brought from bowrampet village ,near Bachupally, Hyderabad, Telangana. The physical properties of the soil were determined as per IS specifications. Fly ash for the study was brought from Dundigal (Hyderabad). It is finely divided residue resulting from the combustion of ground or powdered coal from electric generating plants. It has high water absorption capacity. Copper slag was brought from SRI SRINIVASA METALIZERS (Phase II, IDA, Cherlapally, HYD) Copper slag is a by-product extracted during the process of smelting. In the process of smelting, the impurities become slag and floated in the top surface of the molten metal which will be quenched in water produces angular granules and disposed as wastes. In this test programmer, without additives clay was tested to find the optimum moisture content, CBR value, plasticity index and unconfined compression strength. Fly ash and Copper slag were added in varying percentages and that fraction for which maximum strength is obtained was found out.

Key words: BC Soil, copper slag, fly ash, Compaction, CBR.

INTRODUCTION

Emerging trend of using waste material in soil stabilizing or soil strengthening is being operational all over the world in the present days. The main reason behind this trend is the excessive production of waste like fly ash, plastics, rice husk ash (RHA) which is not only hazardous but also creating deposition/disposal problems. Using some of these waste materials in construction practice will reduce the problem to a great extent.

The history of stabilization of soil has a long background with hundreds of research results. Several research results with waste materials such as fly ash, plastics; rice husk ash has also be published with their benefits Stabilized Sub-Grade Soil containing Copper slag and fly ash and Sensitivity Analysis of Sub-Grade Soil CBR.

The naturally occurring materials are fast depleting because of their over exploitation to meet the huge demand for construction of infrastructure projects. To study behavior of fly ash & copper slag with black soil, samples are collected from Hyderabad.

At present India is in the phase of development and huge investments are being made in the up gradation of existing roads under national highway development programme (NHDP) and construction of new roads under Pradhan Mantri Gram Sadak Yojana (PMGSY).

Therefore the naturally occurring materials are fast depleting because of their over exploitation to meet the huge demand for construction of infrastructure projects.

In a recent years there has been a growing emphasis all over the world towards promoting the use of marginal materials in road construction in order to effect cost saving reduce pressure on good quality aggregates and also protect environment.

FLY ASH

Fly ash is a coal combustion by-product – a finely divided residue resulting from combustion of coal in power plants. In the thermal power stations, coal is pulverized into fine powder and pumped into the boiler along with compressed air. Coal

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powder is fired to generate heat, which in turn produces steam to run the turbine. After burning, the coarse ash or 'bottom ash' gets collected below the boiler. The finer particles of coal are collected in the Electro-Static Precipitators (ESP).

Fly ash, also known as "pulverized fuel ash" in the United Kingdom, is a coal combustion product that is composed of the particulates (fine particles of fuel) that are driven out of coal-fired boilers together with the flue gases. Ash that falls to the bottom of the boiler is called bottom ash.

Physical properties and chemical composition of fly ash

Physical Properties	
Specific gravity	2.27
Loss on ignition	11.8%
Chemical Composition	
Silica (SiO2)	58.3%
Alumina (Al2O3)+Iron oxide (Fe2O3)	26.3%
Calcium oxide (CaO)	2.2%
Magnesium oxide (MgO)	0.3%

COPPER SLAG:

Copper slag is a by-product extracted during the process of smelting. In the process of smelting, the impurities become slag and floated in the top surface of the molten metal which will be quenched in water produces angular granules and disposed as wastes. Copper slag is in black color and granular in shape has less than 1% moisture

The specific gravity of slag was 3.2 and the grain size mostly between 2.36 mm to 1.18 mm which very closely matches with sand property. Mostly the composition of copper slag contains oxides of copper, iron and silica.

Copper slag was brought from SRI SRINIVASA METALIZERS (Phase II, IDA, Cherlapally, HYD) Copper slag is a by-product extracted during the process of smelting. In the process of smelting, the impurities become slag and floated in the top surface of the molten metal which will be quenched in water produces angular granules and disposed as wastes.

Fig 2: Curtailment of Reinforcement in RCC Section Beams

Beam was cast with circular moulds to provide the opening in the transverse direction. These moulds were removed after 24 hours. Beam was unmolded and surface curing was done for 28 days.



METHODOLOGY

Index tests on the natural laterite soils were carried out in accordance with the procedures obtained in IS 2720, step percentages of bitumen emulsion and coconut shell and egg shellby dry weight of soil (5,10 and 15%) was introduced into the soil.

The following tests were carried out on the Laterite soil

- Natural moisture content test
- specific gravity (Density Bottle method)•Compaction test (Standard proctor test)
- California bearing ratio test
- Compressive Strength test
- Direct shear test

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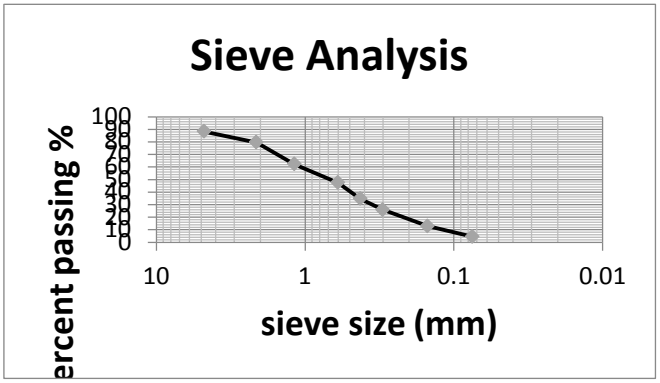
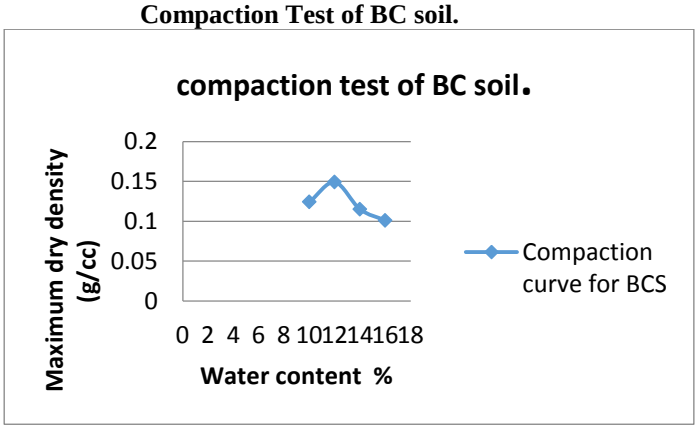


Geotechnical Properties

S.no	Parameters	Parameters
1	Specific gravity Gs	2.6
2	Atterberg's limits %	
	Liquid limit	0.7275
	Plastic limit	18.269
	Plasticity index	17.5
3	Sieve analysis%	
	Sand	30.5
	Silt	44.3
	Clay	24.5
	Effective particle size (D10) mm	0.275
	(D30)mm	0.69
	(D60)mm	61.8
	Coefficient of uniformity (Cu	11.45
	Coefficient of curvature (Cc)	0.88
4	Optimum moisture content	14
5	Maximum dry density KN/M^3	15.901
6	IS classification	CH & MH

The above graph shows sieve analysis test of BC soil Sand is 30. 5%, silt is 44.37 % & 24.5% of clay content.

Compaction Test of BC soil.



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Above graph shows the compaction test of BC soil is 12% of Optimum moisture content&15.901% maximum dry density

RESULT

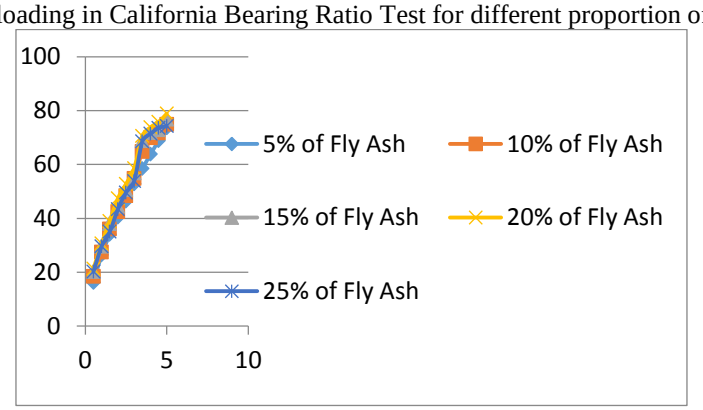
1. Coefficient of Curvature, Cc= 6
2. Uniformity Coefficient, Cu= 2.80

Therefore according to above known conditions the laterite soil taken is perfectly uniformly graded.

CBR values of Fly ash mixing with Black cotton soil with different percentages

Sl.no.	Description	CBR values	
		Penetration 2.5mm	Penetration 5.0mm
1.	Soil	28	17
2.	Soil + 5% fly-ash	29.32	24.12
3.	Soil + 10% fly-ash	31.4	28.3
4.	Soil + 15% fly-ash	32.7	31.41
5.	Soil + 20% fly-ash	33.2	32.6
6.	Soil + 25% fly-ash	38.3	36.5

1) Graph of Penetration v/s loading in California Bearing Ratio Test for different proportion of fly ash



CBR values of Copper slag mixing with Black cotton soil with different percentages

SL.no.	Description	CBR values	
		Penetration 2.5mm	Penetration 5.0mm
1.	Soil	28	17
2.	Soil + 5% Copper slag	19.23	17.01
3.	Soil + 10% Copper slag	21.41	17.32
4.	Soil + 15% Copper slag	22.8	18.6

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5.	Soil + 20% Copper slag	23.3	19.5
6.	Soil + 25% Copper slag	23.9	19.9

1) Graph of Penetration v/s loading in California Bearing Ratio Test for different proportion of Copper Slag

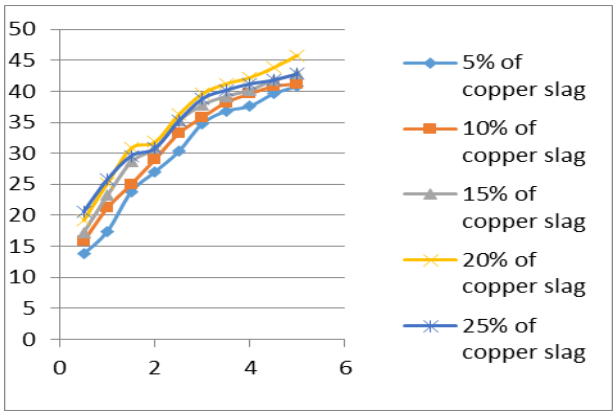
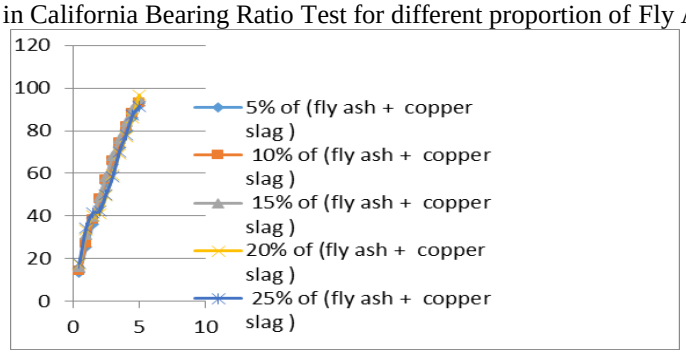


Fig 3 Mounting RCC Beam on Torsion Machine

CBR values fly ash, Copper slag and mixture of fly ash and copper slag with Black cotton soil with different percentages.

SL.no.	Description	CBR values	
		Penetration 2.5mm	Penetration 5.0mm
1.	Soil	28	17
2.	Soil + 5% fly-ash + 5% Copper slag	38.6	35.2
3.	Soil + 10% fly-ash + 10% Copper slag	39.01	36.2
4.	Soil + 15% fly-ash + 15% Copper slag	42.1	37.2
5.	Soil + 20% fly-ash + 20% Copper slag	45.37	39.61
6.	Soil + 25% fly-ash + 25% Copper slag	45.7	43.1

Graph of Penetration v/s loading in California Bearing Ratio Test for different proportion of Fly Ash and Copper Slag



CBR values of Fly ash, Copper slag and mixture of Fly ash and Copper slag with Black cotton soil at a 5%

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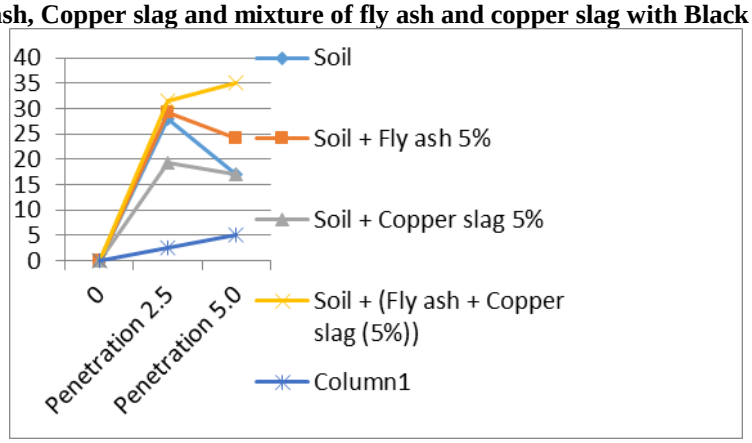
Sample	Penetration	
	2.5mm	5.0mm
Soil	28	17
Fly ash	29.32	24.02
Copper slag	19.32	17.01
Soil +fly ash +copper slag	38.6	35.2

CBR values of fly ash, Copper slag and mixture of fly ash and copper slag with Black cotton soil at a 5%



CBR values of fly ash, Copper slag and mixture of fly ash and copper slag with Black cotton soil at a 10%

Sample	Penetration	
	2.5mm	5.0mm
Soil	28	17
Fly ash	31.4	28.3
Copper slag	21.41	17.32
Soil +fly ash +copper slag	39.01.	36.2

CBR values of fly ash, Copper slag and mixture of fly ash and copper slag with Black cotton soil at a 10%

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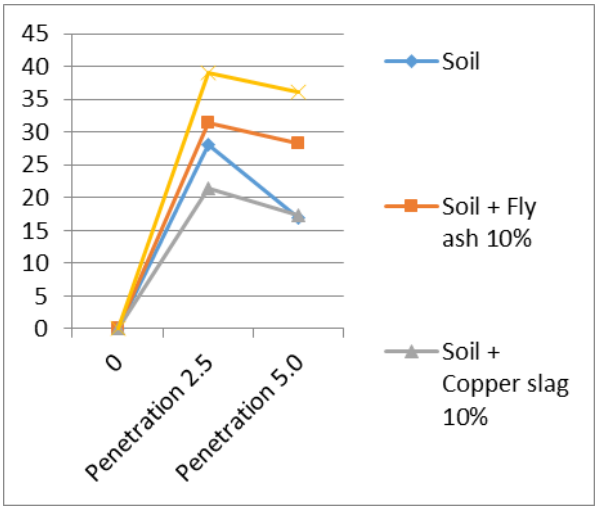
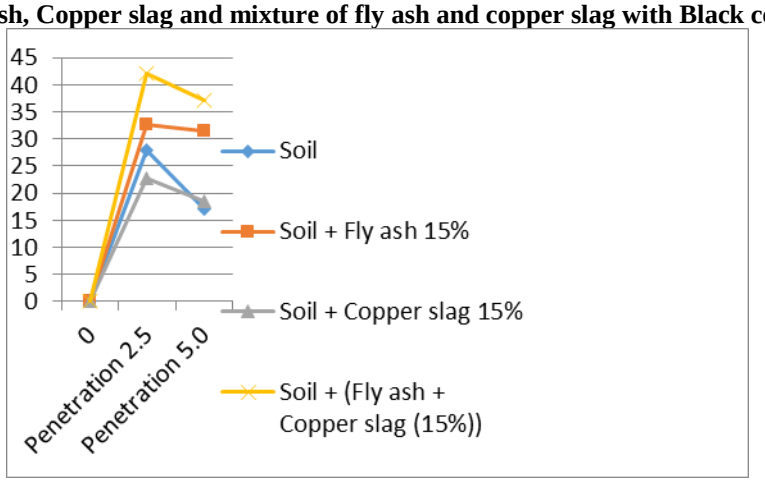


CBR values of fly ash, Copper slag and mixture of fly ash and copper slag with Black cotton soil at a 15%

Sample	Penetration	
	2.5mm	5.0mm
Soil	28	17
Fly ash	32.7	31.4
Copper slag	22.8	18.6
Soil +fly ash +copper slag	42.1	37.2

CBR values of fly ash, Copper slag and mixture of fly ash and copper slag with Black cotton soil at a 15%



CBR values of fly ash, Copper slag and mixture of fly ash and copper slag with Black cotton soil at a 25%

Sample	Penetration	
	2.5mm	5.0mm
Soil	28	17
Fly ash	38.3	36.5
Copper slag	23.9	19.9

Soil +fly ash +copper slag	45.7	43.1

CBR values of fly ash, Copper slag and mixture of fly ash and copper slag with Black cotton soil at a 25%

CONCLUSION:-

The investigation that has been performed on black cotton soil with different admixtures such as fly ash and copper slag gives wide variety of results on several issues from which the following qualitative conclusions can be drawn:-

1. The strength of the black cotton soil without any admixtures is up to 28%.

2. At a 5% of fly ash, copper slag and mixture of the both fly ash and copper slag with black cotton soil, CBR value is increased up to 29.32%, 19.32% and 38.6%.

3. At a 10% of fly ash, copper slag and mixture of the both fly ash and copper slag with black cotton soil, CBR value is increased up to 31.4%, 21.41% and 39.01%.

4. At a 15% of fly ash, copper slag and mixture of the both fly ash and copper slag with black cotton soil, CBR value is increased up to 32.7%, 22.8% and 42.1%.

5. At a 20% of fly ash, copper slag and mixture of the both fly ash and copper slag with black cotton soil, CBR value is increased up to 33.5%, 23.3% and 45.3%.

6. At a 25% of fly ash, copper slag and mixture of the both fly ash and copper slag with black cotton soil, CBR value is increased up to 38.3%, 23.9% and 45.7%.

7. It is clearly observed from the above points that the strength of the soil stabilized using fly ash gives more strength compared to copper slag.

Scope for future work:

Large area of **Bowrampet village** near **bachupally**, **Hyderabad** is covered with black cotton soil, which has low strength and not so suitable as a sub grade material. To improve the strength characteristics of soil, the following further studies can be carried out.

- A detailed review of stabilizing weak soil of **Bowrampet village** near **bachupally**, **Hyderabad.**
- Field performance of different types of admixtures such as Fly ash and copper slag.
- Performance of admixtures for pavement constructions.
- Optimization of layer thickness of admixtures in the sub base layer of soil for reducing the fill thickness in roads.

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SEISMIC ANALYSIS OF MULTI STOREY BUILDING WITH AND WITHOUT HANGING COLUMNS

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Abstract

A-pillar is a vertical section, preliminary from footing level also shifting weight to the base. Hanging or stub section similarly a precipitous element which closes (as of model design/site condition) on its base level, lies on level part i.e., beam (horizontal section). Such sections (hanging or stub) where the burden was mulled over using point load. Present examination on G+12 model with/without hanging section is studied by applying response spectrum & time history procedures beneath quake load at zone two also differentiates with storey shears, lateral burden, storey relocations, storey drifts by using Etabs. From the final output, it was clear that storey shears, lateral burden, storey displacements, storey drifts are increased for the model without hanging sections concerning model with hanging section.

Keyword : storey shear, lateral burden, storey displacements, response spectrum, ETABS

I. Introduction

Innumerable capital (city) multi-storey constructions in India these days has first storey open as a predictable lookout. It is predominantly implemented for house stopping, gathering risk rooms at the essential storey. There were many structures where hanging sections are being used, mainly above the level of the ground. Wherever distribution beams are being used, with the objective that undeniably clear zone available at ground floor. Hanging sections were satisfactorily expert to get hold of gravity mass, nevertheless, distribution beams must have suitable dimensions with a minor deflection. Distribution beams must design prudently, particularly at quake

occurrence zone. Configuration elements of the model which was affected due to quake force should be kept away if not, configuration elements must limit. So, houses previously built with discontinuous sections must jeopardize at seismic tremor zones. Those constructions cannot be crushed, instead, the examination must carry out strengthen the structure or scarcely any recuperating features can propose.

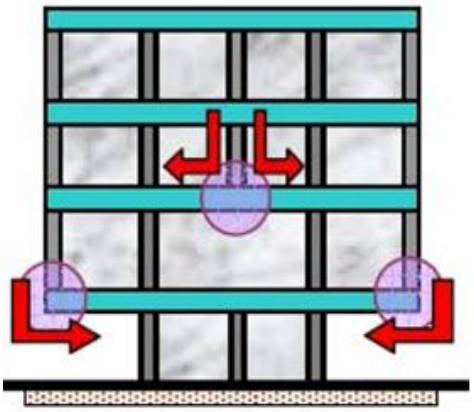

Fig. 1: Hanging column structure

II. Methodology

Response Spectrum Technique:

Response spectrum is a chart of highpoint and constant state reaction of the arrangement of an accelerator of fluctuating frequency which remained inhibited to movement via identical vibration, shake. It is a procedure to find the quake reaction of the model by using vibrational mode shapes. Computer investigation can be applied for guessing out modes of model. By utilizing the design spectrum each mode reaction can be known. After understanding the modal mass & frequency they remained combined on the certain approximation of absolute reaction of the model. In this, we have to figure the consequence of force at Y, X, Z direction and formerly observe the effects on the structure. Integrate approaches contain the following:

Absolute peak method
CQC method
SRSS method

The procedure of SRSS is utilized when the distance among eigenvectors or eigenvalues have more gap then we use this method. CQC procedure is utilized when eigenvalues are in the locale of ten per cent then we follow this method. Therefore, the entire reaction on every floor that has extreme values doesn't happen on a similar period, at a similar period immediately they can't remain added. So, for the accomplishment of the entire reaction 2 procedures were used.

Time history method:

Time history practice contains a stage-by-stage evaluation of model reaction, applying discretized data which was recorded/planned seismic records by way of ground wave input. A couple of ground-level motion records intended for coetaneous study along all flat axis of model essential to remain constant. Steady couples remain regular waves predictable on a specified location mainly depend upon alike seismic tremor. In time history practice, the reaction of the model towards ground level expansion is determined at time-space & wholly phase statics are subsequently sustained. In the situation wherever the model is extremely uneven, extremely elevated, Response Spectrum is not appropriate besides advanced complicated technique is desirable.

III. Modelling

Loads and Intensities:

Live load of the floor- 3 kN/m^2

wall load- 3.9 kN/m^2

Finishing off the floor- 1.5 kN/m^2

Parapet load- 1 kN/ m^2

Building details of modelled structure:

Storey height of Bottom story- 3.0 m

Storey height of typical storey- 3.0 m

Height of structure- 36 m.

Plan area- 8.5 m x 8.5 m

Structure type- Symmetrical and regular

Structure Frame system- O.M.R. F

No. of storeys- G+12

Support- fixed

Seismic Properties:

Seismic zone- II

Time history function- Elcentro seismic tremor data

Soil type- Medium

Damping ratio- 0.05

Response reduction factor- 5%

Zone factor- 0.10

Importance factor (I.F)- 1

Properties of Materials:

Reinforced concrete (R.C) density- 25 kN/m^3

Young's modulus (E_s)- 2 x 10^8kN/m^2

Steel Grade- Fe415

Young's modulus (Ec)- 27386127.87 kN/m^2

Concrete Grade- M30

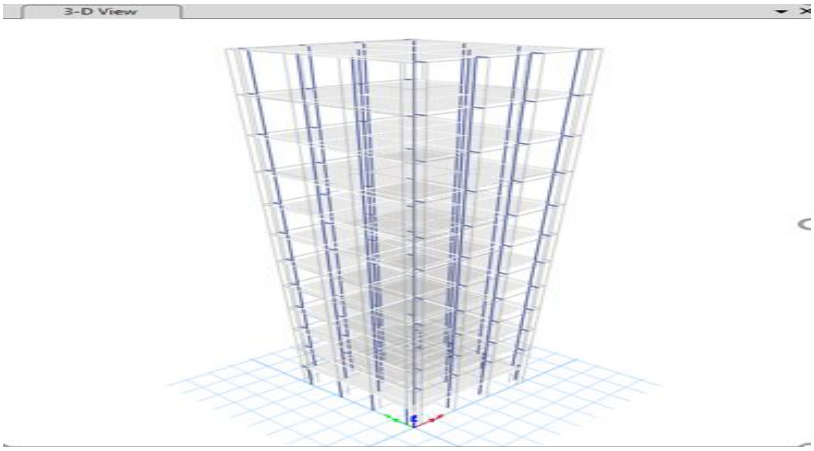

Fig..2: Elevation view of G+12 structure with hanging columns

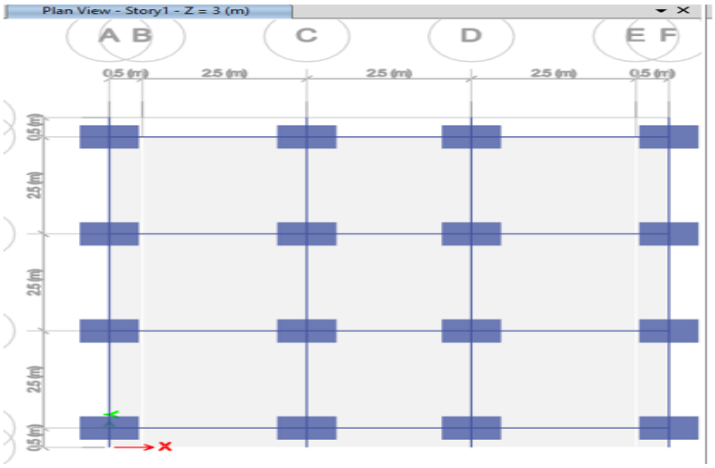

Fig. 3: Plan view of story 1 of G+12 structure with hanging columns

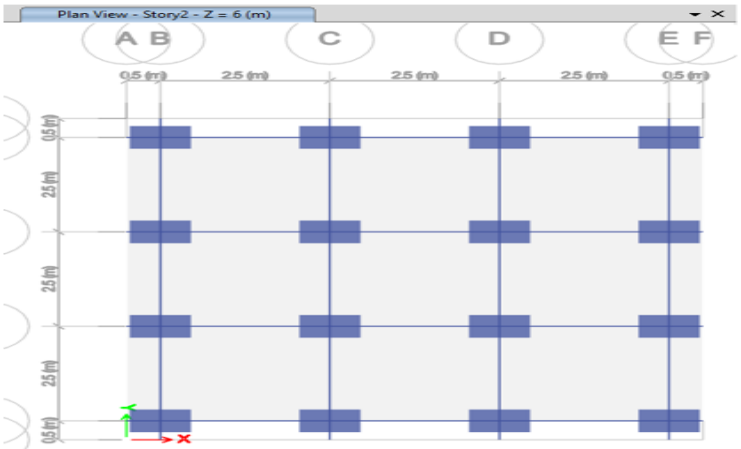

Fig. 4: Plan view of story 2 of G+12 structure with hanging columns

From figure 3&4 Insertion of hanging column exposed clearly.

IV. Results and Discussions

Results of G+12 structure with hanging columns

Lateral loads:

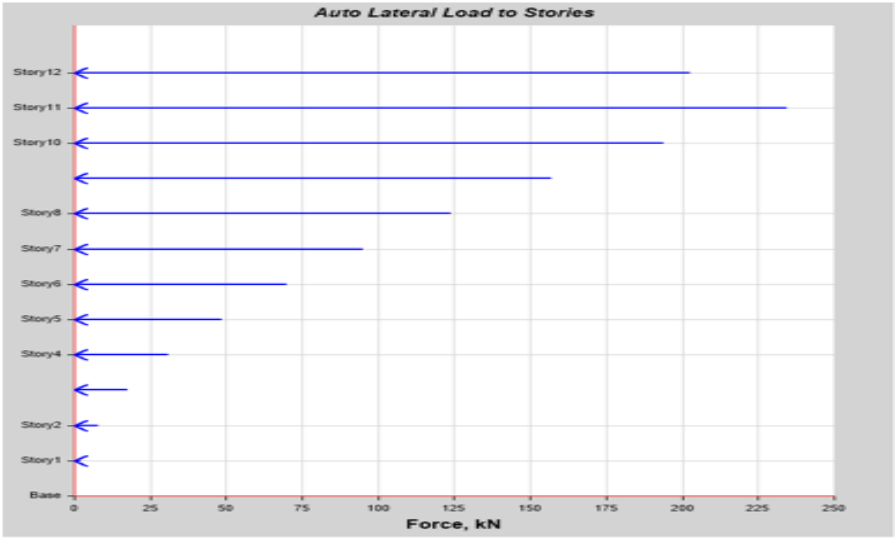

Fig. 5: The lateral burden in direction X at a storey of structure with hanging columns

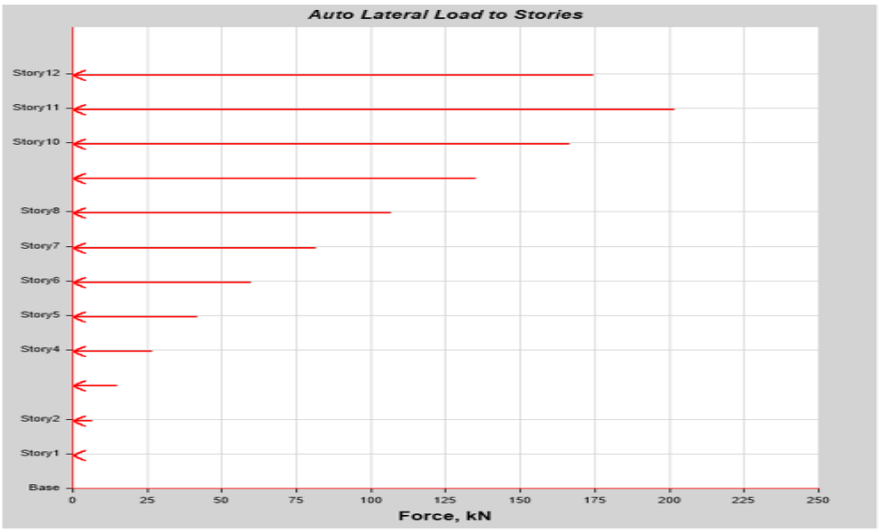

Fig. 6: The lateral burden in direction Y at a storey of structure with hanging columns

The lateral burden is Live loads that were acted parallel to the level of ground i.e., they remain flat forces applied on a model. It was seen that lateral weight for the model with a hanging column in direction X is greater w.r.t direction Y as shown in figure 5&6. lateral weight on model with the hanging column is lesser than the model without hanging column.

Storey shear:

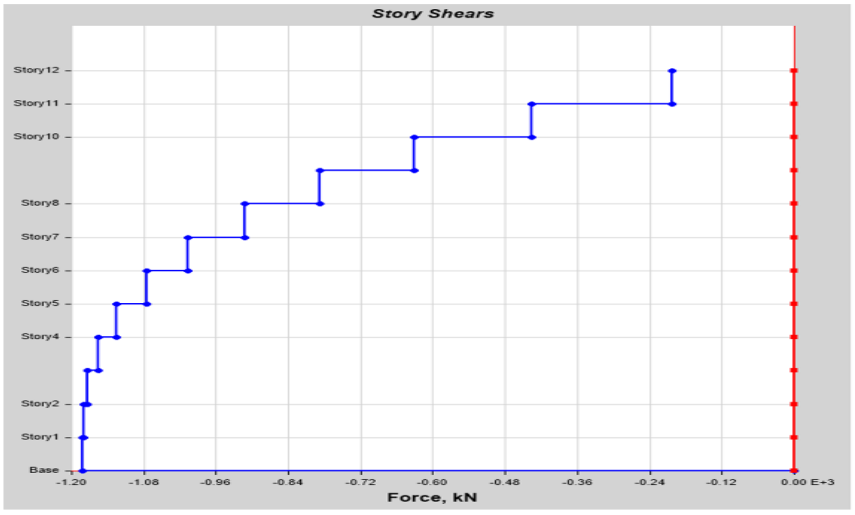

Fig. 7: Storey shear in direction X at a storey of structure with hanging columns

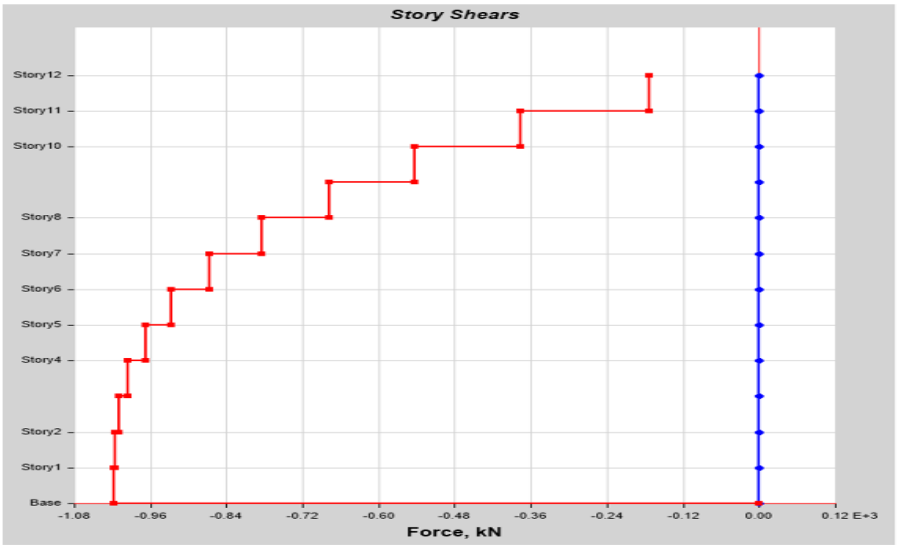

Fig. 8: Storey shear in direction Y at a storey of structure with hanging columns

In storey shear we can imagine conceivable leading lateral burden at a particular storey in a specified path and this determination will help to empathetic and examine where wind governs over quake in a particular direction. It was seen that storey shear for the model with a hanging column in direction Y is lesser w.r.t direction Y as shown in figure 7&8.

Storey drift:

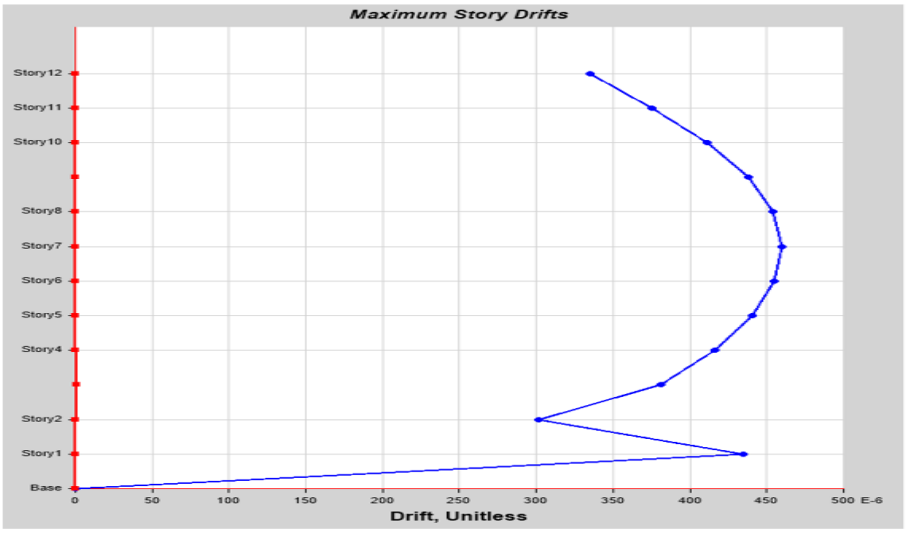

Fig. 9: Storey drift in direction X at a storey of structure with hanging columns

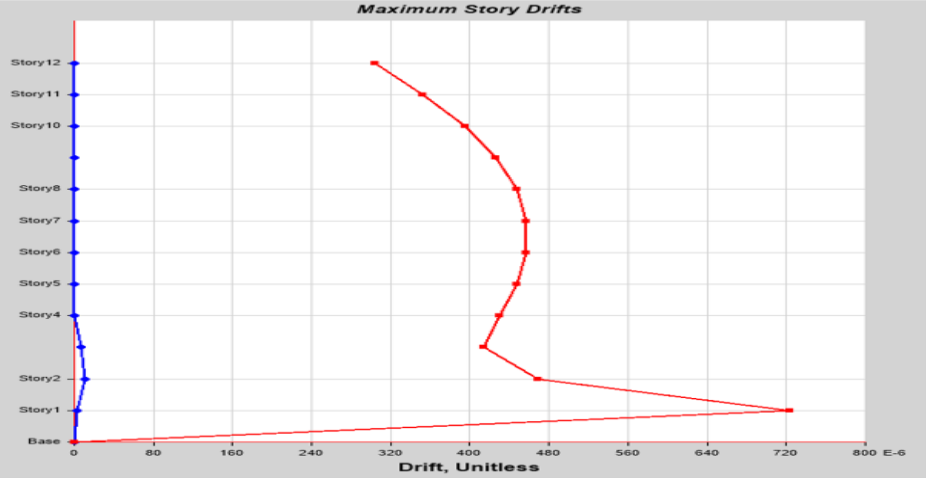

Fig. 10: Storey drift in direction Y at a storey of structure with hanging columns

Storey drift is the dislocation of one floor w.r.t the other floor it was seen that storey drifts for structure with a hanging column in direction X are decreased w.r.t direction Y as shown in figure 9&10.

Results of G+12 structure without hanging columns:

Storey Displacements:



Fig. 11: Storey displacements in direction X at a storey of the structure without hanging columns

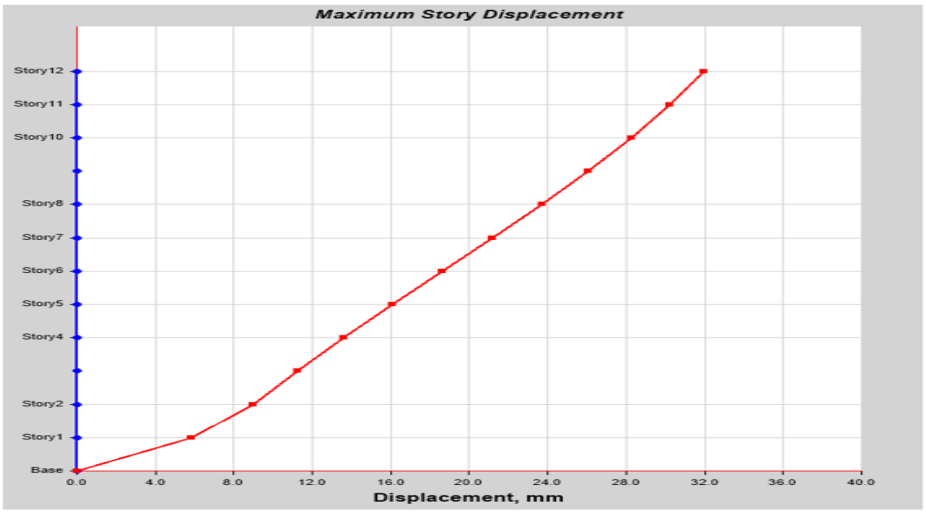

Fig. 12: Storey displacements in direction Y at a storey of the structure without hanging columns

Storey displacements are the dislocation of a floor w.r.t ground level of a structure. it was clear that displacements for the model without hanging column in direction Y is greater than direction X as shown in figure 11&12.

For different periods base shear of a structure:

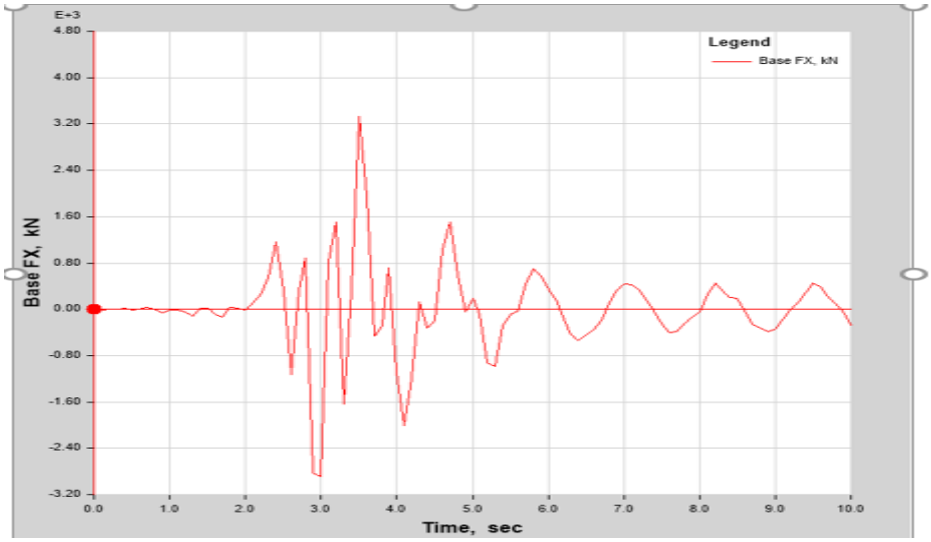

Fig. 13: Base shear for a structure without hanging columns at various periods.

It was demonstrated that with 3333.6 Kilo newton highest base shear befallen for a structure without hanging column at 3.5 seconds as shown in fig.13.

V. Conclusion

The response of high rise structure with and without hanging column is analysed under various earthquake excitation. The finite detailed model was created for observing dynamic conduct of multi-storey frame. Free vibration and static results acquired by utilizing present finite component code which was approved and it was finalized that.

1. The storey shear of structure with a hanging column in X-direction is more concerning Y-direction. The storey shear of structure with hanging columns is 48 per cent decreased than the structure without hanging columns.
2. The storey drifts for structure with hanging columns in Y-direction is more concerning X-direction. The storey drift of structure with hanging columns is 60 per cent decreased than the structure without hanging columns.
3. By increasing the ground floor column maximum displacement, base shear, overturning moment storey drift values are decreasing.
4. The horizontal loads on structure with hanging columns are 45 per cent decreased than structure without hanging column.
5. It has been seen that structure with the hanging column is stiffer than structure without hanging columns.
6. It has been seen that structure with hanging column has increased period as compared to the structure without hanging columns.
7. The storey displacement of structure with hanging columns in X-direction is more concerning Y-direction. The storey displacement of structure with hanging columns is 50 per cent decreased than the structure without hanging columns.
8. It has been seen that structure with hanging column has decreased base shear concerning the structure without hanging column. The maximum base shear occurred in structure with the hanging column is -283.42 Kilonewton at five seconds and the maximum base shear occurred in structure without hanging columns is 3333.6 Kilonewton at 3.5 seconds.

VI. Future Scope

This research can be extended by keeping the hanging columns at various storeys and various locations. We can examine in severe seismic tremor zones by keeping the seismic tremor resistant structural elements to the structure with hanging columns.

Conflict of Interest:

There was no relevant conflict of interest in this report

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Mode Selection and Route Layout of Internal Transportation In Industrial Enterprises

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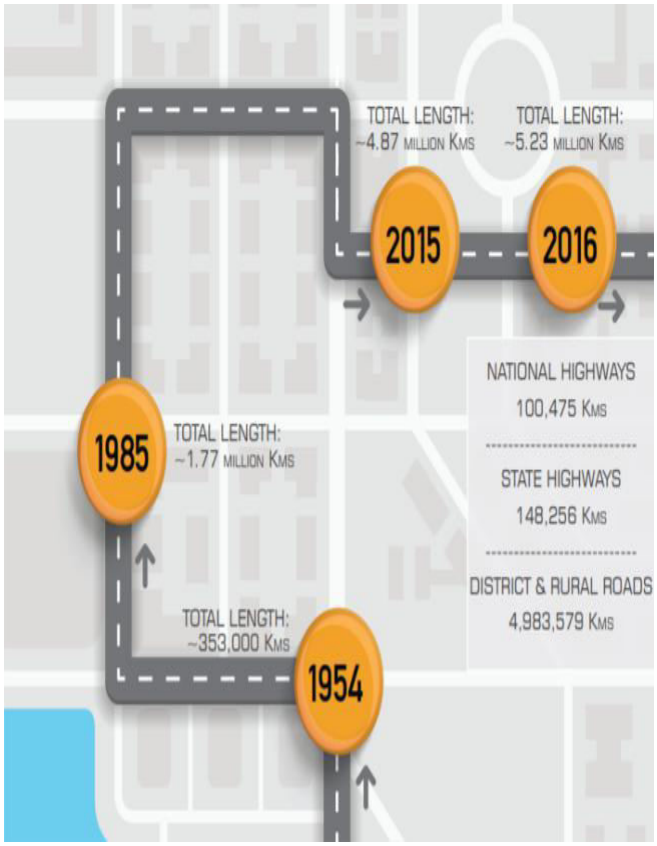
ABSTRACT

Transport is an essential component with which people not just connect with each other, but also progress. To fulfill the increase in demand for safe, reliable, environmental friendly, economical and efficient transport system, road infrastructure becomes crucial. With an increase in types of motor vehicles, there has been a gradual transition from rail-dominated transport to road-dominated transport over last few decades. The share of railways in passenger/km has decreased by ~60%. Transport of passengers and goods is vital to satisfy the mobility needs, which is commensurate with today's lifestyle characterized by social interactions and reliable goods distribution nationwide.Internal transportation means the process transportation in industrial enterprises. It is an extremely important aspect of General layout, the continuation of production and the core of enterprise logistics. Any modern industrial enterprise can operate successfully based on reasonable mode selection and route layout to meet the plan need of business, workshops and team section, to meet the need of handling work and other work, and to improve the relationship between public transport in which the material and technical, labor, consumption of energy and wealth is the minimum. By analyzing characteristics of different transportation, the factors of selecting transportation modes are concluded, focusing on the layout elements of road, rail and pipeline transportation routes to achieve maximum benefit in this paper.

INTRODUCTION

Starting from 1960's, Indian road network has developed in several stages and it is largely influenced by different political, technological, environmental and social factors. Total length of motor able roads in India in 1954 was estimated to be ~353,000 kms, which was meagre for any country of size of India, and its population. In 1985, the total motor able road length increased to

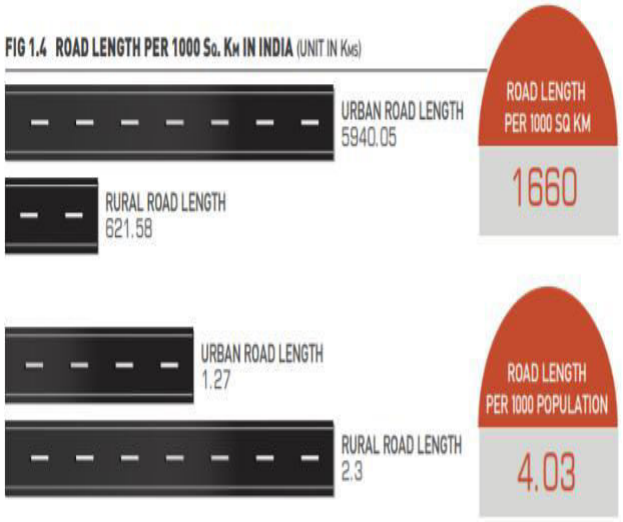
1.77 million kms and 208,938 villages were connected by the new roads. The problems related to urban transport became increasingly complex due to massive increase in road network, increased economic activities on the one hand and shortage of resources on the other hand. Due to unprecedented growth in population and unchecked migration from rural areas to urban areas and metropolitan cities, population pressure increased in urban areas and metropolitan cities. Today, India has one of the largest road networks in the world aggregating to ~5.23 million kms as of November, 2016. Roadways still remains the dominant mode of transport in India, carrying >75% of total traffic, out of which, road carries >57% freight traffic and >85% passenger traffic. There are several indicators, which are the indicators of development of road infrastructure. These include total road length, passengers carried i.e. billion passenger kilometres (BPKM), vehicles per km of road, passenger cars per 1000 people etc. Road network density of India's highways is 0.66 km of road per square kilometre of land, which is almost similar to that of the USA (0.65) and greater than China's (0.16) or Brazil's (0.20) highway network density[3]. Indian road network face numerous challenges such as overcrowding, congestion, pollution, overloading and poor maintenance of the available infrastructure. 33% of Indian villages still do not have access to all-weather roads. The figure 1 shows the evolution of roads as well as the current share of different types of roads in Indian Road network.



Road network needs to be strengthened with new roads, especially connecting remote areas. Last mile connectivity still remains a dream in many areas and needs to be provided. Road quality needs to be improved, especially considering the deterioration in road quality, especially during the rainy seasons. It is suggested that

appropriate concrete or hot mix technology should be used to construct good quality roads. India transports >57% of its total freight by road, compared to ~22% in China and ~37% in USA. In contrast, the share of freight transport by railway is ~36%, compared to ~47% in China and ~48% in USA, which is more energy efficient mode of freight transport.Despite the fact that a large part of India's freight traffic comprises transporting bulk material over long distances, which can be served efficiently by railways and waterways, the share of shipping through waterways.

Infrastructure connectivity is an important link in integrating economic activities and basic services amongst countries in any geographical region and is a prerequisite for future growth of that region. It also opens up rural areas for development and makes cities internationally competitive. Undoubtedly, the evolution of transport will offer many challenges, the biggest of which is providing sustainable transport at the lowest social cost possible. The government policies play a critical role in determining the most likely pathway into the future.



The concept of connectivity via the development of regional infrastructure to link one country to another is not new to Asia. In India, poor rail and road connectivity affects cargo movement and concept of intermodal transport is evolving rather slowly. There is great scope for improvement in rail-road connectivity with major ports. Maritime infrastructure greatly facilitates international trade and economic growth. Therefore a major port performance indicator is intermodal connectivity. Intermodal connectivity is relevant, because many ports can handle a larger share of the volumes with the seamless assistance of intermodal transport methodology. A higher share of intermodal transport requires better connectivity between ports and intermodal terminals in the hinterland. Sea ports in India handle roughly 70% of all container volumes. Cargo handled at the 12 major

ports in India has increased to >400 million tons. Government of India has emphasized on development and modernization of the port infrastructure, in order to become globally competitive.

PROPOSED METHOD

The level of connectivity controls reliability and transit time. Any impediment that slows or halts the flow of traffic creates a bottleneck. The symptoms of bottlenecks are usually congestion, slowdown of vehicular movement, queue formation or shipping delays, which not only have negative impact on economy but also causes environmental pollution. Bottlenecks may be due to lack of infrastructure or due to unfavorable regulatory causes and in some cases, dysfunctional supply chain.

Intelligent Transport System (ITS) is defined as "the use of modern communications, computer and control technologies and systems to improve mobility and transportation productivity, enhance safety, maximize utility of transportation facilities, save energy, and protect the environment". ITS is a term used to refer to several inter-dependent transport modes and road technologies, and offers to check congestion, air pollution and road safety using intelligent communication systems. Information and communication technology (ICT) plays an important role in revolutionizing the ITS. Intelligence can be embedded at all levels of the systems e.g. in the vehicles and its subsystems, in the surrounding infrastructure, in the energy supply, in the traffic management systems and in the services delivered by the system. ITS is not restricted to road transport alone, but also plays an important role for other modes of transport like rail, water, air and MMTS. Internet of Things (IoT) makes these communications amongst different sub-system components possible, thereby enabling a new realm of optimization and automation.

METHODOLOGY

Any new methodology for the comprehensive assessment of the quality of network connectivity should be based on predetermined and well-defined steps. The interconnection of individual indicators must enable the assessment of connectivity, and therefore the quality of transport, on equal terms. This implies that all connections within a selected network must be taken into consideration. The assessment procedure itself includes individual steps as follows:

1. Determining a transport network;

2. Identifying a set of transport connections;

3. Defining the relevanttariff points on a defined transport network;

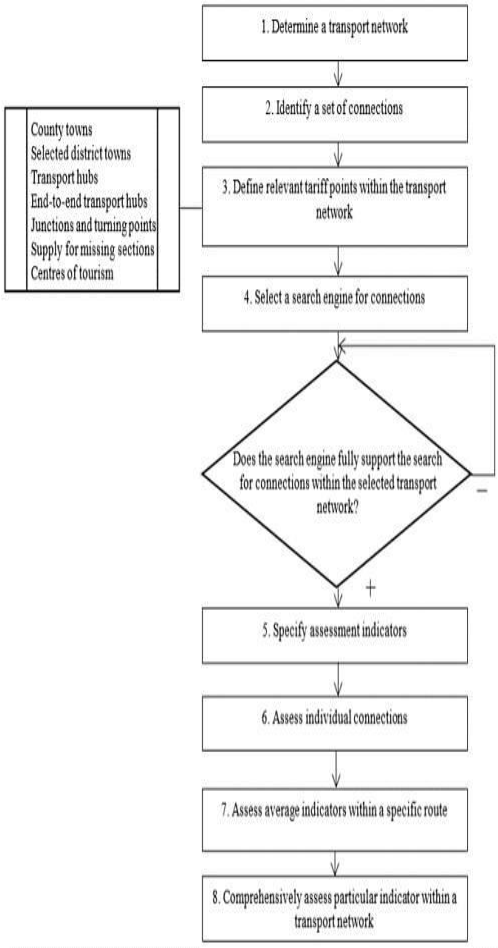
4. Selecting search engines for transport connections;

5. Specifying the assessment qualitative indicators;

6. Assessment of individual connections;

7. Assessment of average indicators within a specific route; and

8. Comprehensive assessment of a particular indicator within a transport network



Flowchart for assessing the quality of transport network connectivity

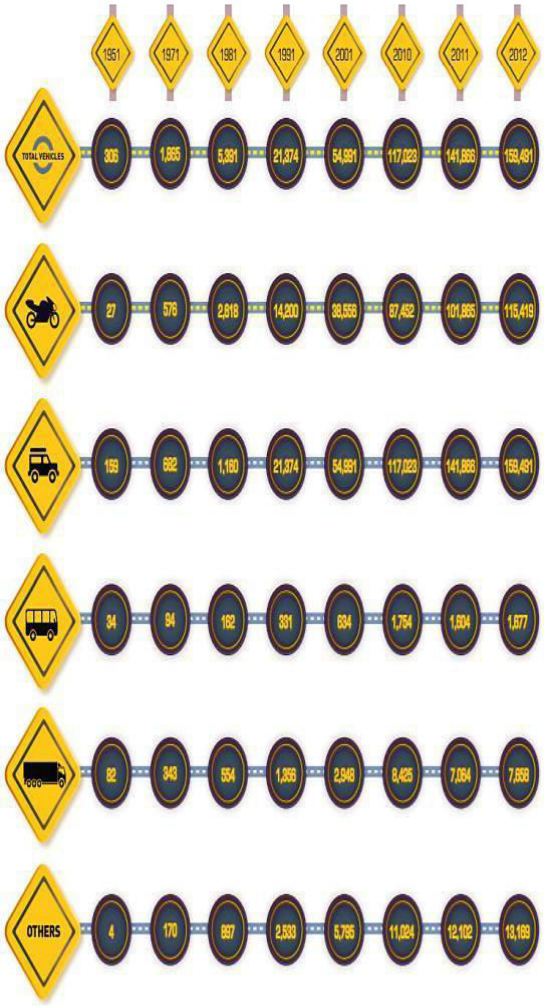
DATA CONTENTS

The traffic in Indian cities has mixed transport modes. There are various modes of road transport in India including 2-wheelers, Cars, SUVs, Jeeps, Buses, Mini Vans, Buses, Vans etc. Urban road transport is increasing significantly per capita however availability of road space per vehicle is declining rapidly, adding to urban congestion woes. As on March 2011, twowheelers account for the largest share

(72%) amongst the total registered motor vehicles of the country, followed by Cars, Jeeps and Taxis (14%), other vehicles (8%), goods vehicles (5%) and buses (1%). The lag in investment in the transport infrastructure has a detrimental effect on the booming car ownership, because available road space per car is continuously shrinking. Congestion leads to higher fuel use per km travelled, leading to significantly higher emissions.

CARRIER KEY ASSUMPTION

Automotive industry in India is one of the largest industry and is one of the key drivers of the economy. Automotive industry comprises of automotive manufacturing units encompassing commercial vehicles, passenger cars, two-wheelers, three-wheelers, tractors etc., and auto-component manufacturing units. Personalized vehicles (mainly two wheelers and passenger cars) account for more than four-fifth of the motor vehicle population in India compared to their share of little over three-fifths in 1951 (Figure 1.7). The total number of registered motor vehicles on Indian roads increased from 0.3 million in 1951, to 115 million in 2008-09, to 182 million in 2013. This has also led to an increase in the number of registered vehicles from ~25 in 2007-08 to ~33 in 2011-12 per km of road, further adding to congestion.



CONCLUSION

According to the different characteristics of transport modes and general layout of industrial enterprises, transportation mode can be selected and transportation routes can be arranged rationally to achieve maximum benefit.

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Treatment Of Methylated Chloro Phenols Using Uv Mediated Oxidation Processes

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Abstract- In this study, decomposition of two methylated chloro phenols - 4chloro3methylphenol (4C3MP) and 2chloro5methyl phenol (2C5MP) are investigated using various UV mediated oxidation processes- Fenton, UV/H_2O_2, UV/Fenton and UV/TiO. Among all the processes, Fenton accelerated with UV is observed to be efficient in decreasing the COD with a maximum removal rate of 98.5% for 4C3MP and 95.2% for 2C5MP. First order equations were used in evaluating the Kinetic constants. Photo mediated Fenton process is observed to have maximum kinetic constants of 5.1×10^{-3} for 2C5MP and 8.3×10^{-3} for 4C-3MP. Among the two chloro substituted cresols, decomposition of 4C3MP is observed to be higher than 2C5MP i.e., 95.2% for 4CMP and 86% for 2C5MP.

Key words: *Compound reduction, substitution, deactivating, oxidation & kinetic constants.*

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1. Introduction

With industrialization and urbanization, large number of chemical industries sprouted worldwide. These industries consume huge amounts of water for production purpose and at the same time release wastewater at an alarming rate. Since the treatment cost of these wastewaters was high compared to production cost, these industries started releasing wastewaters in to the nearby water bodies. Many of these wastewaters contain non-biodegradable compounds of significant concern. Among them, cresols constitute a significant fraction of hazardous waste especially the methylated chloro phenols because of their chronic effects at 12 mg/L. The two model compounds of the present study 4-chloro and 2-chloro methyl phenols (4C3MP & 2C5MP), pose significant health threat when discharged into the environment due their carcinogenic and refractory nature.

4C3MP is used as a stabilizing agent in paint, textile, and cosmetic industry. It is also a chemical intermediate in the manufacture of some pesticides. 4C3MP is toxic to aquatic flora and fauna and can become persistent in some species of fish. 2C5MP is widely used in pharmaceutical industry. Effluents generated from these industries contain excess of methylated chloro phenols.

Many traditional treatments are available for the removal of such non-biodegradable compounds like adsorption or by membrane filtration [1]. However, some of these methods are either too expensive or involve only transfer of pollutants from one phase to another phase without complete removal. Under such conditions, Photo mediated Oxidation process seem to be an alternative for the treatment of methylated chloro phenols. These methods involve reaction of hydroxyl radical (*OH), with refractory compounds converting them to less toxic compounds. Many AOPs result from the combination of UV radiation with oxidants, like H_2O_2, catalyst like TiO_2 and Fenton reagent.

There have been some studies on the decomposition of 4C3MP using pressurized hot water/supercritical oxidation [2] and temperature activated fenton decomposition and 2C5MP using sonication , but no studies have been carried out using UV mediated oxidation processes. Hence, the main objective of this paper is to estimate the potential of photo mediated oxidation processes such as photo mediated catalytic oxidation (UV/TiO_2), photo mediated chemical oxidation (UV/H_2O_2), fenton, and photo mediated fenton oxidation (UV/H_2O_2–Fe) in degrading the methylated chloro phenols. For a greater efficiency of the treatment processes, operational factors such as pH, initial strength of peroxide, initial strength of iron and catalyst dosage effect are all monitored. Further, tentative degradative pathway of the two model compounds is also proposed.

2. Materials & methods

2.1. Chemicals

Analytical grade 4C3MP & 2C5MP were purchased from Sigma Aldrich. P-25 TiO_2 powder, a gift from Degussa Corporation (Pune, India) contains 80% anatase. Analytical grade chemicals like Ferrous Sulphate, Sulphuric acid, Sodium hydroxide are all procured from Merck while H_2O_2 solution is from Lobachem. For the entire study, Glass distilled water is being used.

2.2. Reactor set-up

A 1.0L cylindrical photo reactor with diameter 12cm and height 13.3cm is used for all the experiments. A quartz tube encases the whole reactor to prevent contact with the solution flowing between the inner and the external wall of the quartz tube. The reactor has provision of inlets and outlets for reactants and withdrawing samples along with ports for temperature measurement. A Teflon painted magnetic mixing bar is placed at the bottom for homogenous mixing of compounds. A 16W mercury vapor lamp is the source of UV light (λmax at 270nm) which is placed in the center and immersed in the phenolic solution. The samples are collected with an air tight syringe at regular intervals (Figure 1).

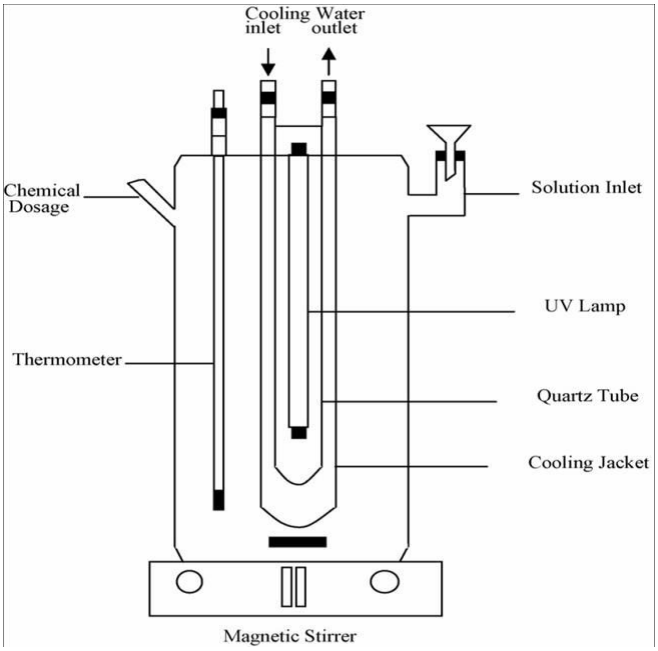

Figure 1 Photo Reactor with 16W UV lamp

2.3 Experimental procedure

Stock solution of methylated chloro phenols with a shelf life 1 week are prepared by dissolving them in methanol solution. Prior to experiments, all the dilutions from stock solution and other standards stored in dark are brought to room temperature. To validate the treatment process and check for any loss on volatilization, control samples are run for every experiment. pH studies are done by adjusting the pH with H_2SO_4 or NaOH (0.1 N /1.0N).

All the experiments are performed in batch mode with varying concentrations of H_2O_2 and Fe^{+2} (10:1) in Fenton and photo mediated Fenton, while 1:1 ratio is maintained for experiments with UV/H_2O_2. In UV/TiO_2 experiments, TiO_2 dosage ranging from 0.1g – 0.5g is varied at an interval of 0.1g. The reaction mixture is introduced in to the photo reactor after homogenization for 15min by magnetic agitation. After collection at regular intervals, the samples are centrifuged and sepearted through 0.25µm syringe filters (mdi, India type SY25NN). The seperated samples are submerged with Na_2SO_3 (10%) solution to stop further oxidation process after the treatment and stored in dark for further analysis.

2.4 Analytical procedure

The decomposition of methylated chloro phenols is evaluated with UV-Vis Spectrophotometer (Systronics-1272 wavelength 234 nm).

COD experiments were performed according to STANDARD METHODS of examination of H_2O and wastewater (1989), 21st edition**.** Systronics pH meter is used for measuring the pH. All the samples were diluted with 1:1 ratio for analysis.

3. Results and discussion

The present section deals with the results obtained in different oxidation methods in degrading methylated chloro phenols. The performance of these methods is evaluated in terms of decomposition of methylated chloro phenols and also reduction in COD.

3.1 UV Photolysis

3.1.1 Initial pH Optimization

Figure 2 & 3 represents the effect of pH in UV photolysis on the decomposition of 2C5MP & 4C3MP. At 250ppm of 2C5MP & 4C3MP, the experiments are performed at pH ranging from of 3 to 11. The decomposition of methylated chloro phenols are significantly affected by initial pH values which directly influences ˙OH radical generation. A 36 % of 2C5MP decomposition is observed at pH 3 which then decreased gradually at increased pH. It decreased to 17.9 % and 14% at pH 7 and 11. At a pH of 3, 59% decomposition is achieved in case of 4C3MP similar to previous studies. The decomposition decreased at higher pH (pH>3) to 26%.

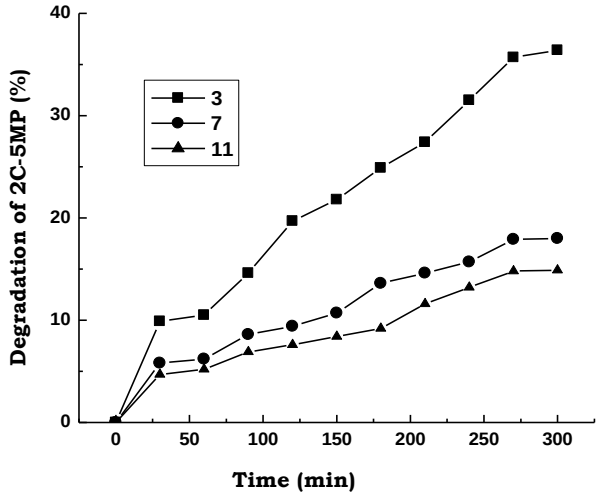

Figure 2 Initial pH Optimization of 2C5MP in UV photolysis

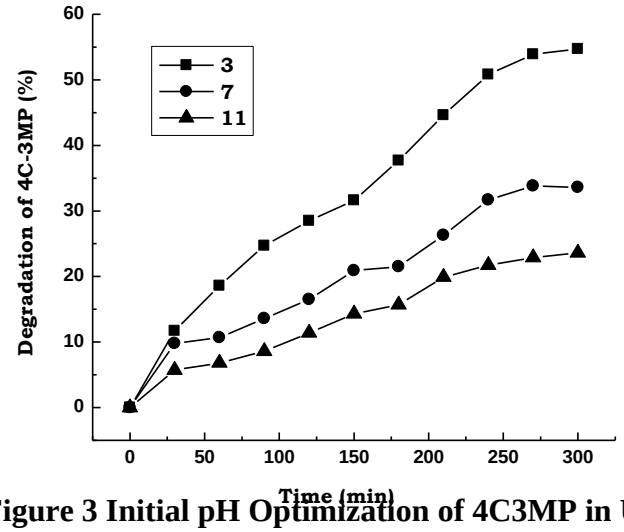

Figure 3 Initial pH Optimization of 4C3MP in UV photolysis

3.1.2 Initial strength Optimizaion

The optimization of initial strength of 2C5MP & 4C3MP in photo mediated experiments is studied with in a range of 50–750ppm at fixed pH of 3. It is observed from figure 4 and 5 that 64% of 2C5MP and 76% of 4C3MP decomposition is achieved with an initial strength of 100ppm of both the compounds. At higher concentrations, the decomposition decreased significantly (17.9% for 2C5MP and 18.6% for 4C3MP). Hence, in all further experiments, 100ppm of methylated chloro phenols is used as the optimum compound concentration.

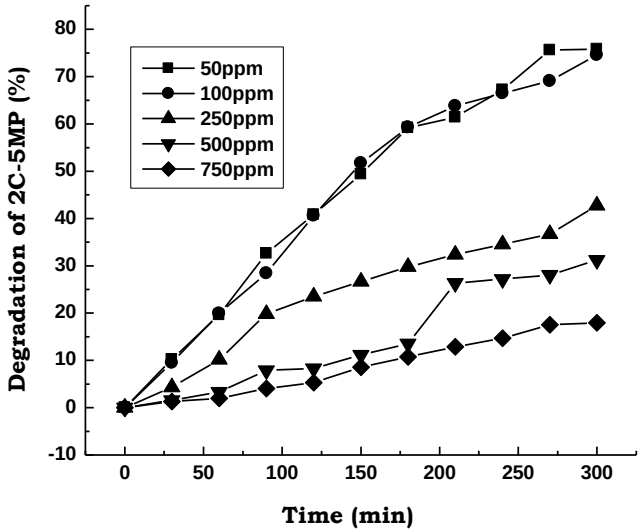

Figure 4 Initial 2C5MP strength optimization in UV photolysis

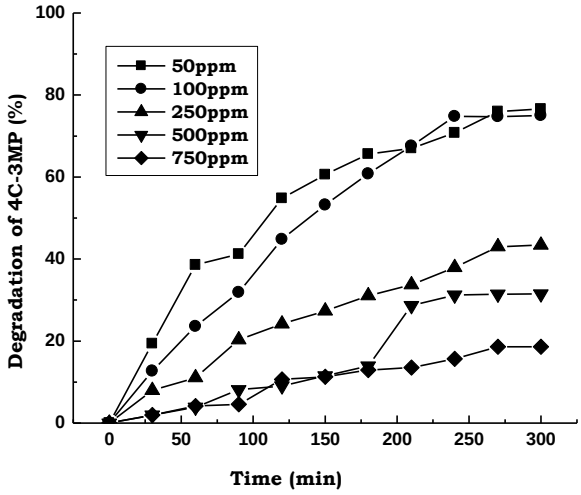

Figure 5 Initial 4C3MP strength optimization in UV photolysis

3.2 UV/H_2O_2 process

3.2.1 Initial H_2O_2 strength Optimization

The peroxide effect on 2C5MP & 4C3MP decomposition is observed by differing the strength of H_2O_2 from 50–500ppm (Figure 6 & 7). At 100ppm of initial peroxide, 48% of 2C5MP decomposition is observed with gradual decrease in the decomposition at higher concentration. The decomposition rate is observed to be high initially (from 50 to 100ppm) which might be due to the generation of more hydroxyl radicals at high peroxide strength. However, 2C5MP decomposition rate slowed down when H_2O_2 strength increased above 100ppm

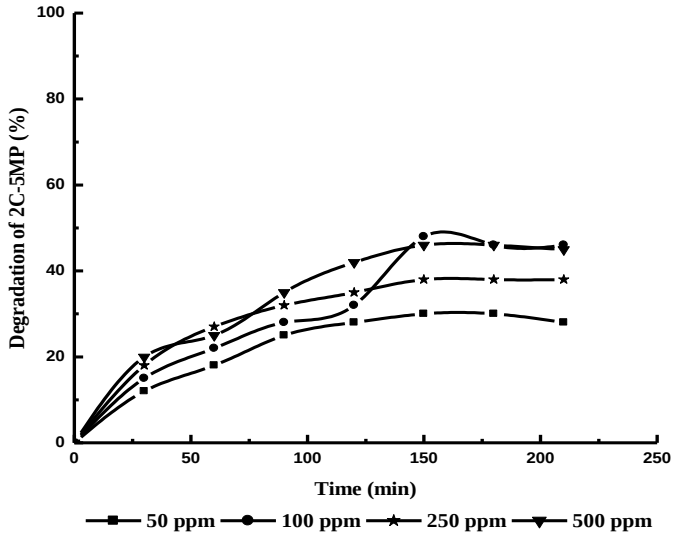

Figure 6 Initial H_2O_2 strength optimization on the decomposition of 2C5MP in UV/H_2O_2 system

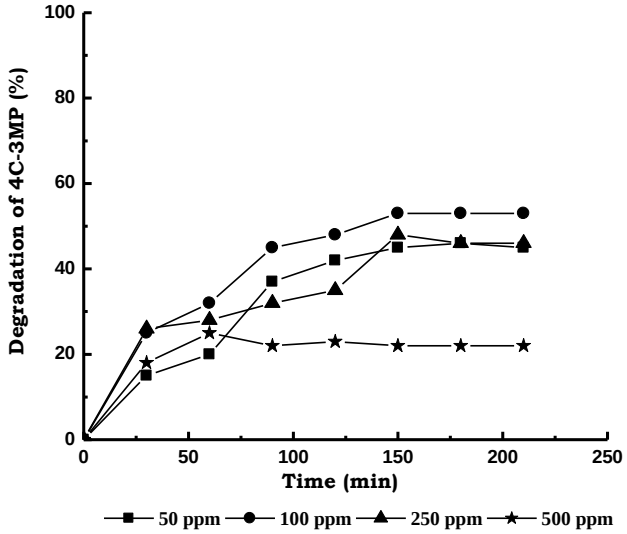

Figure 7 Initial H_2O_2 strength optimization on the decomposition of 4C3MP in UV/H_2O_2 system

As the peroxide strength is increased from 50-100ppm, the decomposition of 4C3MP also increased and it reached to a maximum of 53% at 100ppm of peroxide within 150min. But above this strength (>100ppm), 4C3MP decomposition decreased significantly [3] which might be due to the cleaning effect of ˙OH radicals at high peroxide strength. Therefore, in further studies 100ppm of peroxide is taken as optimum.

3.2.2 Initial pH Optimization in UV Peroxide system

In UV mediated peroxide system (UV/H_2O_2), initial pH was varied from 3-11 to study 2C5MP & 4C3MP degradation. It is found that at pH of 7, 48% of 2C5MP (Figure 8) and 55% of 4C3MP (Figure 9) decomposition is achieved. At lower pH (<7), the decomposition was less effective while at high pH (>7) only 10–15% decomposition is observed.

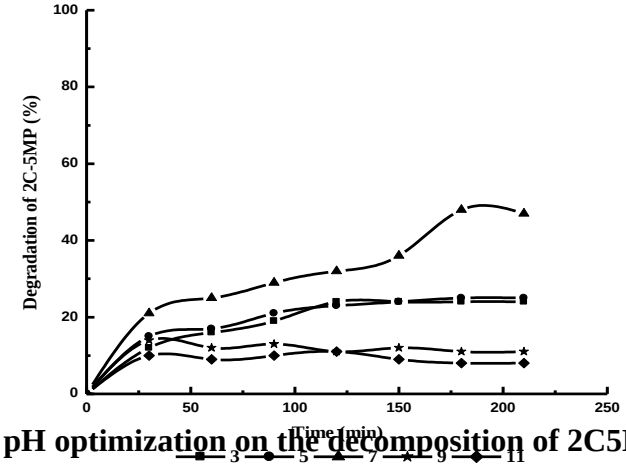

Figure 8 Initial pH optimization on the decomposition of 2C5MP in UV/H_2O_2 system

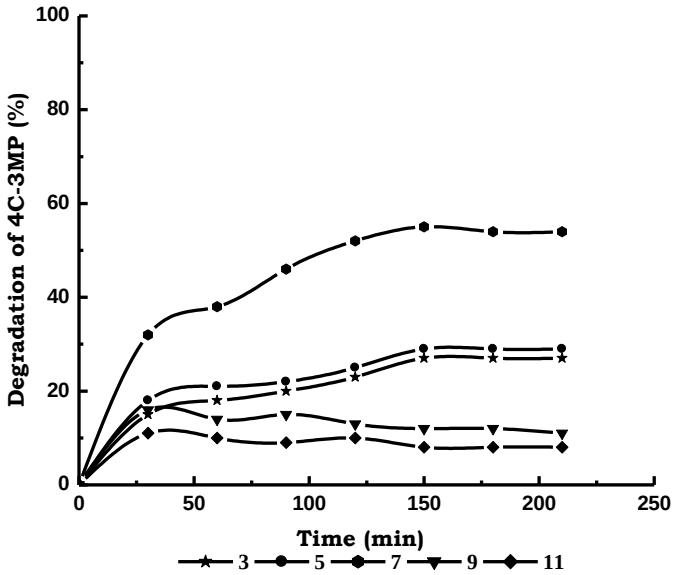

Figure 9 Initial pH optimization on the decomposition of 4C3MP in UV/H_2O_2 system

3.3 Fenton & Photo Fenton process

3.3.1 Initial Fe^{+2} strength Optimization

To find out the effect of Fe^{2+} ion on 2C5MP & 4C3MP decomposition in Fenton and UV mediated Fenton, iron strength was varied at pH 3 from 10 to 50ppm (Figures 10 & 11). The decomposition of 2C5MP was observed to be less than 60% at 10ppm iron strength and it increased gradually due to excess generation of ˙OH radicals [4]. Within 150min, 86% decomposition is observed in photo mediated Fenton while 73% is achieved in Fenton at 20ppm of Fe^{+2}.z

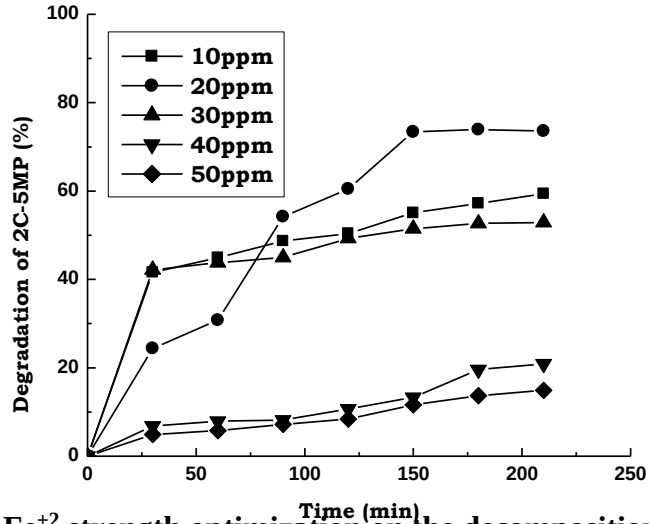

Figure 10 Initial Fe^{+2} strength optimization on the decomposition of 2C5MP in Fenton's oxidation

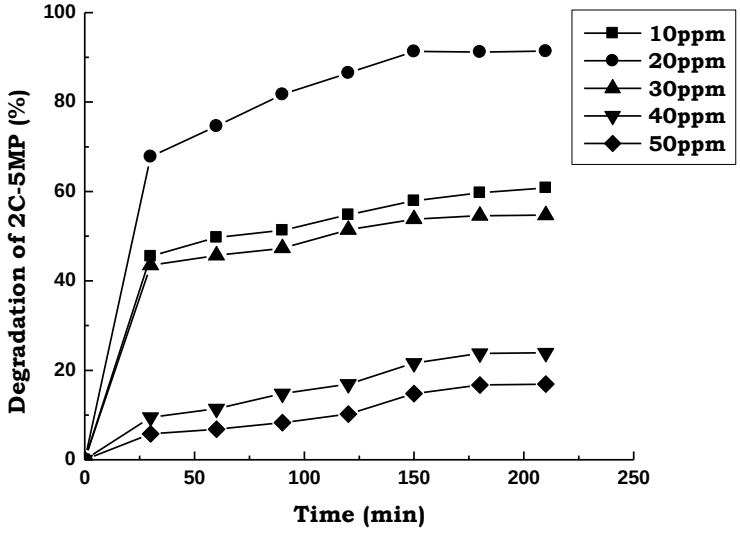

Figure 11 Initial Fe^{+2} strength optimization on the decomposition of 2C5MP in Photo mediated Fenton's oxidation

With an increase in the dosage of iron, significant decomposition of 4C3MP is observed (Figures 12 & 13). In Fenton procedure, adding of Fe^{+2} from 10-20ppm enhanced the degradation of 4C-3MP and attained to. An increase of 79.5% decomposition of 4C3MP is observed with the increase in dosage of iron from 10-20ppm, which is due to rapid formation of hydroxyl radicals catalyzed by ferrous ion. Photo mediated Fenton reaction increased the decomposition of 4C3MP leading to a rapid decomposition compared to Fenton process [34]. In Photo mediated Fenton process, 95% decomposition is observed at 20ppm of iron strength with in 150min (Figure 13). However, an increased iron strength (>20ppm) did not increase the decomposition which might be due to side reactions of hydroxyl radical with iron ions.

$$Fe^{+2} + {}^{\bullet}OH \longrightarrow Fe^{+3} + OH$$

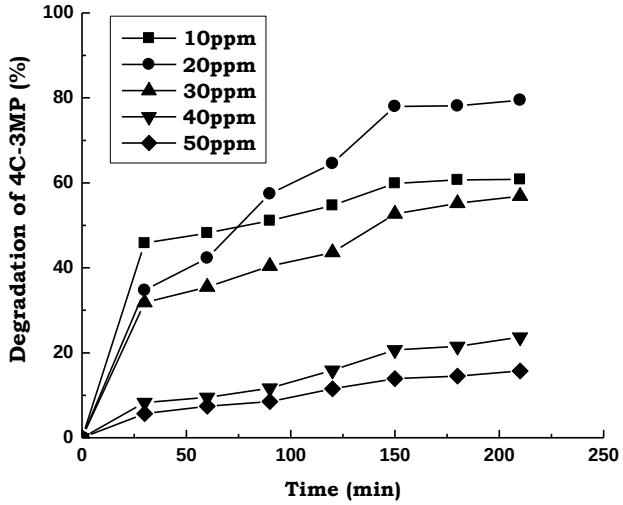

Figure 12 Initial Fe^{+2} strength optimization on the decomposition of 4C3MP in Fenton's oxidation

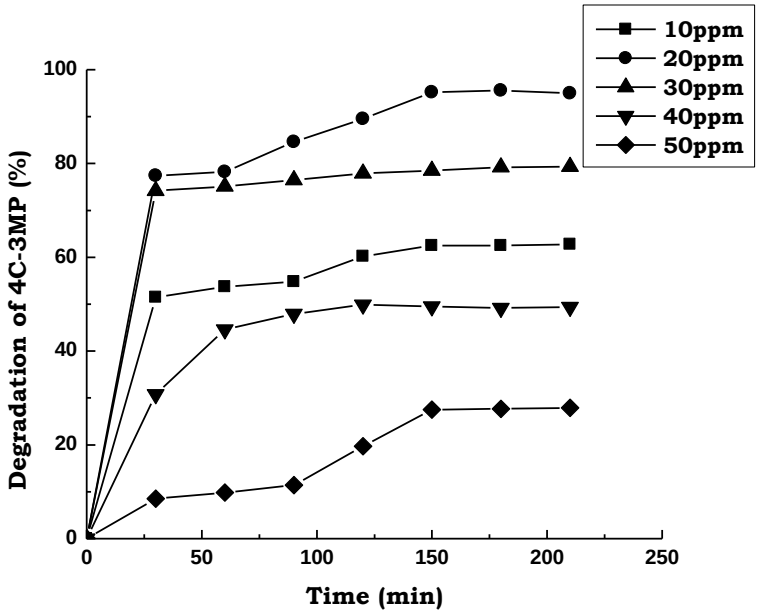

Figure 13 Initial Fe^{+2} strength optimization on the decomposition of 4C3MP in Photo Fenton's oxidation

3.4 Photo mediated decomposition using TiO_2 as catalyst

3.4.1 Initial pH Optimization

To study the pH effect with 0.2g of TiO_2 on 2C5MP & 4C3MP degradation, experiments are conducted by varying the pH from 3-11. It is observed that the decomposition of the compounds was high at neutral pH compared to basic and acidic pH. Basic medium with pH values >7.0 enhance carbonate ion formation, which scavenge hydroxyl ion generation that are responsible for oxidation reaction.

At pH 7, 58% and 70% decomposition of 2C5MP and 4C3MP respectively is observed within 180min (Figure 14 & 15). TiO_2 is amphoteric in nature with a point zero charge around pH 6-7 [5] and hence oxidation reaction is found to be effective at this pH.

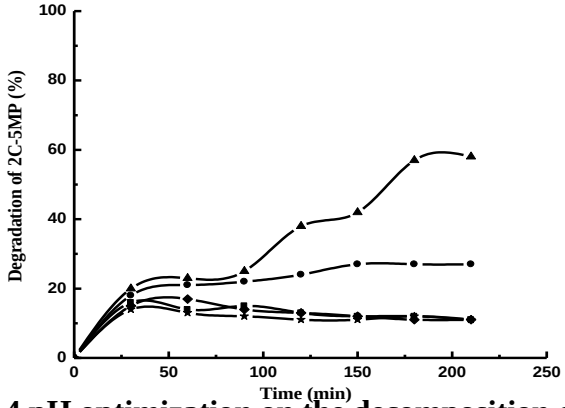

Figure 14 pH optimization on the decomposition of 2C5MP in UV/TiO_2 system

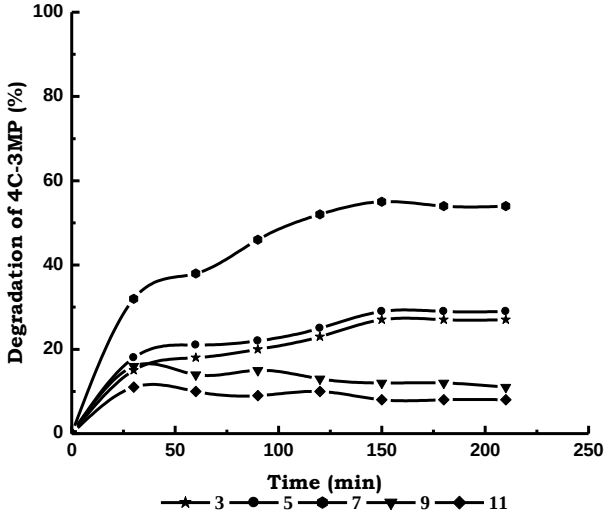

Figure 15 pH optimization on the decomposition of 4C-3MP in UV/TiO_2 system

3.4.2 TiO_2 dosage Optimization

TiO_2 dosage variation (0.1, 0.2, 0.3, 0.4 and 1.0 g) is studied for 2C5MP & 4C3MP at neutral pH (Figure 16 & Figure 17). At 0.3g of dosage of TiO_2 and within 180min 72% and 75% decomposition of 2C5MP & 4C3MP is achieved. The high reaction efficiency at this dosage may be due to increased active sites for oxidation process.

When the dosage of the catalyst was increased above 0.3g, the reaction efficiency decreased due to loss of interaction between photons and catalyst. While at low catalyst dosage, the efficiency decreased due to non-availability of active sites for oxidation process to occur.

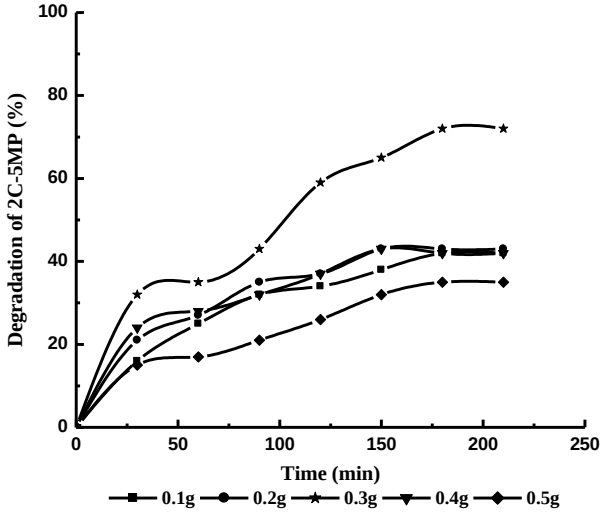

Figure 16 TiO_2 dosage optimization on the decomposition of 2C5MP in UV/TiO_2 system

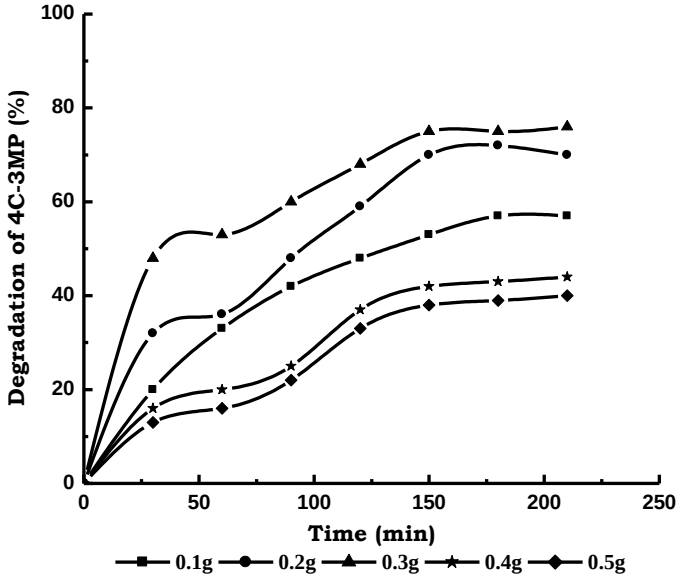

Figure 17 Effect of TiO_2 dosage on the decomposition of 4C-3MP in UV/TiO_2 system

3.5 Comparative study of various treatment systems

3.5.1 COD reduction

The decomposition of 2C5MP & 4C3MP with advanced treatment systems is evaluated using reduction in COD and compound. In COD reduction experiments of 2C5MP (figure 18), it was observed that 20.1% reduction in COD could be achieved with UV alone but very slowly. The COD reduction is found to increase (38%) when peroxide is added to the system with increased free radical formation. In Fenton process, COD reduction increased to 58.7%. The COD reduction rate increased to 85% when the catalyst TiO_2 is used along with UV. The optimum COD decrease of 95.2% is achieved with photo mediated Fenton process.

With 4C3MP (Figure 19), the COD reduction was found to be highest (98.5%) in photo mediated Fenton reaction. In UV/TiO_2, the COD reduction was observed to be 88.4%. While UV alone could reduce the COD to 25.6%, it was further enhanced to 65.2% when peroxide was added to the system. In Fenton system, COD reduction of 68.5% is observed.

The order of reduction in COD in both cresols is found to be:

UV/Fenton > UV/TiO_2 > Fenton > UV/ H_2O_2 > UV

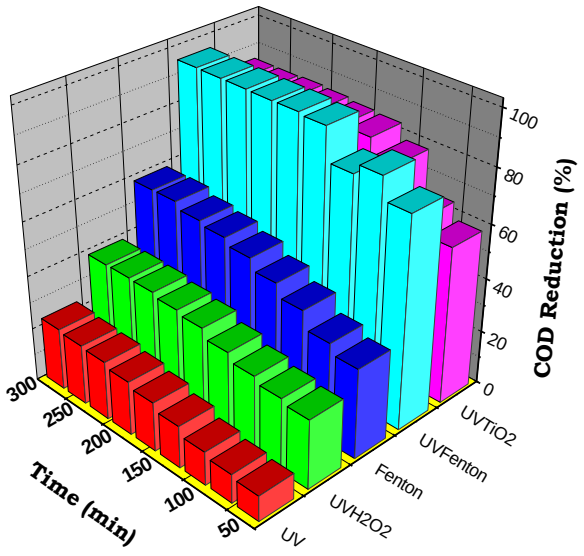

Figure 18 COD Reduction of 2C5MP with different oxidation systems

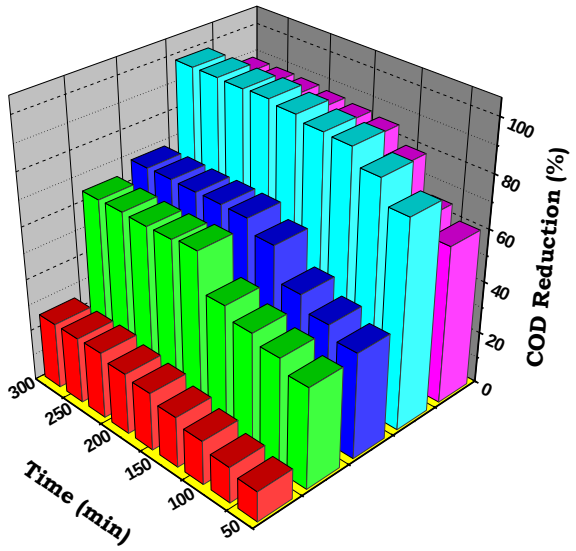

Figure 19 COD Reduction of 4C3MP with different oxidation systems

3.5.2 Compound reduction

UV process is observed to be a very slow method in degrading the compound with 36% of 2C5MP and 58% of 4C3MP. The decomposition of both the compounds is enhanced with 48% and 64.3% decomposition of 2C5MP & 4C3MP when peroxide is added to the system. In Fenton and UV/TiO_2, systems, 73 & 72% decomposition of 2C5MP and 79.5% & 75% decomposition of 4C3MP is observed. Photo mediated Fenton showed high efficiency among all the treatment system with 86% of 2C5MP and 95.2% of 4C3MP degradation.

3.5.3 Decomposition rate

2C5MP & 4C3MP decomposition rates with time for various treatment systems is observed to follow the pseudo first order kinetics (Figure 20 & 21) which is expressed as:

$$ln\ C_t / C_0 = -k^* t$$

Where C_0 and C_t represent 2C5MP & 4C3MP strength at times (minutes) 0 and t, while k* represents pseudo first order rate constant.

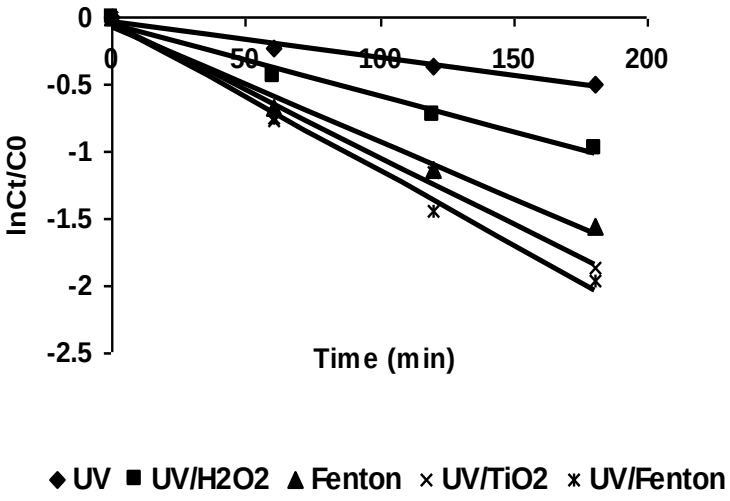

Figure 20 Kinetics showing the decomposition of 2C5MP with various treatment systems

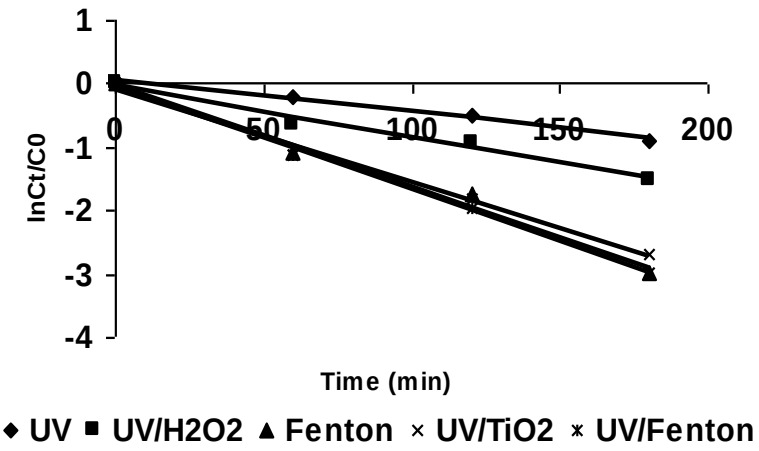

Figure 21 Kinetics showing the decomposition of 4C3MP with various treatment systems

S.No	Oxidants	K (min^{-1})	r^2
1.	UV/Fenton	5.1×10^{-3}	0.99
2.	UV/TiO_2	4.2×10^{-3}	0.98
3.	Fenton	4.3×10^{-3}	0.98
4.	UV/ H_2O_2	2.1×10^{-3}	0.98
5.	UV	1.4×10^{-3}	0.97

Table 1 2C5MP - rate constants

S.No	Oxidants	K (min^{-1})	r^2
1.	UV/Fenton	8.3×10^{-3}	0.99
2.	UV/TiO_2	7.8×10^{-3}	0.99
3.	Fenton	6.6×10^{-3}	0.98
4.	UV/ H_2O_2	5.6×10^{-3}	0.98
5.	UV	4.9×10^{-3}	0.98

Table 2 4C3MP – rate constants

Table 1 & 2 shows the rate constants obtained with linear regression analysis confirming the efficiency of photo mediated Fenton oxidation in the decomposition of 2C5MP & 4C3MP. All the treatment processes studied followed pseudo first order equation with highest rate constants of 5.1×10^{-3} & 8.3×

10^{-3} for 2C5MP & 4C3MP in photo mediated Fenton oxidation. However, a slight deviation from linearity (r^2 =0.97) is observed in UV system attributing to its low efficiency in degrading the cresols.

3.5.4 Degradative pathway

Among the two model compounds studied in the present paper, 4C3MP decomposition is observed to be very fast compared to 2C5MP. The OH group present in both the methylated chloro phenols is highly reactive and directing in electrophilic aromatic replacement of direct hydroxyl charged particle attack on electron rich positions. Since the hydroxyl radical attack is on electron rich chloro group, there is a considerable reduction in the stearic effect on 4C3MP making it more vulnerable to decomposition process. Figure 22 shows the tentative degradative pathway of 4C3MP & 2C5MP.

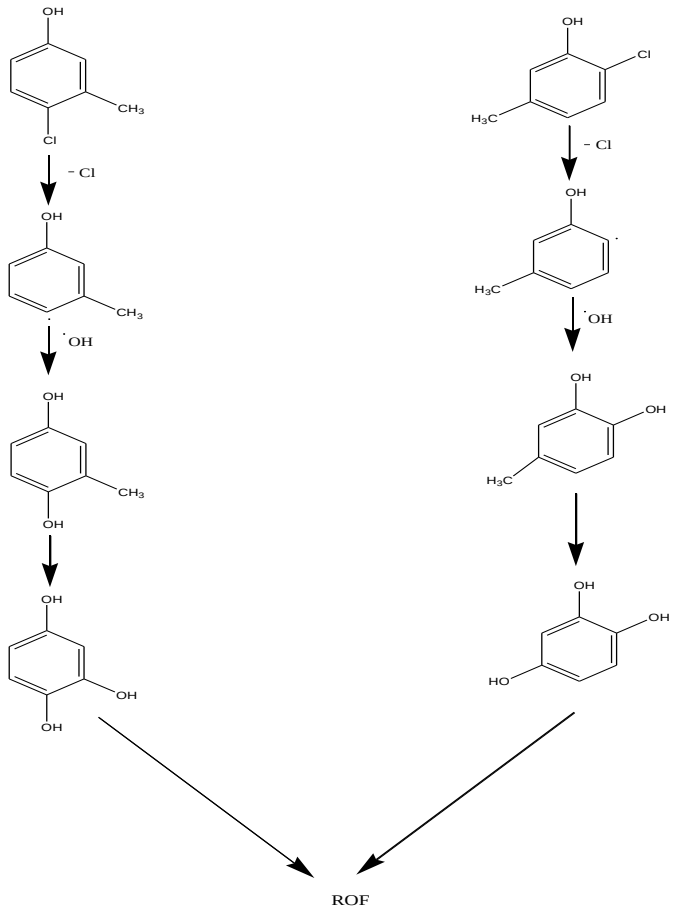

Figure 22 Tentative Degradative pathways of methylated chloro phenols

4. Conclusions

Photo mediated Fenton system is found to be efficient in degrading the cresols compared to other treatment systems.

- UV alone was found to be less efficient in the decomposition of cresols.
- UV peroxide was observed to enhance the treatment system but it required longer reaction time.
- Photo mediated Fenton process was efficient in achieving maximum COD as well as compound reduction.
- This was confirmed by kinetic studies which showed linearity in all the treatment systems except for UV that slightly deviated showing its least efficiency in the decomposition of cresols.
- 4C3MP decomposition is much faster compared to 2C5MP due to the position of active chloro group.

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Pharmaceutical Wastewater Treatment Using Natural And Chemical Coagulants

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***Abstract*—** Pharmaceutical industrial wastewater is hazardous in nature so it needs to be treated before it is discharged in to any water body or on to soil. This paper, deals with the study of the treatment of pharmaceutical wastewater using different coagulants. Experimental investigations are carried with different operational parameters such as pH variation (2-10) and coagulant dosage variation (1-5g/500ml). Alum, Iron sulphate and Moringa oleifera are used as coagulants. Treatment is done for turbidity removal and COD reduction. Among all the coagulants studied, the natural coagulant Moringa oleifera is observed to be efficient in the treatment of pharmaceutical wastewater.

***Keywords*—** *Phamaceutical wastewater; Alum; Iron sulphate; coagulation.*

INTRODUCTION

Rapid industrialization and subsequent urbanization have increased the rate of environmental pollution [1]. Depleting water resources have seriously impacted industrial growth and also the standards of urban dwellers. Major problems are due to wastewater containing high SS concentration, COD and BOD. There is a constant search for finding new methods for the treatment of wastewater.

Pharmaceutical industry is considered as one of the highly polluting industry, generating a huge amount of wastewater [2]. Pharmaceutical products are manufactured in batch mode and this leads to a wide variety of pollutant production from different stages of manufacture. Pharmaceutical compounds enter into potable water through two different sources: Production processes and through usage of the same by human beings [3]. A plethora of toxic compounds are present in pharmaceutical effluents. Reuse of water also contributes towards contamination [4]. To overcome contamination, as well as to cater to the needs of the urban dwellers optimized methods of removal are the need of the hour [5].

Chemical coagulation is usually accomplished with coagulants such as Aluminium sulphate- or Ferrous sulphate. Natural coagulants can also be used to reduce the secondary pollution loads [6].

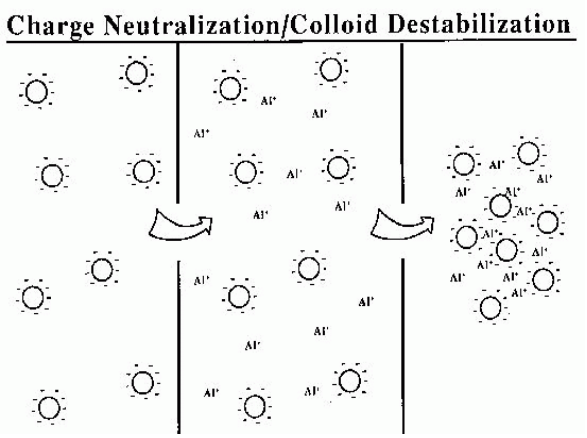

Fig.1 Charge Neutralization and Colloid Destabilization Mechanism

The focus of this work is to study the efficiency of wastewater treatment using suitable coagulants and to determine the values of optimum pH and dosages of FeSO4, Al(SO2).12H2O and Moringa Oleifera for the treatment.

MATERIALS AND METHODS

2.1 Materials

*2.1.1 Wastewater***:** The wastewater used in the present study is obtained from a reputed pharma industry. Initial turbidity, pH, COD and other parameters are to be investigated in this work.

2.12. Chemicals: Alum & Ferrous sulphate are purchased from Sigma Aldrich and Moringa oleifera is collected from nearby local market, Hyderabad.

2.1.3 *Preparation of Moringa oleifera coagulant:* the common name of Moringa is drumstick. The Moringa Oleifera plant seeds are sun dried and ground to fine size (fig.2).



Fresh drumsticks



Sundried drumsticks



Dried seeds of drumstick



Powdered Moringa

Fig.2 Preparation of Moringa coagulant

2.2 Methodology:

Wastewater sample is collected from a reputed pharmaceutical industry to which initial characterization is done. Experiments are run in a batch mode using Jar Test and the total volume of the sample taken is 500ml for each experiment. Optimization of parameters such as effect of pH and

dosage of the coagulant are being studied. pH of the pharmaceutical wastewater [7] is adjusted using diluted Sodium hydroxide (NaOH).The dosage of coagulant is varied from 1g to 4g (1g,2g,3g & 4g). Experiments are run for 30 min, after which they are allowed to settle down [8]. The supernatant is filtered and further analysis such as COD and Turbidity are done for the filtered sample to check the treatment efficiency.

% removal of COD/Turbidity = $\{(C_i-C_f)/ C_i\}X100$

Where,

C_i - initial concentration of COD/Turbidity

C_f - Final concentration of COD/Turbidity

3. Results and Discussion:

The studies of effects of pH and coagulant dosage with different coagulants are conducted in order to investigate the efficiency of Coagulation process in the treatment of Pharmaceutical wastewater. COD of wastewater is a good indicator of the strength of pollutants. Also the physical parameters like turbidity of wastewater are estimated.

3.1 Characterization of wastewater: The initial characteristics of the wastewater from pharmaceutical industry are as follows:

S. NO	**Parameters**	**Characteristics of the wastewater**	**Standards for disposal (mg/l**
1	pH	3.	6.5 – 8.5
2	BOD	45	10
3	COD	105	25
4	TS	149	210
5	TS	59	10
6	TD	98	10
7	Chloride	10	25
8	Alkalinity	20	60
9	Acidity	46	20
10	Turbidity	46	40

3.2 Effect of pH: pH of wastewater changes surface charge of coagulants and affects stabilization. pH value plays a prominent role in solubility of pollutants in wastewater. The study of pH plays a prime role in working of wastewater treatment system. At a coagulant dose of 2g/L, rapid mixing was done at a rate of 250 rpm for 10 minutes and slow mixing was done at a rate of 30 rpm for 20 minutes. Later, the solution was allowed to settle for about 30 minutes. The results obtained were analyzed by plotting the parameters and is presented in Fig.3.The range of pH tested was between 3 and 10, which indicates vthe effects of pH on percentage of COD. The initial turbidity and COD are observed to be 460NTU and 1050 mg/l respectively [9]. At an acidic pH 3 and basic pH 10 the removal % found very low. At the pH studied, pH 8 showed maximum removal efficiency of turbidity of 81, 11, 85% and COD of 78, 2.8 and

85% with Alum, Iron sulphate and Moringa (Fig.3) respectively. So, the maximum pH value by using alum as coagulant is 8.

S. No	Types of coagulant	Reduction in COD (%)	Cost in (Rs)
1	Alum	81.9	150.00
2	Ferrous sulphate	1.33	300.00
3	Moringa olefeira	**87**	**5.00**

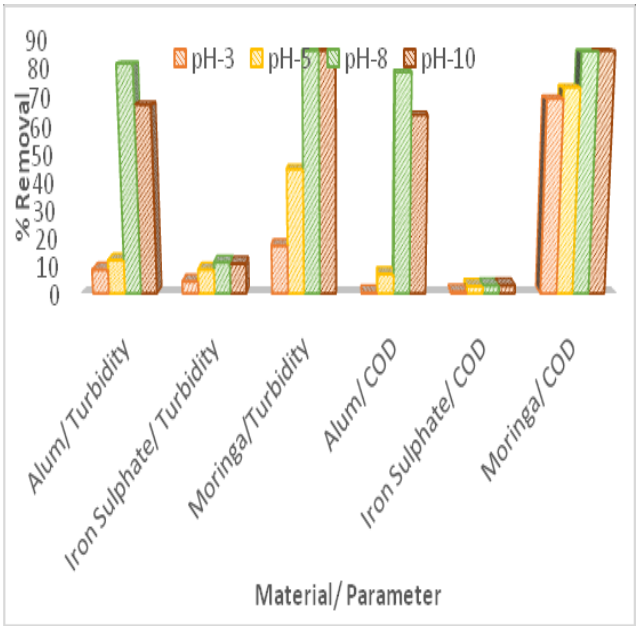

Fig.3:Influence of initial pH on turbidity and COD. Volume of sample = 500ml, pH

variation = 3, 5, 8, 10, Dosage of the coagulant =2g

3.3 Influence of dosage of coagulant

The impact of coagulant range on the treatment of pharmaceutical wastewater is studied by varying the dosages from 1g-5g at a constant pH of 8 (fig.4). From the figure, it is clearly observed that with an increase in the dosage of coagulant, there is an increase in the percentage removal of turbidity and COD. Maximum percentage removal of turbidity of 83, 86, 86.8 and COD of 81, 2.3, 87 is observed with Alum, Iron sulphate and Moringa compounds. The removal efficiency of turbidity stabilized and in case of COD, it decreased when the dosage of alum is increased above 3g.

3.3 Effect of dosage of coagulant

The effect of coagulant dosage on the treatment of pharmaceutical wastewater is studied by varying the dosages from 1g-5g at a constant pH of 8 (fig.4). From the figure, it is clearly observed that with an increase in the dosage of coagulant, there is an increase in the percentage removal of turbidity and COD.

Maximum percentage removal of turbidity of 83,
86, 86.8 and COD of 81, 2.3, 87 is observed with
Alum, Iron sulphate and Moringa compounds. The removal efficiency of turbidity stabilized and in case of COD, it decreased when the dosage of alum is increased above 3g. It can be due to reversal of charge. Hence, the optimum dosage of alum for the treatment system is 3g (9).

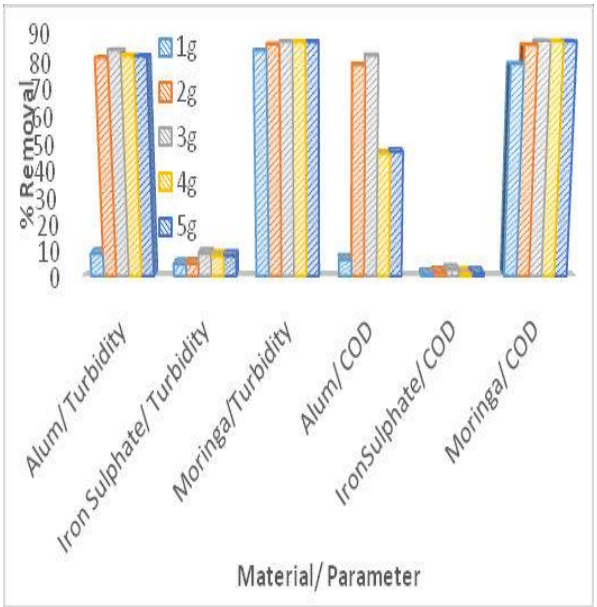

Fig.4: Influence of coagulant dosage on Turbidity and COD removal from pharmaceutical wastewater Conditions: Volume of sample = 500ml, pH =
8, Dosage variation= 1g, 2g, 3g, 4g & 5g

3.4 Comparative study: In this section, a comparative study is done between the different types of

coagulants on the treatment of Pharmaceutical wastewater in terms of percentage reduction in COD and also cost of operation. Among all the coagulants studied, ferrous sulphate is found to be the least efficient in the removal ofCOD while alum showed much higher removal efficiency than ferrous sulphate. However, huge amounts of sludge is formed which is again a problem for disposal as it is a chemical sludge and nonbiodegradable. In the present study, as shown in table 2, the natural coagulant Moringa oleifera is observed to be more efficient. A maximum of 85.7% COD reduction is achieved with this coagulant. In terms of cost also, this coagulant is found to be economically feasible. Moreover, less amount of sludge is formed which is easily biodegradable.

Table 2 Comparative study of various coagulants studied

The final characteristics of the pharmaceutical wastewater are given in table 3. It shows both initial and final characteristics of the wastewater with Moringa oleifera as the coagulant. All the parameters are found to be within the standard limits of disposal. Hence, Moringa oleifera can be effectively used as the coagulant for the treatment of industrial wastewaters.

Table 3 Characteristics of the pharmaceutical wastewater before and after the treatment with Moringa oleifera as coagulant

S NO	**Parameters**	**Initial (mg/l)**	**Final (mg/l)**	**Standards for disposal (mg/l)**
1	pH	3.0	8	**6.5 – 8.5**
2	BOD	450	85	**100**
3	COD	1050	135.4	**250**
4	TS	1490	180	**2100**
5	TSS	590	100	**100**
6	TDS	900	80	**100**
7	Chloride	100	35.4	**250**
8	Alkalinity	200	354	**600**
9	Acidity	460	150	**200**
10	Turbidity (NTU)	460	60.4	**100**

Note: all the parameters are given in mg/l except for pH and turbidity (NTU)

4. Conclusions:

- Pharmaceutical wastewater has the initial characteristics of pH-3, Color-milky white, COD- 1050 mg/l and turbidity- 460 NTU, also the remaining parameters are found to be above permissible limits.

- The optimum pH in coagulation process for Alum, Ferrous sulphate and Moringa oleifera seed powder is found to be 8.
- The optimum dosages of Alum, Ferrous sulphate and Moringa oleifera seed powder as coagulant are found to be 3g/500ml, 3g/500ml and 2g/500ml respectively at an optimum pH of 8.
- Of all the coagulants used in the present analysis, optimum turbidity decrease is found to be 86% and optimum COD decrement is 87% with Moringa Oleifera

Therefore, we can interpret that as compared with remaining coagulants, Moringa Oleifera is the best coagulant in removal of pollutants from pharmaceutical wastewater.

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A Study on Enhancement of Properties of Concrete by Vacuum Dewatering Method for Construction of Rigid Pavements and its Cost Evaluation

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Abstract- The road building agencies in India are promoting construction of concrete pavements in a big way due to its ability in handling complex stresses from vehicle loads and temperature. As per the Indian Road Congress guidelines for design of concrete pavements, M40 grade concrete is to be used for the concrete slab and accordingly, the approximate slab thickness shall be varying between 250mm to 320mm. Higher the concrete grade results in further reduction of pavement thickness, temperature stresses and depth of joints. Therefore, in this study, to increase the grade of the concrete, VacuumDewatered Concrete (VDC) technology is adopted in place of conventional method of pavement construction. The properties of concrete such as compressive strength, flexural strength and split tensile strength were found in both the methods and compared. The test results depicted that all the properties discussed above are higher in case of VDC method as compared to the conventional method of construction.

Key words: Design mix concrete, Conventional concrete, Vacuum Dewatered concrete, Rigid pavements, cost comparison.

1.0 Introduction:

To maintain the workability of concrete, it is necessary to add water content above the optimum which is required to attain the strength. The excess water evaporates and left the pores in the concrete which leads to reduction in strength of the concrete. Water above the

optimum could be removed after placing the concrete that is the role of workability completes and this will help in attaining the higher strength. To remove the excess water, generally vacuum pressure is applied and therefore, this method is named as Vacuum Dewatered Concrete (VDC). It is an alternative method of pavement construction in which water is removed from the concrete through vacuum pressure after the laying**(Academy, 2011)**. With the help of VDC technique, it is possible to achieve the concrete with higher strength with less cementitious materials and hence, it is cost effectiveness. A pavement constructed with VDC technique is found be more abrasive resistance, less shrinkage, less permeability, high durability and can resist higher traffic loads**(Bolat and Çullu, 2016; Jacobs *et al.*, 2012; Ebensperger and Torrent, 2010)**.Using VDC technique, it is possible to reduce the water content approximately by 15-25% in the concrete **(Feng, Sun and Feng, 2018)**.

The present study is aimed to achieve the high-strength concrete pavement with less cementitious materials. Accordingly, two test sections were constructed with conventional and VDC technique methods. For the test sections, same proportions of materials and water-cement ratio were maintained. While constructing the conventional pavement, testing specimens were casted at the site to check the compressive strength, flexural strength and split tensile strength. In case of VDC technique, cores were extracted after construction to check its properties. These specimens were tested in the laboratory to find the 7 days and 28days strengths and compared the results with both the methods. The results show that the VDC technique has given the better strength and performance as compared to the conventional method of concrete. In addition, cost estimates were carried out to check which method is economical and presented here.

2.0 Materials and methods:

Conventional Portland cement of 53 grades is used. River sand locally available in the market is used. Crushed granite aggregate of 20 mm nominal size produced from local crushing plants are used. Water is the cheapest but the most important constituent of concrete. Generally water fit for drinking called "wholesome water" or potable water is used**(Saeed and Ezzulddin, 2014)**.

To study the parameters, one pavement was constructed by conventional method, and another one using vacuum dewatering method. From the conventional concrete cubes of 150x150x150mm were casted and tested for 7 and 28 days compressive strength. And another pavement casted by vacuum dewatering method is tested for 7 and 28 days compressive strength by taking core samples. The results are compared for both the pavements. And also the cost involvement in the construction for both types of pavements is worked out and comparative studies carried out with these results and conclusions have been made.

TABLE – 2.1			
PHYSICAL PROPERTIES OF CEMENT **REFERENCE IS:12269-2013 (First Revision)**			
Sl. No.	**Test Conducted**	**Results**	**Requirements as per IS: 12269-2013 (First Revision)**
1.	Brand of cement	ACC	-
2.	Type of Cement	53 Grade, OPC	-
3.	Consistency	28.0%	Not specified
4.	Initial setting time	145 Minutes	Min 30 minutes
5.	Final setting time	290 minutes	Max 600 minutes
6.	**Compressive strength:** (Average of three results)		
	3 days	29.5 MPa	Min 27.0 MPa
	7 days	39.0 MPa	Min 37.0 MPa
	28 days	58.5 MPa	Min 53.0 MPa
7.	Fineness (by Blaine's air permeability method)	301 m^2/kg	Min 225 m^2/kg
8.	Soundness (by Le-Chatelier's method)	0.5 mm	Max 10mm
9.	Density	3.10 g/cc	Not specified
REMARKS: Sample supplied was tested as per guidelines in IS 4031 (Part 3 to 6) 1988 (Reaffirmed 2009), IS 4031 (Part 2) -1999 (Reaffirmed 2008) and it conforms to the Indian Standard specification IS: 12269-2013 (First Revision) for 28-days strength.			

TABLE – 2.2		
CHARACTERISTICS OF FINE AGGREGATE **(NATURAL RIVER SAND – NRS)**		
1.	a) Dry rodded bulk density	1676 Kg/cu.m
	b) Loose bulk density	1564 Kg/cu.m
2.	Specific gravity	2.58
3.	Water Absorption	1.0%
4.	**Sieve Analysis:**	

IS Sieve **Designation**	Cumulative Percentage		Specification as per IS: 383-1970 (Reaffirmed 2011) (Percentage Passing)		
	Retained	Passing	Zone I	Zone II	Zone III
4.75 mm	2.1	97.9	90-100	90-100	90-100
2.36 mm	10.9	89.1	60-95	75-100	85-100
1.18 mm	30.5	69.5	30-70	55-90	75-100
600 microns	62.0	38.0	15-34	35-59	60-79
300 microns	91.0	9.0	5-20	8-30	12-40
150 microns	98.9	1.1	0-10	0-10	0-10
REMARKS: The sample supplied satisfies the requirement of grading Zone II as per IS: 383-1970 (Reaffirmed 2011).					

TABLE – 2.3

CHARACTERISTICS OF COARSE AGGREGATE OF 20 mm DOWN SIZE

1.	Shape	Angular
2.	a) Dry rodded bulk density	1566 Kg/cu.m
	b) Loose bulk density	1407 Kg/cu.m
3.	Specific gravity	2.63
4.	Water Absorption	0.2%
5.	**Sieve Analysis:**	

IS Sieve **Designation**	Cumulative Percentage		Specification as per IS: 383-1970 in respect of 20mm nominal size aggregate (% passing)	
	Retained	Passing	Graded	Single sized
40.00 mm	0	100	100	100
20.00 mm	8.0	92.0	95-100	85-100
12.5 mm	95.3	4.7	-	-
10.00 mm	98.9	1.1	25-55	0-20
04.75 mm	99.9	1.1	0-10	0-5
REMARKS: Sample conforms to the requirement of single size aggregate as per IS: 383-1970 (Reaffirmed 2011).				

TABLE – 2.4

CHARACTERISTICS OF COARSE AGGREGATE OF 10 mm DOWN SIZE

1.	Shape	Angular
2.	a) Dry rodded bulk density	1539 Kg/cu.m
	b) Loose bulk density	1406 Kg/cu.m
3.	Specific gravity	2.62
4.	Water Absorption	0.4%
5.	**Sieve Analysis:**	

IS Sieve **Designation**	Cumulative Percentage		Specification as per IS: 383-1970 in respect of 10mm nominal size aggregate (% passing)
	Retained	Passing	
12.50 mm	0	100	100
10.00 mm	2.7	97.3	85-100
4.75 mm	94.2	5.8	0-20
2.36 mm	98.9	1.1	0-5

REMARKS: Sample conforms to the requirement of 10 mm aggregate as per IS: 383-1970 (Reaffirmed 2011).

TABLE – 2.5

COMBINED SIEVE ANALYSIS OF 20 mm AND 10 mm COARSE AGGREGATE

Cumulative sieve size (mm)	**Cumulative % passing 20 mm**	**Cumulative % passing 10 mm**	**Cumulative % passing when 20 mm and 10 mm are mixed in 60:40 ratio**	**Requirement of Cumulative % passing for 20 mm graded aggregate as per IS: 383-1970 (RA 2011)**
40.0	100	100	100	100
20.0	92.0	100	95.2	95 - 100
12.5	4.7	100	42.8	-
10.0	1.1	97.3	39.6	25 - 55
4.75	0.1	5.8	2.4	0 - 10

3.0 Results and Discussion

3.1 Compressive strength

From Fig 3.1 it can be observed that as design mix concrete, conventional concrete and vacuum de-watered concrete are cured and hardened, vacuum de-watered concrete has attained a considerably high amount of compressive strength with progress of time. Also it can be seen that vacuum de-watered concrete attained stability quicker. The mix proportions of design mix concrete, conventional concrete and Vacuum dewatered concrete for investigating compressive strength are presented in Table 3.1., Table 3.2 and Table.3.3 respectively.

TABLE – 3.1

DESIGN MIX (BY WEIGHT) FOR CONCRETE

Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Compressive strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	38.5	53.1

* Cement: Fine Aggregate : Coarse Aggregate

\# Admixture used is SAVEMIX SP 111 R of M/s. MYK Schomburg India Pvt. Ltd.

REMARKS:- (1) Coarse aggregate shall satisfy the grading requirements as per IS: 383-1970 (Reaffirmed 2011).

(2) Correction for water absorption of sand and coarse aggregate to be applied.

(3) Coarse aggregate of 20 mm & 10 mm shall be used in the ratio of **60:40** respectively

(4) Performance of admixture shall be checked and verified periodically.

TABLE – 3.2									
FOR CONVENTIONAL CONCRETE									
Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Compressive strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	28.20	43.80

TABLE – 3.3									
FOR VACUUM DE-WATERING FLOORING CONCRETE									
Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Compressive strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	41.47	54.00

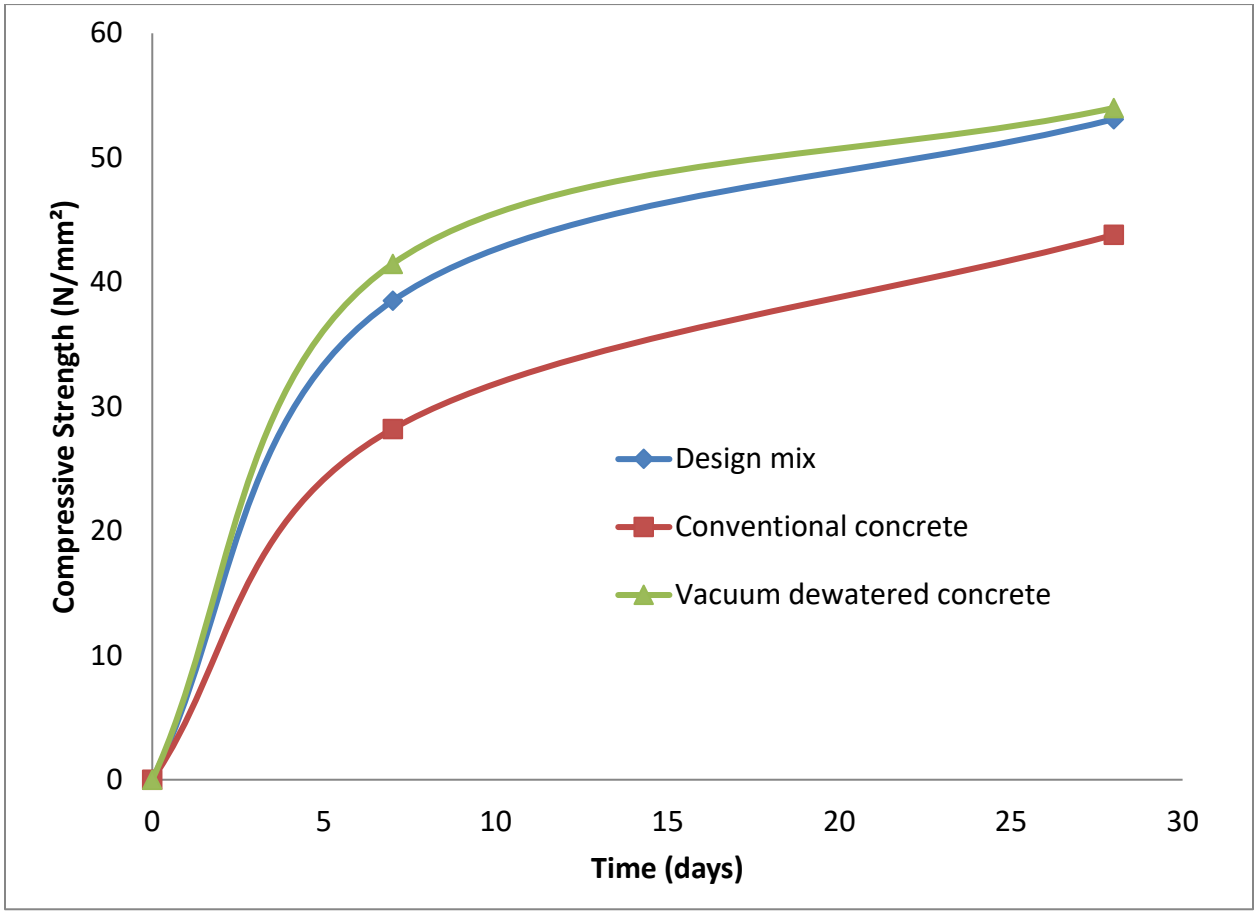


Fig 3.1: Comparison of compressive strengths of Design mix, conventional concrete and vacuum de-watered concrete with progress of time

3.2 Flexural strength

From Fig 3.2 it can be observed that as design mix concrete,conventional concrete and vacuum de-watered concrete are cured and hardened, vacuum de-watered concrete has attained a considerably high amount of compressive strength with progress of time. Also it can be seen that vacuum de-watered concrete attained stability quicker. The mix proportions of design mix concrete, conventional concrete and Vacuum dewatered concrete for investigating flexural strength are presented in Table 3.4., Table 3.5 and Table.3.6 respectively.

TABLE – 3.4									
DESIGN MIX (BY WEIGHT) FOR CONCRETE									
Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Flexural strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	3.9	5.1

TABLE – 3.5									
FOR CONVENTIONAL CONCRETE									
Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Flexural strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	3.9	4.80

TABLE – 3.6									
FOR VACUUM DE-WATERING FLOORING CONCRETE									
Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Flexural strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	4.1	5.30

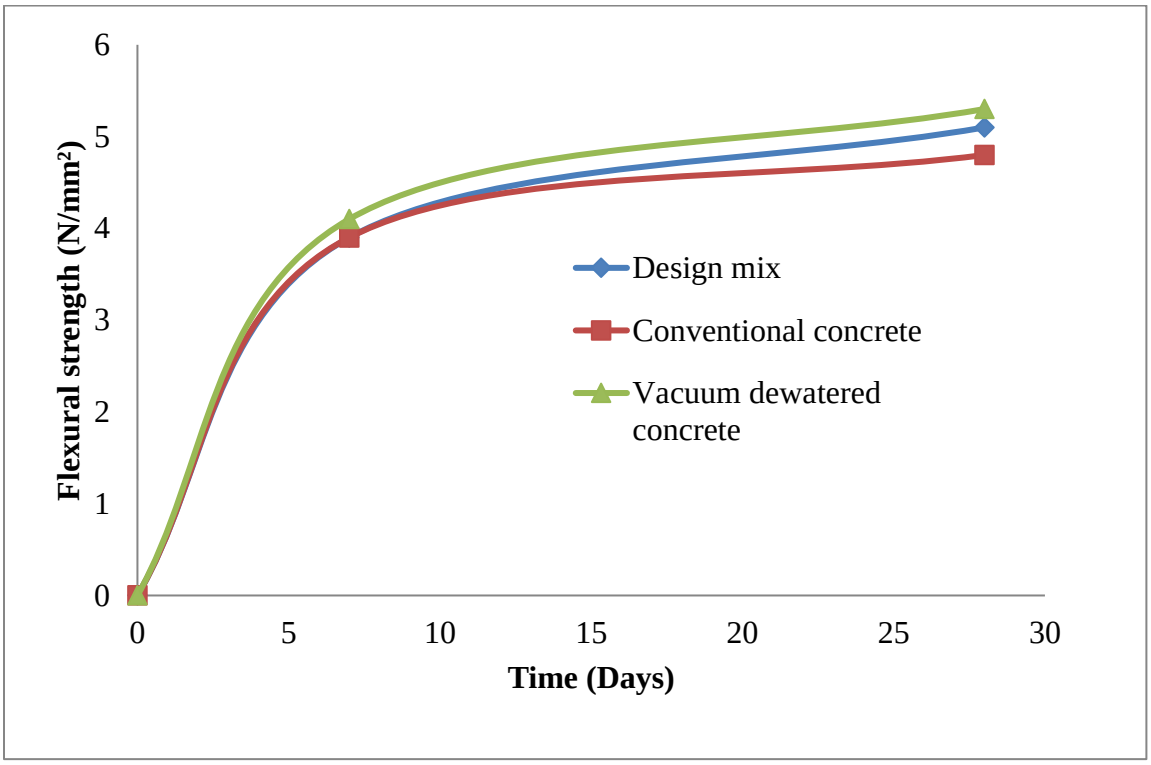


Fig 3.2: Comparison of Flexural strengths of Design mix, conventional concrete and vacuum de-watered concrete with progress of time

3.3 Split Tensile strength

From Fig 3.3, it can be observed that as design mix concrete,conventional concrete and vacuum de-watered concretes, vacuum de-watered concrete has attained a considerably high amount of compressive strength with progress of time. Also it can be seen that vacuum de-watered concrete attained stability quicker. The mix proportions of design mix concrete, conventional concrete and Vacuum dewatered concrete for investigating Split Tensile strength are presented in Table 3.7., Table 3.8 and Table.3.9 respectively.

TABLE – 3.7

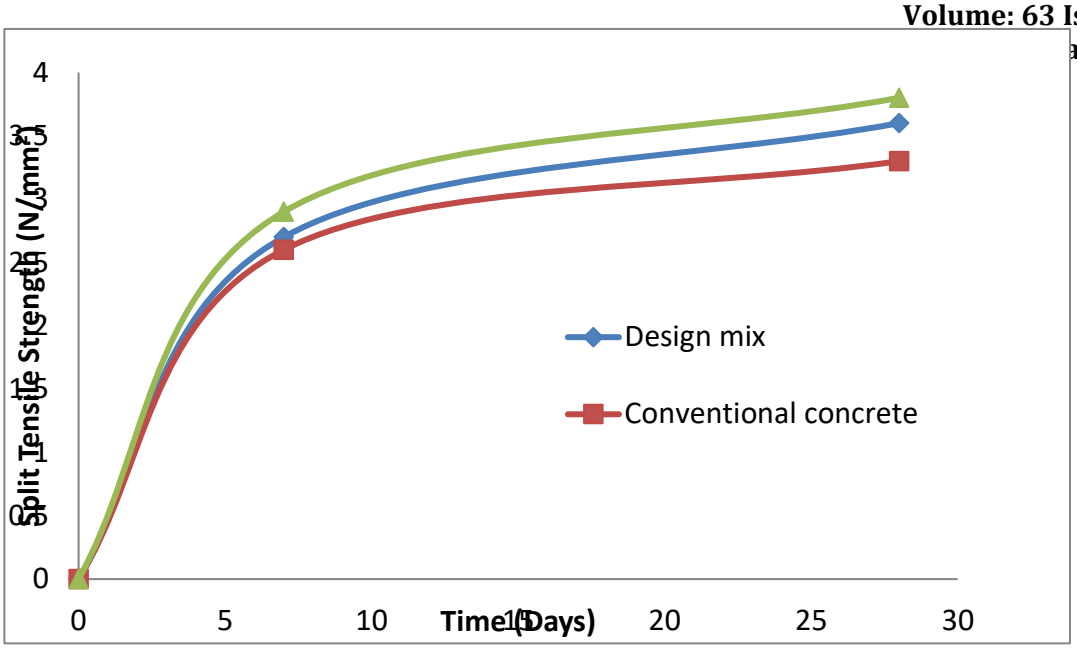
DESIGN MIX (BY WEIGHT) FOR CONCRETE

Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Split Tensile strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	2.7	3.6

TABLE – 3.8

FOR CONVENTIONAL CONCRETE

Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Split Tensile strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	2.6	3.30



3.4 Cost estimation for Conventional Concrete

TABLE – 3.9

FOR VACUUM DE-WATERING FLOORING CONCRETE

Cement used	Mix Designation	Aggregate Max. Size (mm)	Cement content (Kg/cu.m)	Free water cement ratio (max)	Mix Proportions C:FA:CA*	Dosage of admixture per bag of cement (g)#	Slump obtained (mm)	Split Tensile strength (N/sq.mm)	
								7 days	28 days
ACC, 53 grade, OPC	M 40	20	380	0.42	1: 1.85 : 3.08	250	35	2.9	3.80

The following aspects were included in estimating the cost of conventional concrete:

Table. 3.10 shows the detailed cost analysis of Normal concrete for 1 m^3 of concrete work. From this table, it can be observed that the cost of vacuum de-watered concrete is a little bit higher compared with conventional concrete by a margin of just Rs. 271 or by a mere 3%. But the benefits accrued far surpass the marginal increase in cost. Therefore it can be said considering the compressive strength and cost analysis that vacuum de-watered concrete is invariable better.

Table.3.10: Cost estimate of conventional concrete

S.No	Description	Rate (Rs)	Unit	Quantity	Total (Rs)
1	Details of cost for 1.00 cum				
2					
3	Stone Aggregate (Single size) : 20 mm nominal size	1562.75	cum	0.5	781.375
4	Stone Aggregate (Single size) : 10 mm nominal size	1562.75	cum	0.33	515.708
5	Carriage of Stone aggregate below 40 mm nominal size	141.632	cum	0.83	117.554
6	Coarse sand (zone III)	1596	cum	0.45	718.2
7	Carriage of Coarse sand	141.632	cum	0.45	63.7343
8	Portland Cement	8379	tonne	0.38	3184.02
9	Carriage of Cement	125.885	tonne	0.38	47.8361
10	Plasticizer / super plasticizer	50.54	kilogram	1.9	96.026
11	0.50% of cement	0	0	0	0

12	Production cost, pumping to respective floors and laying in position	0	0	0	0
13	Production cost of concrete by batch mix plant.	465.5	cum	1	465.5
14	Pumping charges of concrete including Hire charges of pump, piping work & accessories etc.	199.5	cum	1	199.5
15	LABOUR	0	0	0	0
16	Labour for pouring, consolidating & curing	0	0	0	0
17	Mason (average)	554.61	Day	0.17	94.2837
18	Beldar	437.57	Day	2	875.14
19	Bhisti	482.79	Day	0.9	434.511
20	Vibrator(Needle type 40mm)	465.5	Day	0.07	32.585
21	Sundries	2.3674	L.S.	13	30.7762
Total					7656.75
Add 1 % for water charges					76.5675
Total					7733.32
Add 15 % for contractor's profit and overheads					1160
Cost per 1.00 cum					8893.31
Say					8894

3.5 Cost estimate of vacuum Dewatered Concrete

The following aspects were included in estimating the cost of vacuum dewatered concrete:

Table.3.11: Cost estimate of vacuum de-watered concrete

S.No	Description	Rate (Rs)	Unit	Quantity	Total (Rs)
1	Details of cost for 1.00 cum				
2					
3	Stone Aggregate (Single size) : 20 mm nominal size	1562.75	cum	0.5	781.375
4	Stone Aggregate (Single size) : 10 mm nominal size	1562.75	cum	0.33	515.708
5	Carriage of Stone aggregate below 40 mm nominal size	141.632	cum	0.83	117.554
6	Coarse sand (zone III)	1596	cum	0.45	718.2
7	Carriage of Coarse sand	141.632	cum	0.45	63.7343
8	Portland Cement	8379	tonne	0.38	3184.02
9	Carriage of Cement	125.885	tonne	0.38	47.8361
10	Plasticizer / super plasticizer	50.54	kilogram	1.9	96.026
11	0.50% of cement	0	0	0	0
12	Production cost, pumping to respective floors and laying in position				
	Production cost of concrete by batch mix plant.	465.5	cum	1	465.5

13	Pumping charges of concrete including Hire charges of pump, piping work & accessories etc.	199.5	cum	1	199.5
14	LABOUR				
15	Mason (average)	554.61	Day	0.17	94.2837
16	Beldar	437.57	Day	2	875.14
17	Bhisti	482.79	Day	0.9	434.511
18	Vibrator(Needle type 40mm)	465.5	Day	0.07	32.585
19	Sundries	2.3674	L.S.	13	30.7762
20	Operational charges for vacuum dewatering system including screed vibration, placing of filter mat, top mat, vacuum process, floating, troweling, brooming etc.	2.3674	L.S.	57.2	135.415
21	T & P charges including consumable power charges, loading , unloading and hire charges of equipments	2.3674	L.S.	41.6	98.4838
Total					7890.64
Add 1 % for water charges					78.9065
Total					7969.56
Add 15 % for contractor's profit and overheads					1195.43
Cost per 1.00 cum					9164.99
Say					9165

Table. 3.10 shows the cost estimate of conventional concrete and Table. 3.11show the cost estimate of vacuum dewatered concrete. It can be observed from these tables, that with just an additional cost of Rs.271/- per Cu.m, exorbitant benefits such as increase in compressive strength, lower consumption of cement etc can be achieved.

4.0 Concluding remarks:

It can be arrived that there is a considerable enhancement in compressive strength, flexural and split tensile strength and on usage of vacuum de-watered concrete. With a marginal increase in cost of construction, good benefits such as overall increase in all the three strength parameters, reduction in cement consumption, early utilization of pavement, reduction in maintenance cost etc, are possible by using this technology.

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Behaviour Of Pedestrians At Mid-Block While Crossing The Road And Recommendations For Providing Exclusive Pedestrian Phase (Epp)At Those Locations.

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Abstract: Pedestrian crossing and the behavior of pedestrians in different conditions especially at uncontrolled crossings is a subject which needs in depth study and analysis. At uncontrolled junctions, the pedestrians and their behavior, safety of pedestrian crossing is neglected and no measures are taken to systematize pedestrian crossings at these junctions. Therefore a practical study of the pedestrian road crossing data is made in this study and statistical analysis of the data is done at uncontrolled crossing junctions in mixed traffic conditions of Indian scenario. The main objective of study is to analyze the pedestrian road crossing behavior at uncontrolled junctions. Adopting multiple regression technique the various parameters which effect the behavior of pedestrian. Vehicular gap, driver yielding behavior, frequency of attempts to cross, age and condition of pedestrian , rolling gap are some of the parameters that decide the pedestrian crossing time and other requirements. The surveys have been conducted at all junctions between Bowenpally to Kompally on national highway manually and analysis is made. The survey and statistical analysis concluded that at almost all junctions, the vehicular gaps and pedestrians behavior is not up to mark and the parameters considered indicate there is scope of accidents if suitable measures are not taken. It is concluded that counselling pedestrians and drivers for change of their behavior is very important. Providing visible marks for pedestrian crossing is to be done at all junctions. Traffic control devices are to be installed where ever possible. Considering the volume of pedestrian traffic all along the city, safe crossings for pedestrians has to be given.

Key words:*PedestrianCrossing-speed, Gap-acceptance, Delay, Safety, Mid-block crossing*

I. INTRODUCTION

A person walking on road is called pedestrian. They are required to cross the roads to go to other side. Foot paths and crossing facilities like Zebra crossings, foot over bridges are to be provided for them, to safe guard their lives and make them move safely without any fear, or hurdle to their destinations. It is responsibility of the Government and authorities to ensure their safety. On their behalf, the drivers

and pedestrians should behave properly and follow the traffic rules correctly. To achieve this objective, a study of behavior of drivers and pedestrians is very important. This paper makes such study.

A convergence is characterized as an at-level intersection of at least two streets. Convergences are the most bustling spots in the street way. Safety for pedestrians is very important in designing any traffic control system. Several necessities make people walk. Walking for health and good health is now considered as prime necessity. If a person has to go to his friends house which is nearby he will walk. A person requiring some goods to purchase for his daily needs will also walk. Persons having no vehicular support will walk for all their requirements even for long distances. Whenever a need arises in these endeavors, they have to cross the roads. When no traffic signals are available at near places, they will try to cross seeing the vehicular gaps. It is very difficult to predict the vehicle gaps in mixed traffic conditions. Therefore the pedestrians may try to run or behave improperly to cross roads in hurry leading to accidents. At intersections, this is very problematic as vehicles come in all directions.

1.1 Need for Present Study

Several problems like darting, dashing, age, intoxication of both pedestrians and drivers, lighting darkness, fog, are associated with pedestrian crossing. Each problem has its own effect on pedestrian crossing. Therefore multiple regression analysis is done on the data collection. Each road and city has got specific problems of pedestrian crossing and is to be studied separately having its own uniqueness. Therefore the problem of National highway 44(NH44) from Bowenpalli to Kompally is studied in this analysis and conclusions are drawn.

1.2 Objective and Scope of the Study

This study has been directed towards accomplishing the following goals:

- To study the walker crossing offices at convergences in Hyderabad City.
- To study passerby development design at some chosen crossing points and foot over scaffolds in our City.
- To recognize the issues related with person on foot crossing at convergences.
- To assess the need of restrictive walker signal stage at signalized convergence.

2. LITERATURE REVIEW

Only a few studies were done in the Hyderabad city, regarding pedestrian problems.

These investigations are chiefly centered around review of the summed up issues related with people on foot. In any case, none of them has estimated the condition of people on foot at convergences. To have better comprehension on the conceptualization on the issue, data identified with the exploration

were gathered from various accessible existing books/diaries, unpublished proposition, course papers, magazines, papers and so forth.

The different studies made on this issue are presented below to understand the problem and to serve as guide for our study.

ChaudhariAvinash[a]ShahJiten[b]ShriniwasArkatkar[a]JoshiGaurang[a]ParidaManoranjan, 2018.

This work explains the impact of encompassing elements on common intersection in various urban communities of India, explores the impact of person on foot qualities on strolling speed, hole acknowledgment conduct and deferral and it suggests 50th percentile (1.15 m/s) speed as configuration speed for mid-block intersections, especially for developing countries like India. A normal 6.2 s is suggested as mean speed for plan of walker office at mid-block crosswalks under blended traffic conditions, A normal 8 s is suggested where female or senior people on foot are available.

Saha et al. 2011;Pa sha et al. 2015;Ma lik et al. 2017;Anciaes and Jones 2018.

Dread of heights (Opdyke et al. 1995;Juan and Pérez 2009) and the nonattendance of sufficiently planned flights of stairs (Mutto et al. 2002;Rizati et al. 2013) essentially influence the rationale of the walkers toward utilizing raised offices. Walkers across various Asian urban areas generally favored utilizing at-grade offices instead of utilizing underpasses or bridges because of security concerns.

Malik et al. 2017;Saha et al. 2011;Das and Barua 2015;Pasha et al. 2015;Sinclair and Zuidgeest 2016.

Past investigations indicated that in any event, when such isolated offices were given, walkers were hesitant to utilize them and crossed unlawfully utilizing accessibility at-grade middle openings. Analysts over the globe had contemplated distinctive intersection offices to comprehend factors that prompted the utilization or non-utilization of such isolated offices.

Pasha et al. (2015)

Even the presence of merchants, diminished the compelling walkway width, which was further liable for the decrease in the utilization of the pedestrians, and this was as per the findings announced by Pasha et al. (2015). During the review, a lot of criticisms were acquired from respondents which additionally affirmed that the portability contact happened significantly.

TRB, National research council, Washington

A study was made by TRB, National research council Washington on pedestrian flow, speed, capacity relationships and gave their own equations. The level of service aspects was also studied.

Di Pietroand King& V. Himanen, R. Kulmala

Dr. pietroand and others studied decision making process and explained the same with a gap acceptance theory.

D.Sun, S.K.Ukku suri, R.F. Bene kohal, et al.

D. Sun et.al studied the gap acceptance theory and suggested suitable modeling for assessment of gap acceptance by pedestrians.

Transportation Research board meeting,2003.

The motorist-walker association at uncontrolled block cross sections was studied by TRB in 2003 and recorded during their 82nd proceedings and studies continued up to 2006.

C. Holland, R. Hill

The pedestrian, vehicular and roadway characteristics which influence the pedestrian crossing behavior was studied by Holland and others and concluded that gender and age influence the behavior to a large extent. The driver status will also influence the crossing behavior in risky situations.

G. Tiwari, S. Bangdiwala, A. Saraswat, et al.

Tiwari et.al concluded that Females will wait for longer time than males while crossing the road.

J. Oxley, B. Fildes, E. Ihsen, et al.

The studies on age were done by J. Oxley et.al and it was concluded that the elderly and old peoples crossing behavior is more safe compared to young people. This behavior is more predominant in roads without dividers and with small dividers.

Himanen and Kulmala, 1988.

The behavior of pedestrians and car drivers on pedestrian crossings was analyzed by Himanen and Kulmala, in 1988. And an application of logical models was developed.

3. METHODOLOGY

Information from just one source has been utilized for this examination. This study keeps up the stringent standards for the accomplishment and effective achievement of the proposed targets of the work. Field overview has led to distinguish the current walkers crossing offices beginning at Bowenpally Police Station and ends at Kompally X-Roads, Hyderabad on NH44. Existing walker crossing dat has been gathered physically. Walkers information has been gathered by manual checking some chosen crossing points where traffic interest and passerby exercises are exceptionally high. Heading passerby crossing information has been gathered for 7 sequential days starting from 7AM toward the beginning of the day till 7PM at night. Information investigation has been performed using MS Excel. Walkers data has been correlated with manual perception. From this perception, issues related with passerby crossing at convergences and mid-blocks have been recognized. Some signalized crossing points have been chosen to present selected walkers.

3.1 Data collection

The data on the parameters like driver behavior, pedestrian behavior, road condition was collected at all the junctions from Bowenapally to Kompally on National highway 44 and recorded with different teams. The data collection included the age, gender, condition of pedestrian, gap of vehicles, vehicle types, driver conditions, average speed, and number of vehicles. The data were recorded for a period of 7 days Starting from 7 AM to 7 PM on 7 consecutive days as explained above manually through different teams on all the parameters identified. A Proforma was furnished to the team and the team members were asked to collect the information and fill up the data in detail with remarks if any. They were advised to collect the information from different type of people like young, old male and female, pedestrians and drivers, traffic officials. They were also instructed to note down the road conditions

and existing facilities of pedestrian crossings at the junctions. The road sketch of the reach indicating the crossing locations where survey was conducted is shown in **Fig.1** below.



Fig.1: Intersections from Bowenpally P.S to Kompally X-Roads

The **Figure 1** shows the junctions between Bowenpally to Kompally on National highway 44.

The study is done through manual count. The following measureswere taken for manual count to get correct and accurate results.

- The time period(s) of count should cover the peak times of the pedestrian crossing activity of study. As counts are done from 7 AM to 7 PM, this is covered as peak time will be in the afternoon and noon times.
- A continuous period of 7 days were observed where there are no school holidays, no office holidays, no bank holidays, no early closing, and no special events were considered for this study.
- All the junctions were considered and selected which cover all strategic locations of the road stretch under consideration.
- The pedestrian facilities need to be provided to divert trips to walking, or increase the current pedestrian activities,at each junction were also studied.

3.2Data extraction

At the junctions, cameras are placed and the information of passerby crossings are recorded once in every 30 milliseconds. This data is extricated by utilizing AVS video editorial manager programming from each forward snap and is shown in Fig. 2. The manual tallying of data recorded by software at Dhulapally crossroads is shown in Fig 3. The traffic jams were usually not included in the data extraction process and the collected data are summarized in **Tables 1 and 2** for male and females respectively.



Fig 2: Data Extraction using AVS video



Fig.3: Dhulapally X-Roads Mid-Block Road Crossing
Morning Survey Timings - 7:00AM To 11:00AM

Table1: Time Vs number of persons crossing (extracted from camera)

TIME PERIOD (in Seconds)	Number of Persons crossing the road (Male)
10-20	5
20-30	18
30-40	24
40-50	11
50-60	25
60-70	13
70-80	2
80-90	1
90-100	6
100-110	17
110-120	26

Table 2: Time Vs number of persons crossing (extracted from camera)

TIME PERIOD (in Seconds)	Number of Persons crossing the road (Female)
10-20	12
20-30	17
30-40	21
40-50	26
50-60	15
60-70	8
70-80	3
80-90	8

The data points from manual counting are related to gap required for pedestrian crossing and the empirical equations are developed. These equations have demonstrated that age, gender and driver condition are most influencing factors.

4. CONCLUSIONS

Age, gender and driver condition effects the gap time required to be provided for pedestrian crossing and should be considered while fixing the pedestrian signals. Our Survey was based upon the pedestrians and the motorists.

In spite of the fact that traffic light gadgets can assist with traffic control, educating people on foot and drivers is principal to a safe control. Arrangement of noticeable cross stamping must be introduced in all the convergences. Considering the high thickness of walker traffic everywhere on the city, pedestrian foot crossing has to be provided. Middle Island with middle obstruction must be given in all the convergences to guarantee safe walker crossing. Road lighting around the intersection ought to be sufficient so that cross imprints are handily caught by the vehicle drivers to have halting sight separation to keep away from crash in evening. The executives of existing physical framework must be upgraded to empower more powerful utilization of crosswalks. Street marking signs, traffic lights, and channelization at convergences, turning limitations, partition hindrances, space for transport stops and leaving off of space for public vehicles should be given provision. Passerby intersection ought to be considered cautiously in rush hour gridlock designing and arranging of the convergences and mid squares. Strolling ought to be perceived as one of the predominant methods for movement all over Hyderabad city. Pedestrian wellbeing ought to be considred depending on traffic convergences, midblock plan contemplations, signal planning, sign boards, cross checking, isolated traverse paths, underpass and numerous other parameters. It is important to eliminate improper and illicit non-transport related traffic from the public traffic to ensure safety on the street. This may include the buildup of elective destinations. Demo-exercise activities ought to be taken to improve the capacity of passengers (drivers and walkers) to be more productive and more secure. Projects ought to be taken to adjust huhman mentalities and bring about eagerness among people to assist better traffic administrations. Set of traffic rules guarantee a more consistence compliance of conduct. Implementation activities can include formal policing to embrace traffic standards and code of conduct, ought to be incorporated into the common public. During foot crossings, vehicles are found to run with max throttle which poses a perilous danger to passersby. Therefore security must be beefed up and traffic police should adopt strict measures to control it. All the vehicles ought to be authorized appropriately to decrease speed at the zebra crossing in the whole signalized convergences.

5. RECOMMENDATIONS

A few suggestions are given considering modifications to encourage safe pedestrian transportation during strategy making. Restrictive passerby phase might be provided in some chosen convergences on pilot premise to improve pedestrian safety and give the walker a cordial ambience. These may be provided where passerby traffic volume is high and where pedestrians regularly violate crossing indiscriminately. Selective Pedestrian Phase (SPP) might be presented which will lessen vehicular movement in the convergences. Convergences, for example, in and around shopping zones and institutional zones are associated with higher volume of people on foot and therefore vehicular regulation time exerts a better flow of traffic. Pedestrian path regularization might be carried out in

different staging plans. At areas with hefty passerby volumes and weighty turning developments, it might be reasonable to give a select path to walkers. Unlawful stopping close to the crossings which obstruction walker crossing ought to be eliminated. Pedestrian regularization methods at intersection ought to be permitted through law. At grade crossing walkers should not be allowed to cross, aimlessly on account of profound traffic flood in most of the assemblies, considering high people thickness and high volume of traffic in the city. It will in general be communicated that introduction of prohibitive bystander signals and placards in the high business and shopping domains of the city will be prohibited.

6. FUTURE SCOPE

Colossal possibilities ought to be considered to suggest most ideal alternatives for determination of the convergence to the present EPP and propose for signal planning in setting of the whole stretch from Bowenpally P.S to Kompally X-Roads. Such exploration may improve the nature of traffic and assist policy makers of Hyderabad.

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Critical Gap Calculation At Unsignalized Intersectionsby Occupancy Method

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ABSTRACT-The behavior of accepting gap determines the capacity of an uncontrolled intersection.Intersection performance influences the critical gap. Gap and lag give better results. Studies reveal that developed countries exhibit good performance by adopting proper traffic rules. When a minor road intersects a major road critical gap is to be considered. Critical gap concerns the safety of traffic and pedestrians. In developed countries people follow traffic rules voluntarily. In some cities of India, due to heavy traffic regulation of the traffic is difficult at intersections with no control. Pedestrian safety is also of paramount importance. The aim of this paper is to calculatecritical gap and critical lag separately. In this work we used the clearing behavior of vehicles in connection with gap and lag. The clearing behavior of vehicles is studied along with lag and gap data procured from the local region at two legged and three leg controlled intersections. It was observed that the critical lag and critical gap values were dynamically changing with change in the volume of traffic and also pedestrians. Depending on the nature of intersections, the values of critical gap and lag were observed to be quite changing. The values of critical gapwere found to be more than critical lagin our study area.

Keywords:*Mixed traffic, Uncontrolled cross, Critical gap, Gap acceptance.*

1.0 Introduction:

Gap acknowledgment at convergence is generally viewed as where a little street meets an enormous street. A gap between two vehicles is to be deliberately kept up by drivers during blending and intersection [1]. The way of moving toward vehicles of the significant road vehicles bring about the production of delays of various spans. A gap between two vehicles is the separation between the back guard of the primary vehicle and the front guard of the subsequent vehicle and is typically estimated in a flash. Slack is the separation in time between the entering vehicle and the progressive vehicle in the significant stream.

An uncontrolled convergence is one in which the passage into the crossing point from any of the methodologies isn't constrained by an administrative (i.e., STOP) sign or a traffic light. "at the point when two vehicles approach or enter a convergence from various expressways at roughly a similar

time, the driver of the vehicle on the left will yield the option to proceed to the vehicle on the right." The driver should likewise respect any vehicle that is now legitimately in the convergence and any common in a checked or plain crosswalk. Uncontrolled crossing points are generally restricted to low-volume streets in rustic or neighborhoods, as outlined beneath.

The base sight separation (perceivability) relies upon the control that exists. For an uncontrolled convergence, drivers drawing closer from all headings ought to have the option to see the crossing point as well as the restricting minor road comes nearer from a separation that would be adequate for them to securely respond [2]. In the event that the convergence is constrained by a STOP sign, the driver drawing nearer on the significant street ought to have the option to see the crossing point from at any rate the halting sight separation. The base halting sight separation relies upon the plan speed of the street and is usually alluded to as the Green Book, the public plan manages streets and gives guidance on the best way to decide the proper halting sight separation for a given area.

Drivers don't have adequate perceivability of approaching vehicles on the two methodologies of the converging road to securely enter or cross the convergence. For convergences at which just the minor street approaches are stop-controlled, the minor street crossing point sight separation is the length obvious along the two methodologies of the significant road. Convergence sight separation is estimated utilizing approach sight triangles or takeoff sight triangles, contingent upon the control at the crossing point. The sight triangle is framed by the two legs of the contradicting roads and relies upon the working rate and the traffic light of the converging streets. The clients' view inside the triangle ought to be unhampered. There are a few situations that relate crossing point sight separation to the kind of control and vehicle maneouver.

Drivers are not given adequate data as signs or markings to recognize or explore the crossing point. At some unsignalized crossing points, the way or path of the driver ought to follow may not be self-evident, or the plan and arrangement may lead the driver into an off-base way. This is regularly the situation at bizarre crossing points, particularly if there are no asphalt markings depicting the paths. The absence of a Street Name sign at the convergence can likewise be viewed as insufficient direction.

The crossing point is powerless to visit close misses or clashes and coming about crashes between vehicles because of a mix of traffic volumes, working rates, and turning developments at or close to the convergence.

There are a few factors that can intensify the potential for clashes among vehicles at a convergence, for example, neighboring area uses and passageways (e.g., business carports in nearness to the crossing point), hefty through volumes and additionally turning developments, and high working paces on the methodologies.

Numerous analysts have dealt with the idea of gap acknowledgment during the previous hardly any years, yet the vast majority of them considered homogeneous traffic stream circumstances [3]. As indicated by accessible writings, a few strategies or models have been set up since the time of 1947 for the assessment of basic gap as unmistakably as conceivable [4] Thus, plainly written works with respect to gap acknowledgment wonder is rich. Larger part of literary works ordinarily think about the dismissed and acknowledged gaps as the vital boundaries for the basic gap assessment. "accordingly basic progress/gap can be assessed based on perceptions of the biggest dismissed and littlest acknowledged gap relating to a given transportation office.

Raff and Hart (1950) said that the expression "basic slack" as a significant boundary in the assurance of gap acknowledgment for a minor road driver ready to take a orientation development in an un-signalized convergence. Additionally the creator proposed a theoritical model where two aggregate conveyance bends identified with the quantity of acknowledged and dismissed gaps meet to yield the estimation of basic Lag .

Mill operator (1972) remedied the Raff's model and reasoned that the created model is appropriate for traffic however isn't satisfactory for substantial traffic conditions. The creator additionally confirmed that it gives good outcomes for gaps as that acquired for slacks. Further the creator recommended a gap acknowledgment to check the materialness of different techniques for basic gap assessment.

The targets of this work are to investigation the inhabitance season of various vehicles at unsignalized crossing point, to gauge the traveler vehicle unit for various vehicles at unsignalized convergence to decide the estimation of basic gap for various vehicles at unsignalized crossing point and to comprehend the accessibility of gap impact.

2.0 Materials and methods:

Information was gathered from three legged crossing points in Hyderabad city, Telangana state, India. Both the convergences comprise of two path isolated significant roads and one path unified minor roads. Crossing points were chosen with the end goal that there is an away from in the extent of hefty vehicles.

For convergence 1, extent of hefty vehicles is less contrasted with crossing point 2. The decision has been had to dissect the unmistakable effect between the gap acknowledgment conduct due to hefty vehicles and other vehicle types on the significant street. The video-realistic information was caught from raised situations for a time of three hours during non-weekend days on every area [5].

Gap acknowledged and dismissed, subsequent time for every vehicle type was extricated from the video. What's more, the impact of gap accessible for every vehicle type and with other vehicle types in

the transfer was separated from the data. characterization follow up progress as the time between the takeoff and flight of the following vehicle utilizing a similar major-road progress, under a state of constant lining on the minor road. The subsequent time is estimated from the field as the normal of the absolute readings.

The philosophy incorporates reasonable site choice for the field overview, assortment and extraction of field information, distinguishing proof and measurable investigation of components prompting gap acknowledgment. For gathering the gap acknowledgment information, blend of vehicles are ready for the significant stream traffic. The gap acknowledgment study is done uniquely for vehicles which are taking right abandon minor to significant stream.

Further, the significant stream vehicles are isolated into various blends. As the level of portion of , 3w, and 4w are higher, the mixes are readied. In basic gaps strategy, it is hard to gauge basic gap legitimately. Generally it tends to be assessed by acknowledged gaps and dismissed gaps. As referenced previously, there are numerous computation strategies for basic gap, for example, inhabitance technique, Acceptance bend strategy , slack strategy, Ashworth's technique, Raff's technique, Harders' technique, Logit methodology, and Greenshield technique.

Information was gathered from three legged crossing points in Hyderabad city, Telangana state, India. Both the convergences comprise of two path isolated significant roads and one path unified minor roads. Convergences were chosen with the end goal that there is an away from in the extent of substantial vehicles.

For crossing point 1, extent of substantial vehicles is less contrasted with convergence 2. The decision has been had to break down the unmistakable effect between the gap acknowledgment conduct on account of hefty vehicles and other vehicle types on the significant street. The video-realistic information was caught from raised situations for a time of three hours during non-weekend days on every area [5].

Gap acknowledged and dismissed, subsequent time for every vehicle type was extricated from the video. Also, the impact of gap accessible characterizes follow up progress as the time between the takeoff of one vehicle from the minor road and flight of the following vehicle utilizing a similar major-road progress, under a state of constant lining on the minor road. The subsequent time is estimated from the field as the normal of the all out readings.

The procedure incorporates reasonable site choice for the field review, assortment and extraction of field information, ID and factual examination of components prompting gap acknowledgment. For gathering the gap acknowledgment information, blend of vehicles are ready for the significant stream traffic. The gap acknowledgment study is done distinctly for vehicles which are taking right abandon

minor to significant stream. The ideal opportunity for the appearance, flight and leave time for every vehicle.

Further, the significant stream vehicles are partitioned into various mixes. Different mixes comprise of blend of LCVs, transports, farm vehicles and HVs with , 3w,4w which are less in number. In basic gaps technique, it is hard to quantify basic gap legitimately. Normally it very well may be assessed by acknowledged gaps and dismissed gaps. As referenced previously, there are numerous figuring strategies for basic gap, for example, inhabitance technique, Acceptance bend strategy , slack strategy, Ashworth's technique, Raff's strategy, Harders' strategy, Logit system, and Greenshield technique.

Information was gathered from three legged crossing points in Hyderabad city, Telangana state, India. Both the convergences comprise of two path isolated significant roads and one path unified minor roads. Crossing points were chosen with the end goal that there is an away from in the extent of weighty vehicles.

For convergence 1, extent of hefty vehicles is less contrasted with crossing point 2. The decision has been had to break down the reasonable effect between the gap acknowledgment conduct in light of weighty vehicles and other vehicle types on the significant street. The video-realistic information was caught from raised situations for a time of three hours during non-weekend days on every area [5].

3.0 Results and Discussion:

Occupancy time analysis for combined traffic for 3 hours from minor to major road.Table.1, shows Occupancy time analysis for minor right vehicle.

Table.1: Occupancy time analysis for minor right vehicle

Type of vehicles	**Number of vehicles**	**Time**
CS	19	6.9 sec
CB	6	7.3 sec
TWO WHEELERS	44	1.5 sec
LW	32	9.2 sec
HCV	40	12 sec

AUTOS	3	5.2 sec

Maximum occupancytime was 1.7sec and minimumoccupancy time was0.4sec whereas the averageoccupancytime was found to be3.42sec. Theaverage occupancy time of individual vehicleon3.5mwide traffic lane was7.01 sec. The passenger car unit value which is combined from occupancy method is 4.47sec. Theaverage criticalgapby raff's method is 3.1 sec. Theaverage criticalgapby lag method is 3.89 sec from the collected data design of signals was proposed atunsignalized intersections.

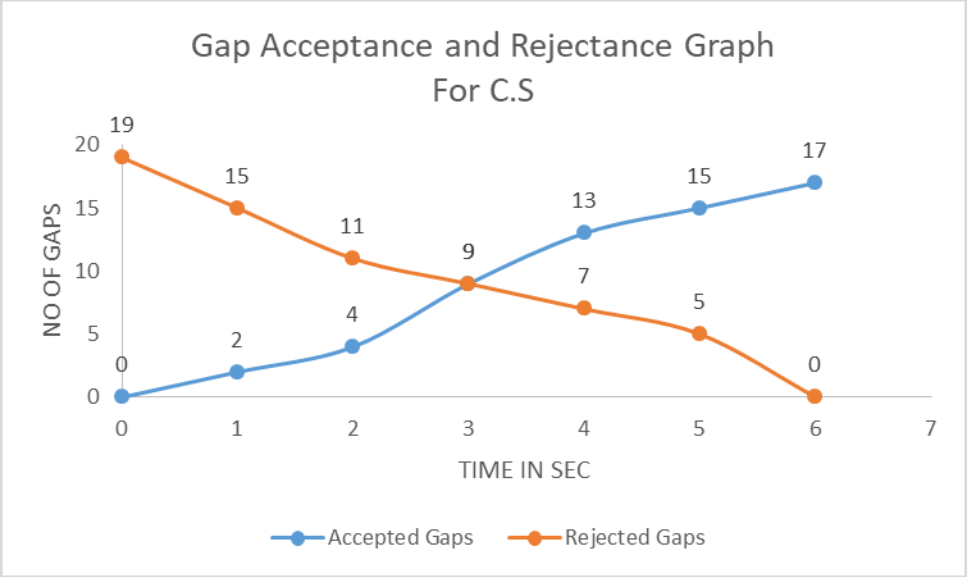

Fig.1: True average of the critical headway

Average critical gap : 3.0 sec .9.5-acceptance gap less than 3.0sec. 9.5-rejected gap greater than 3.0 sec.Pcu=average of individual vehicle by occupancy method / pcu factor [6]. Fig.1 shows the The average value of the headway is found. Table.2 shows the Consistency and homogeneity of drivers and it does needs predefined programs of critical gap and theories connect to the uniformity and equality of drivers.

Table.2: Consistency and homogeneity of drivers

Length of gap t(sec)	Number of allowable gaps	Number of rejected gaps
0.0	0	116
1.0	2	103

2.0	12	66
3.0	32	38
4.0	57	19
5.0	84	6
6.0	116	0

From experimental and hypothetical contemplations, if the reliant variable is a parallel variable, the state of the reaction capacity will be curvilinear. Table.3 shows gap acknowledgment conduct of ward factors of this reaction bend are the aggregate likelihood of tolerating a gap of a particular length.

Table.3: Gap acceptancebehaviour

TIME		**TURNING LEFT**			**TURNING RIGHT**		
FROM	TO	Two wheelers	Autos	CB	Two wheelers	Auto s	CB
8.3	9.3	44	25	10	55	11	10
8.45	9.45	55	10	15	45	16	14
9	10 0	40	15	17	55	13	14

The x-value comparing to the 0.5 probabilities might be characterized as a basic gap size. The primary disadvantage of this philosophy is that the improvement of acknowledgment bend predisposition (or slack acknowledgment inclination) delivers a pretty much misshaped. This predisposition is presented when information from drivers that reject numerous gaps are incorporated.

4.0 Conclusions:

The traffic surveys wereconductedat Kompally, by using the video recording technique:

- Passenger car unit:
  -Minimum for small cars = 1.4
  -Maximum forheavy commercial vehicles = 5
- Theaverage occupancy time of individual vehicle on3.5m wide traffic lane is7.01 sec.
- The passenger car unit value which is combined from occupancy method is4.47sec.
- Theaverage criticalgapby raff's method is 3.1 sec.
- Theaverage criticalgapby lag method is 3.89 sec
- From the collected data:
  -design of signals atunsignalized intersection.
  -Provision ofsignals for pedestrians.
  -Design ofroad as per traffic conditions.

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Durability of Brick Cast by Using Sludge

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Abstract- India delivers yearly around 960 MT of solid waste, which poses major natural and biological issues in addition to posing huge risk of diseases. In spite of the fact that numerous lab cycles, items and advances have been created dependent on agro-modern squanders, non-adequacy of the other option and recently created items among clients because of absence of mindfulness and certainty is to be eliminated. Be that as it may, climate well disposed, energy-productive and savvy elective materials created from strong squanders will show great market potential to take into account individuals' needs in country and metropolitan regions. So as to augment the utilization of elective structure materials created from various kinds of strong squanders and to expand the creation limit of lab scale measures, innovation empowering focuses are should have been set-up to encourage business visionaries for successful commercialization. Toughness and execution of the fresher items and spread of advances underlining costs-benefits examinations and life cycle evaluation report will essentially add to fruitful commercialization of inventive cycles. Consideration of mechanical waste-based more up to date assembling materials, accentuating their ecological criticalness in the educational program at advanced education level and pragmatic uses of squanders in development area will offer fillip to such innovation advancement. The logical progression in reusing and utilizing mechanical and agrarian cycles for using squanders will prompt a superior utilization of world's assets. The new and elective structure development materials created utilizing agro-mechanical squanders have adequate degree for presenting new structure parts that will diminish to a degree the expenses of building materials.

1.0 Introduction:

Waste might be characterized as an undesirable material produced after the assembling cycle of mechanical, or from agrarian, or from house hold action. It is the disposed of material which fundamental prerequisite of removal. Squander causes numerous aggravations in the climate. It produces numerous sorts of viral or bacterial contamination for the human and creature which make awful impact on wellbeing.

During various mechanical, mining, horticultural and homegrown exercises, India creates every year around 960 MT of strong squanders as results, which posture major natural and environmental issues other than involving an enormous territory of land for their capacity/removal [1]. Looking to such gigantic amount of squanders as minerals or assets, there is huge extension for setting up auxiliary ventures for reusing and utilizing such strong squanders in development materials. Despite the fact that numerous lab cycles, items and innovations have been created dependent on

agro-modern squanders, non-agreeableness of the other option and recently created items among clients because of absence of mindfulness and certainty is to be taken out. Nonetheless, climate agreeable, energy-productive and practical elective materials created from strong squanders will show great market potential to oblige individuals' needs in rustic and metropolitan territories [2]. So as to boost the utilization of elective structure materials created from various sorts of strong squanders and to build the creation limit of lab scale measures, innovation empowering focuses are should have been set-up to encourage business visionaries for viable commercialization. Sturdiness and execution of the fresher items and spread of advancements stressing costs-benefits investigations and life cycle evaluation report will fundamentally add to effective commercialization of imaginative cycles. Incorporation of modern waste-based fresher structure materials, accentuating their natural noteworthiness in the educational plan at advanced education level and pragmatic utilizations of squanders in development area will offer fillip to such innovation advancement. The logical progression in reusing and utilizing modern and rural cycles for using squanders will prompt a superior utilization of world's assets. The new and elective structure development materials created utilizing agro-modern squanders have plentiful degree for presenting new structure parts that will diminish to a degree the expenses of building materials. The Endeavor, thusly, should be to support business visionaries and development organizations to grow new items and cycles utilizing every one of these losses as crude materials for setting up auxiliary enterprises and adding to decrease of green house gases and a dangerous atmospheric devation.

It was seen that sythesis of the examined changed after some time. During the relieving time frame, different hydration items were shaped. These new items impact the breadths of the pores and their appropriation inside the composite, diminishing the extent of huge pores, while expanding the volume of miniature pores, in this way debilitating water availability to the fused poisons, and catching them in the composite network [3]. Underway of such composites reused totals can likewise be utilized, bringing about comparable low-quality materials, with a comparable mineralogical organization, which contrast basically because of the mineral arrangement of the additional reused total. All the composites concentrated inside the extent of this examination have the qualities of CLSM, and can be utilized as a development material primarily in the zone of every day or middle landfill covers, and the adjustment of street bases. Because of their properties they can likewise be utilized as low stream fills material, just as bedding material for lines and links, and for the refilling of utility channels. As to economical turn of events, the portrayed waste buildups the executives strategy speaks to an ideal e zero waste arrangement, bringing about the cleaner creation, while safeguarding characteristic assets, lessening CO2 emanations and bringing down the expenses of sewage muck the board. An investigation comprising of an ecological effect examination of the novel treatment of sewage muck and biomass debris with traditional treatment advances is on-going.

Landfill drain ate comprises of a wide range of disintegrated or suspended structure natural and inorganic mixes. These mixes, paying little mind to their inclination, have a potential contamination impact on neighborhood ground and surface waters. An extremely wide scope of treatment measures have been applied for the treatment of this exceptionally defiled waste stream.

The RO cycle is an elective filter ate treatment technique which is supported by districts in Europe and Turkey. RO measure doesn't give a last removal to landfill drain ate without a powerful RO concentrate treatment alternative. The utilization of RO just declines the measure of waste stream and expands the toxin focuses. The treatment of concentrate ought to be considered top to bottom. Concentrate distribution which is the generally utilized technique isn't an answer for this issue and furthermore prompts serious issues about filter ate treatment and landfill dependability. This examination demonstrated that all contaminations in drain ate concentrate can be cemented effectively. Also, eluate fixations agreed to the Turkish and EC guidelines [4]. Be that as it may, the utilization of zeolite as a total material didn't show huge contrasts. The critical factor for the evaluation of hardening/adjustment innovation is the utilization of set material as an eventual outcome. By the by, in the inscription of this examination the model for the utilization of hardened materials as significant item was not considered as an exploration subject. This subject was considered as a future exploration for the minimization of cementing/adjustment cost of concentrate removal.

2.0 Materials and methods:

The materials utilized in the solid blend configuration were dry slop, soil and fly Ash. Sifter investigation was done as follows: A reasonable amount of broiler dried dry slop was taken. . The mass of dry slime test needed for each test relies upon the most extreme size of material. The sifter to be utilized was gauged and the heaviness of each strainer and container were recorded. The strainers to have the biggest work size at the highest point of the stack. The dirt example was filled the top strainer and a cover was set. The sifter stack on the mechanical shaker was in a bad way down the cover and the dry ooze test was vibrated for 10 minutes.

The stack was weighed again and each sifter and the base container with the dirt example division were held on it. Delegate compaction test and explicit gravity trial of dry ooze investigation were done according to standard methods referenced in code books. Weight was estimated utilizing weight cluster strategy. The form was set on a firm base and compacted to guarantee ejection of water.

Dry slop explicit gravity test was done as follows: The Pycnometer was washed, dried and weighted. Around 10 g of dry muck test was put in the Pycnometer. The container was weighed with the dry slime. Adequate water was added to cover the dry slime and it was associated with a vacuum siphon to eliminate all entangled air. The siphon was separated and topped with water off to the alignment mark [5]. The outside surfaces of the jug and Pycnometer were cleaned with a dry fabric and weighted. The container was cleaned once more. It was topped with refined water off to the imprint and its weight was recorded.

3.0 Results and discussion:

The weights of the blocks made, produced using distinctive blend of sludge are introduced in Table.1. It is demonstrated that various metallurgical squanders blended in with common earth and sand can be utilized for the creation of clay development materials. Substance of 50 wt% exhaust

dust in the underlying blend for earthenware production furnishes flexural quality of the examples with increment of dilatation coefficient and water ingestion.

Table.1 Weights of blocks made of sludge

S.no	Conventional bricks (gms)	10% sludge bricks (gms)	20% sludge bricks (gms)	30% sludge bricks (gms)	40% sludge bricks (gms)	50% sludge Bricks (gms)
1	3800	3211	2903	2674	2553	2203

Organizations with 35% fumes give residues marginally of higher quality, and water assimilation. Consequently, an ideal creation of beginning combination can be picked relying upon neighborhood accessibility of spent foundry sands and different parts just as on the requests to pottery's mechanical properties.

Notwithstanding the high substance of substantial metals in the crude materials, draining and dissolvability trial of the new earthenware production show profitable qualities when contrasted with the Brazilian norms. The Weight of Bricks after Water Absorption is introduced in Table.2. The materials and innovations created might be profoundly beneficial considering the way that the utilization of normal modern squanders fundamentally lessens the expense of the final result in contrast with customary common materials.

Table.2 Weights of Bricks after absorbing Water

S.no	Conventional bricks (gms)	10% sludge bricks (gms)	20% sludge bricks (gms)	30% sludge bricks (gms)	40% Sludge bricks (gms)	50% sludge bricks (gms)
1	3950	3550	3280	3030	3000	2980

Wide use of this technology can result in an extended service life of the bricks and can also result in a reduction of waste generated. However, proper treatment and disposal are required to ensure environmental safety. Dry shrinkage involves expulsion of air from the voids. This results in shrinkage in the volume of the bulk of cement. This also enhances hydraulic pressure. Hydraulic pressure is reduced when the pore spaces get emptied. Pressure increases with increase in pore spaces. The Compressive Strength of Bricks observed is given in Table.3. During the curing period, various hydration products were formed. Different hydration bye-products have resulted out of the reactions.

Table 3: Compressive Strength of Bricks

No. of Brick	Conventional Bricks	10% Sludge Bricks	20% Sludge Bricks	30% Sludge Bricks	40% Sludge Bricks	50% Sludge Bricks

1	4	3.50	3.00	2.50	2.00	1.5

During the curing period, various hydration products were formed. Different hydration bye-products have resulted out of the reactions.



Fig. 1: Water Absorption of Bricks

Fig.1 shows the water absorption of bricks. Bricks were soaked in water for about 28 days and the water absorption was measured at regular intervals of time. It was observed that as sludge volume was increased there was an initial increase in compressive strength and later it gradually got decreased after a threshold.

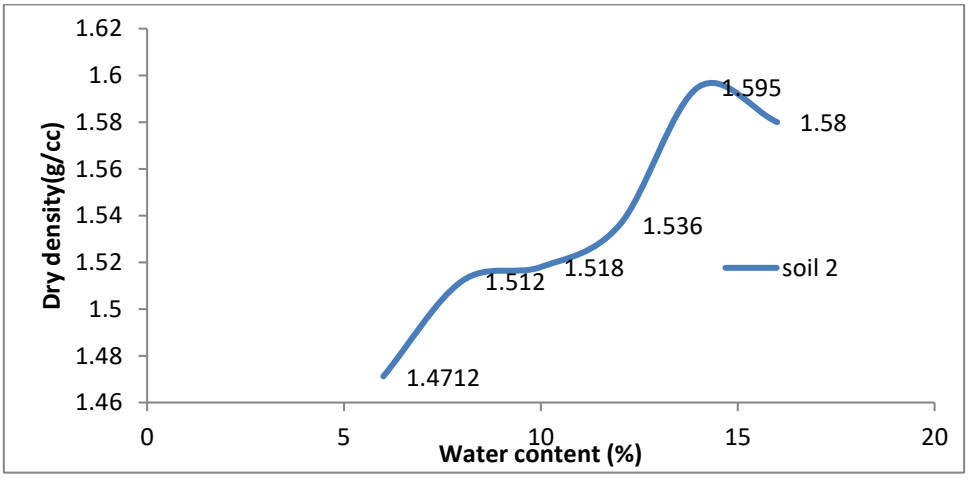

Fig.2 : Analysis of compaction Test of Soil

In Fig.2 the analysis of compaction of soil based on dry density is made. In order to use waste materials, they were used as a raw material for the manufacture of bricks. To agreeably use these hardships as an unpleasant material, filler, folio and added substance in making elective structure materials, wicked good physical-compound, arranging, warm, mineralogical and morphological properties of these squanders are to be studied and cautious information made open.

To develop the utilization of elective structure materials produced using various kinds of strong squanders and to develop the creation farthest reaches of lab scale measures, progression drawing in focuses are should have been set-up to help business visionaries for persuading commercialization. Toughness and execution of the more current things and scattering of degrees of progress underlining costs-benefits evaluations and life cycle appraisal report will all around add to profitable commercialization of innovative cycles.

4.0 Conclusions:

Dry sludge has no plastic limit. The cost of Dry sludge is very less. A 50% replacement of dry sludge by soil resulted in a tremendous increase in compressive strength. Water absorption is dependent on sludge characteristics. There is a significant reduction in weight of bricks on sludge replacement. Utilization of Dry Sludge in block can spare the ferrous and non-ferrous metal through ventures removal, land contamination, cost and produce a greener block for development. Ecological impacts from squanders and removal issues of waste can be diminished or controlled through this examination.

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Abstract

The data required for the study was collected from YMCA road in Calicut city for frame based approach. Video-graphic technique was used for the data collection by the advantage over other data collection technique. For frame based approach video frames were taken approximately with a time lag of 3 s. From extracted data calculate the speed of vehicles, porous area, areal density, density and space headway of vehicles. From porous area data, pore space distribution function was determined by using easyfit5.5 software. The difficult was arises when extracting the traffic data from video frames. So for solving that problem on screen versus on ground distance graph was prepared. Best parameter to explaining the heterogeneous traffic system obtained as areal density rather than density measurement based on R-square value. The speed, areal-density model obtained was linearly decreasing relationship.

Keywords

Frame based approach | Arial density | Density | Pore space distribution

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Effect of Plate Curvature on Blast Response of Structural Steel Plates

Lakshmi Shireen Banu Veeredhi, N. V. Ramana Rao & Vasudeva Rao Veeredhi

Journal of The Institution of Engineers (India): Series A **99**, 463–471 (2018) | Cite this article

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Abstract

In the present work an attempt is made, through simulation studies, to determine the effect of plate curvature on the blast response of a door structure made of *ASTM A515* grade 50 steel plates. A door structure with dimensions of 5.142 m × 2.56 m × 10 mm having six different radii of curvatures is analyzed which is subjected to blast load. The radii of curvature investigated are infinity (flat plate), 16.63, 10.81, 8.26, 6.61 and 5.56 m. In the present study, a stand-off distance of 11 m is considered for all the cases. Results showed that the door structure with smallest radius of curvature experienced least plastic deformation and yielding when compared to a door with larger radius of curvature with same projected area. From the present Investigation, it is observed that, as the radius of curvature of the plate increases, the deformation mode gradually shifts from indentation mode to flexural mode. The plates with infinity and 16.63 m radius of curvature have undergone flexural mode of deformation and plates with 6.61 and 5.56 m radius of curvature undergo indentation mode of deformation. Whereas, mixed mode of deformation that consists of both flexural and indentation mode of deformations are seen in the plates with radius of curvature 10.81 and 8.26 m. As the radius of curvature of the plate decreases the ability of the plate to mitigate the effect the blast loads increased. It is observed that the plate with smaller radius of curvature deflects most of the blast energy and results in least indentation mode of deformation. The most significant observation made in the present investigation is that the strain energy absorbed by the steel plate gets reduced to 1/3 rd when the radius of curvature is approximately equal to the stand-off distance which could be the critical radius of curvature.

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Physical Chemistry of Water Treatment Processes | Published: 03 July 2019

Fluoride Removal from Groundwater Using Hybrid Cylindrical Electrocoagulation Reactor

D. Bhagawan, P. Saritha, G. Shankaraiah & V. Himabindu

Journal of Water Chemistry and Technology **41**, 164–169 (2019) | Cite this article

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Abstract

Long-term consumption of water containing excessive fluoride can lead to fluorosis of the teeth and bones. Electrocoagulation is an electrochemical technique, in which a variety of unwanted dissolved particles and suspended matter can be effectively removed from an aqueous solution by electrolysis. Semi continuous flow experiments for fluoride removal were undertaken to investigate the effects of the different parameters such as: applied voltage (10–20 V), flow rate (150–450 mL/min), initial pH (6–8), and initial fluoride concentration (2–10 mg/L) at lowest cost with novel rector. The maximum of 8 mg/L fluoride treated up to World Health Organization drinking limits within 30 min residual time at a flow rate of 300 mL/min, with an applied voltage of 15 V at influent pH 7. The results obtained, showed that this novel semi continuous flow electrocoagulation reactor is an effective for defluoridation of ground water supplies at lower cost.

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Outline

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3. Test results and discussions
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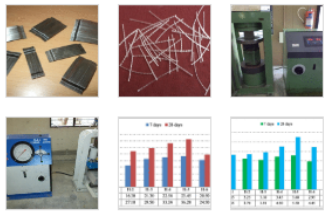

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Effects on dual fibres to act as reinforcement in a composite matrix along with sugarcane bagasse ash in conventional concrete

V.M. Sounthararajan [a], K. Dilli bai [b], C.M. Vivek Vardhan [c]

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Abstract

This paper has been investigated the effect of steel and polypropylene fibres addition in concrete and evaluating the mechanical properties of concrete. In this research work has focused on concrete specimens for compression and flexural rigidity prepared with steel fibres and polypropylene fibres along with the different percentage of SCBA for various moist curing. The experimental test results were proved a better improvement in strength gain up to16.37% and 27.01% for 7 and 28 days respectively when the dual fibre combination of 1.5% of steel (by volume fraction) along with 0.2% of polypropylene fibres along with 20% of SCBA. Also, there was an increase in flexural strength up to 57.14% in concrete with steel and polypropylene fibre combinations than compared to conventional concrete.

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Recent Trends in Waste Water Treatment and Water Resource Management

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Preface: Everything Flows, but Circularity is the Solution

There is nothing more essential to life on Earth than water. Yet, there is a global water crisis. People are struggling to access the quantity and quality of water they need for drinking, cooking, bathing, hand washing and growing their food. Rapid industrialization, population growth and unplanned urbanization have contributed to severe land and water pollution. The main sources of freshwater pollution can be attributed to direct discharge of untreated toxic industrial wastes and dumping of various industrial effluents. More than 40% of the world's population resulted affected by water scarcity, and this problem is also featured in the UN Sustainable Development Goal 6 (SDG 6), "clean water and sanitation". Currently, about 3 in 10 people lack safe drinking water and 6 in 10 lack inadequate sanitation systems. Globally, 844 million people lack access to clean water resulting in families and communities being locked in poverty for generations. Access to clean water as a stepping stone to development changes everything. Safe, secure, affordable and equitable access to clean water in particular for the poor is among the most relevant challenge to be faced in the next years. In 1993, the UN General Assembly designates March 22 as World Water Day and recognizes the importance of addressing the global water crisis each year with an amazing progress in making clean drinking water accessible to 2.6 billion people in developing countries from 1990 to 2015. There are still opportunities to multiply the benefits of clean water through improved sanitation and hygiene education.

The wastewater contains contaminants such as metal ions and organic compounds impacting the environment severely. This aspect will be further exacerbated in the next years by the increase in urbanization, in particular in developing areas, leading to the use of more of Earth's dwindling resources. In recent years, nanotechnology has introduced a myriad of novel nanomaterial that can have promising outcomes in environmental clean-up and remediation. Thus, it is highly needed now to recycle and reuse water resources in a sustainable manner. Effluent discharged in water bodies contributes to eutrophication, pathogen growth and emission of nitrous oxide and methane with GHG potential of about 300 and 21 times higher

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than CO_2, respectively. Untreated effluents have impacts three times higher than the treated ones representing a key factor of paramount importance for safe and environmentally sustainable urbanization. Among the multiple pollutants like fluorides, heavy metals, dyes, oils, etc., several new emerging components, such as endocrine-disrupting compounds, pharmaceuticals, personal care products and other bioactive organic compounds, are also present in the wastewaters.

The conventional wastewater treatment processes such as ion exchange, electrocoagulation, membrane filtration and adsorption are used. Adsorbents from renewable resources like tamarind seed, agricultural waste materials, Bermuda grass, rice husk and tea wastes are used nowadays. Carbonaceous materials are being used widely nowadays, which include hydrochar, biochar and activated carbon. These adsorbents are environmentally sustainable and available from waste products like MSW and domestic wastes. Various low-cost sorbents including waste/by-products from industries and agricultural operations, natural materials and microbial and non-microbial biomass have been identified and documented as effective dye-removing agents. Synthesizing cellulose nanofibres from agricultural lignocellulosic wastes is a novel approach for the production of a material from a cheap renewable resource. Recent development of membrane separation technologies, nanomaterial-based waste separation processes and advanced oxidation processes like combinations of ozone, UV light and H_2O_2 could be the alternative to these problems. Private and public sectors should invest in infrastructure to create the conditions for the transition to a circular use of resources bringing about social, economic and environmental benefits. Implementation of circular economy in this sector, including the safe reuse of water and the energy neutrality, can have also positive consequences on water quality and water security.

The 8th IconSWM 2018 received 380 abstracts and 320 full papers from 30 countries. A total of 300 accepted full papers have been presented in November 2018 at Acharya Nagarjuna University, Guntur, Andhra Pradesh, India. After thorough review by experts and required revisions, the board has finally selected 25 chapters in this book, "Recent Trends in Waste Water Treatment and Water Resource Management", dealing with the application of synthesized nanocellulose material, defluoridation of water, removal of hexavalent chromium, methylene blue dye, lead, chloride and different iodine species, sustainable sewage treatment process, utility of bacteria for detoxification of textile dyes, utilization of activated carbon, anaerobic co-digestion of sewage sludge and animal by-product and many modern techniques of wastewater treatment.

The IconSWM movement was initiated focusing better waste management, resource circulation and environmental protection since the year 2009. It helps in generating awareness and bringing all the stakeholders together from all over the world under the aegis of the International Society of Waste Management, Air and Water (ISWMAW). It established a few research projects across the world involving the CST at Indian Institute of Science, Jadavpur University, and a few other institutions in India and experts from more than 30 countries in the research project on circular economy. Consortium of Researchers in International Collaboration (CRIC) and many other organizations across the world help the

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IconSWM movement. IconSWM has become one of the biggest platforms in India for knowledge sharing and awareness generation among the Urban Local Bodies (ULBs), government departments, researchers, industries, NGOs, communities and other stakeholders in the area of waste management. The primary agenda of this conference is to reduce the waste generation encouraging the implementation of 5Rs (Reduce, Reuse, Recycle, Repair and Remanufacturing) concept. The conference provided holistic pathways to waste management and resource circulation conforming to urban mining and circular economy.

The success of the 8th IconSWM is the result of effective contribution of the government of Andhra Pradesh, several industry associations, chamber of commerce and industries, the AP Higher Education Council, and various organizations and individuals in India and abroad. Support of the UNEP, UNIDO and UNCRD and delegation from European Union and other foreign organizations was significant. 8th IconSWM 2018 was attended by nearly 823 delegates from 22 countries. The 9th IconSWM 2019 will be held at KIIT, Bhubaneswar, Odisha, during 27–30 November 2019, expecting nearly 900 participants from 30 countries.

This book will be helpful for the educational and research institutes, policy-makers, government implementers, ULBs and NGOs. We hope to see you all in 9th IconSWM 2019 in November 2019.

July 2019

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Anaerobic Co-digestion of Sewage Sludge and Animal by-Product



Ahmad Reza Salehiyoun, Maria Francesco Di, Mohammad Sharifi, Omid Noroozi, Hamid Zilouei and Mortaza Aghbashlo

Abstract The management of animal by-products (ABP) is a crucial issue since the relevant economic and environmental consequences that this practice involves. Anaerobic digestion (AD) is indicated as a suitable process for addressing such issue. AD facilities resulted already largely implemented in existing wastewater treatment plants for sludge stabilization but operated a quite low organic loading rate ($kgVS/m^3$). For this reason, thence digestion of ABP with SS in existing facilities can be considered a solution to a double problem: efficient treatment of ABP at reduced investment costs; increase in energy efficiency of existing digesters. In this study, the effect of different ABP to sewage sludge ratios on AD performances was investigated by batch runs. Best results were achieved for a ratio of 40% w/w leading to a biomethane yield of 730 L/kgVS with a VS reduction of 70%. No significant inhibition phenomena occurred during the runs.

Keywords Anaerobic digestion · Animal by-product · Co-digestion · Sewage sludge · Biomethane potential

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1 Introduction

Due to the high nutritional value of meat, meat consumption has increased in the world and its production has exacerbated centralized activities, causing large animal by-product (ABP) in slaughterhouses (Moukazis et al. 2018). Approximately, between 20 and 50% of weight of a live animal is not edible for human (Pagés-Díaz et al. 2014).

In the only EU area, the amount of deadweight of animals generated by slaughterhouses is of about 39 M tonnes. Of these 6.3 M tonnes are represented by bovine and 17.5 M tonnes by swine. At the Italian level, the total amount of dead weight of animals processed in slaughterhouses is of about 3.77 M tonnes of which 1.1 M tonnes are bovine and 1.4 M tonnes swine. According to European Union legislation for slaughterhouse by-products management (EC 2009), animal waste is divided into three categories, namely Category 1, 2 and 3, based on the reduced risk of utilization. Majority of the slaughterhouse waste (SHW) belongs to Category 2 and 3 of ABP, which can be used in various ways under certain conditions, provided that not be hazardous to animal and human health.

Different methods for management of ABP have been proposed including incineration (for energy), aerobic digestion (composting), alkaline hydrolysis and anaerobic digestion (AD) (Moukazis et al. 2018). Anaerobic digestion is one of the best options for slaughterhouse waste treatment which produce energy-rich biogas, reducing greenhouse gases emissions and effectively control the pollution in abattoirs. Category 2 and 3 can be used as a feedstock to AD after completing a series of pretreatment including crushing, pressure sterilization (heating in 133 °C, 3 bar for 20 min) and pasteurization (size reduction below 6–12 mm and heating to 70 °C for 60 min) (Ortner et al. 2014).

AD of solid and pasty slaughterhouse waste fractions is much more difficult, and in contrast to wastewater, only a few industrial applications are established (Ortner et al. 2014). Anaerobic digestion of solid slaughterhouse waste is engaged several problems owning to its high nitrogen and sulfur concentration. The anaerobic treatment of these wastes as mono-substrates often leads to the accumulation of ammonia, volatile fatty acids (VFA) and long chain fatty acids (LCFA). These may inhibit methanogenesis and thereby lead to instability, lower biogas production and, at higher concentrations, lead to complete inhibition (Di Maria et al. 2016; Hejnfelt and Angelidaki 2009; Pitk et al. 2013). Dissolved free ammonia (NH_3) and sulfides are most responsible for process imbalances, causes, e.g., reduced methane yields and the inhibitory effects of intermediate substances (Chen et al. 2008). For successful operation of anaerobic digestion at high concentrations of ammonia, measures such as adjustment of C/N ratio by adding high-carbon substrates, acclimatization of microflora to higher ammonia concentrations, control and modification of pH, reduction in ammonia concentration by stripping or membrane technique, and two-stage anaerobic digestion have been proposed (Rajagopal et al. 2013). The most problems often occurred in non-appropriate C/N ratio. Many studies proposed in the literature investigated the possibility of increasing the performance of these existing

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digesters by co-digestion with other substrates. Co-digestion can supply macro- and micro-nutrient, vary in bacteria consortium, balance C/N, improve buffer capacity and process stability, dilute inhibitors and supply water resource for process and increment biogas production with respect to mono-digestion (Karthikeyan and Visvanathan 2013).

A relevant sector in which AD is currently fully implemented is the wastewater treatment plant (WWTP). In this sector in the only EU, there are about 36,000 WWTPs. Despite the development of many AD treatment plants in Italy, most of the designed anaerobic digesters have exceeded the required capacity, so organic loading rates in their digesters are low, which results in the digester to operate in an inefficient and non-economic way. For this reason, in the present work the possibility of co-digestion of ABP with sewage sludge for an existing Italian WWTP was investigated.

In this research, the effect of adding the total stream of slaughterhouse waste originated from a small-scale bovine-pig abattoir in Italy to the sewage sludge (SS) was investigated in different proportions in batch assays. The results of this research will contribute to assess the sustainability of the exploitation and management of ABP by an integrated approach strongly related to human bean basic needs as food and wastewater.

2 Materials and Methods

2.1 Slaughterhouse Waste and Inoculum

The slaughterhouse waste was prepared from a pig and bovine slaughterhouse in the city of Marsciano, Italy, which slaughtered 15,000 pigs, 2000 cows and a limited number of sheep per week. The bovine slaughterhouse waste was selected and collected in all sections of categories 2 and 3 according to the European standard (EC 2009). Each section was first grinded with industrial meat grinder up to 6 mm and then was homogenized in a large blender (Fimar, Italy) and was finally stored in a freezer at −20 °C until it was consumed. Prior to consumption, the pasteurization operation was performed at 70 °C for 1 h in an oven in a sealed container.

Municipal sewage sludge was prepared from a WWTP of 90,000 population equivalent in the town of Foligno (Italy). The sludge sample was sampled after a concentrator including primary and waste activated sludge. Sewage sludge was stored at 4 °C. The inoculum was sampled from the anaerobic digester of the WWTP and acclimatized at 37 °C for 2 weeks. When necessary the total solids (TS) concentration of the sludge was increased by settling operation.

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2.2 Experimental Setup

Experiments in batch mode were carried out in 0.5-L glass digesters at mesophilic conditions (37 °C ± 1 °C) by an incubator (Fig. 1a). Different SHW to SS ratios were used: $R1 = 0\%$; $R2 = 2\%$; $R3 = 40\%$; $R4 = 60\%$ (Borowski and Kubacki 2015; Pitk et al. 2013). Experiments were performed at 4% TS. The volume of the reactor fluid was filled with 400 g of the feed and inoculum. The ratio of inoculum to feedstock was set to 1:3 on VS basis. When necessary, TS concentration was adjusted by deionized water. Before starting, each reactor was flushed with nitrogen gas for 2 min. Control samples were also activated to determine the amount of biogas produced from inoculum. Reactors were shaken manually once a day, and all the runs were activated in triplicate.

Biomethane volume was determined directly by measuring the displaced water volume (Fig. 1a) and expressed at standard pressure and temperature (273 K and 1 atm) (Kafle and Kim 2013). The percentage of methane was measured via extraction of a 10 ml sample by syringe from the reactor head and injecting and passing through a 3 molar solution to remove carbon dioxide and hydrogen sulfide (Fig. 1b).

The weighted average was used to calculate the average methane percentage (El-Mashad and Zhang 2010). The experiments were stopped when the daily biogas production reached less than 1% of cumulative one (VDI standard 2006).

Analysis of variance (ANOVA) was carried out using the SPSS18 in order to find a significant difference between the treatments in a completely randomized design (one-factor ANOVA) for biomethane yield, methane content and VS destruction. The significant difference between results was considered when p-value was lower 0.05 at a probability level of 5% ($\alpha = 0.05$).

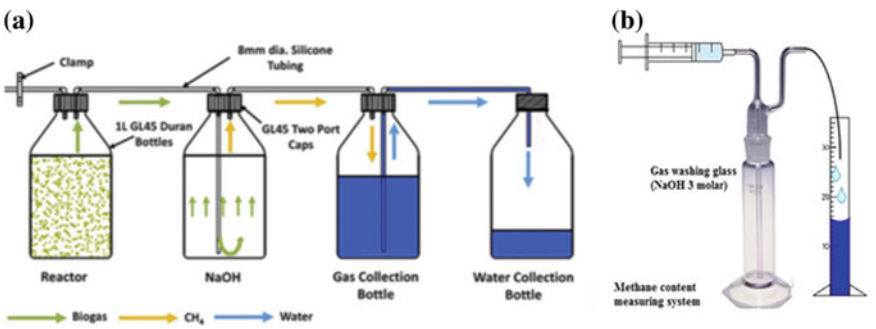

Fig. 1 Schematic of the batch laboratory-scale reactors (Ware and Power 2016) (**a**), and gas scrubber for determining of methane content (**b**)

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2.3 Chemical Analysis

The total solid content was determined by placing the wet samples in an oven at 105 °C for 24 h. The dried samples were then milled and combusted to determine the VS percentage at 550 °C in a muffle furnace until it reached a constant weight (APHA 2004). The pH of the feedstock and inoculum was measured by a PH meter METTLER TOLEDO. The total amount of organic carbon (TOC) was determined in the percentage of TS according to APHA's 5310 standard (APHA 2004). The amount of total Kjeldahl nitrogen (TKN) was assessed using an autokjeldahl device and subsequent titration with 0.1 normal sulfuric acid according to ISO 1871 standard (ISO 1871: 2009 (E); ČSN, 2010). To measure the total ammonium nitrogen (TAN) and total volatile fatty acids (TVFA), the HACH Lange DR 3900 Spectrophotometer was used. The digestate samples were first centrifuged at 6000 rpm for 10 min and then filtered through 45 μ paper. Total volatile fatty acids equivalent to mg/L of acetic acid and ammonium were measured by LCK 365 kuvet and LCK 303 kuvet, respectively. The amount of VS degradation as an indicator of anaerobic degradation efficiency in converting materials and reducing its contamination load was calculated by measuring the VS of each reactor after digestion and comparing it with VS before the process.

3 Results and Discussion

3.1 Feed Characteristics

The characteristics of the SHW and municipal SS are presented in Table 1. For the former, TS and VS were 25.6% and 95.6%, respectively, very similar to those reported in the study of Hejnfelt and Angelidaki (2009), with high degradable VS. C/N ratios resulted much higher than those reported in other studies, in the range of 6–10 (Borowski and Kubacki 2015), given that total carbohydrate wastes (ruminal

Table 1 Characteristics of slaughterhouse waste and inoculum

Particular	SS		SHW		INO	
TS	1.73	0.01	25.6	0.18	2.97	0.15
TS/VS	78.6	0.17	95.6	0.04	48.5	0.93
PH	6.49		6.14		7.45	
TOC (g/kg TS)	46.9	0.27	72.7	2.18	44.0	0.75
TKN (g/kg TS)	4.00	0.22	5.81	0.22	3.78	0.01
C/N	11.7	0.51	12.5	0.49	11.7	0.14
Alkalinity ratio	–		–		0.14	

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and intestinal contents) and digestive tract are considered as a mixture with the waste flow (Pitk et al. 2013). Therefore, there is a better balance in terms of preventing the ammonia inhibition.

3.2 Batch Experiments

Mean results of the batch runs are summarized in Table 2. The cumulative BMP (L/kg VS) per day, as well as the daily production of methane, is represented in Fig. 2.

Table 2 Biogas production results in a 4% TS batch experiment

Parameter	4% TS							
	0% (sewage sludge)		20% ABP		40% ABP		60% ABP	
Temperature	37		37		37		37	
OLR (g VS/L)	31.4		37.1		37.8		38.0	
Biomethane yield (L/kg VS)	434.8	45.6	717.1	29.4	736.4	9.2	674.8	15.1
CH4 content (%)	67.2	1.1	70.5	1.0	71.4	0.4	71.5	1.4
VS removal (%)	32.60	0.38	36.64	0.26	36.70	0.47	36.83	0.79
T90% (day)	16.2		12.8		13.1		12.6	

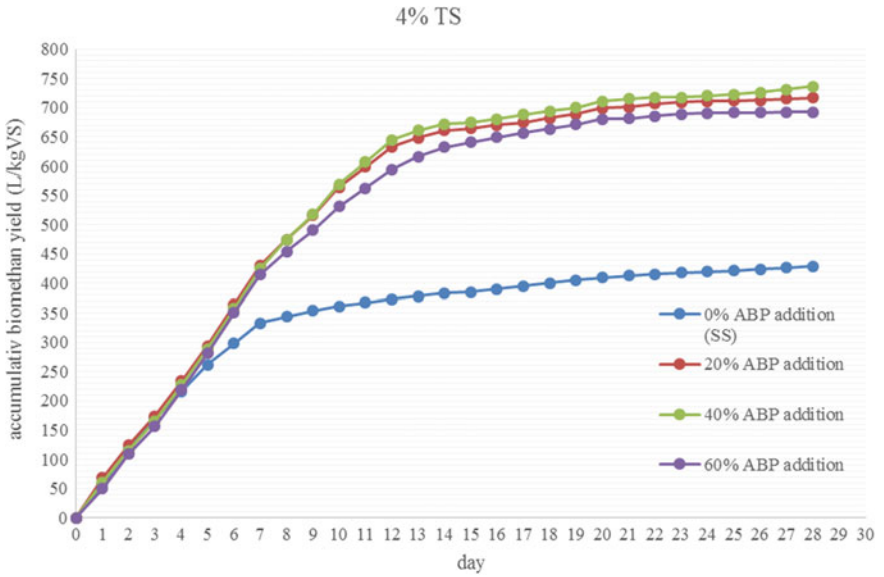

Fig. 2 Co-digestion of slaughterhouse waste and sewage sludge in BMP tests

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The results of ANOVA test showed mixer had a significant effect on biomethane production ($p > 0.05$). As seen in Fig. 2, the co-digestion has doubled the production of biomethane potential indicating the presence of synergic effects. There is no significant difference between R2, R3 and R4 treatments, but the highest methane yield was obtained for R3 treatment, 736.4 L/kgVS. Anaerobic digestion of single feed wastewater has been reported in the range of 200–350 L/kgVS (Luostarinen et al. 2009; Pitk et al. 2013; Wan et al. 2011), whereas in this study achieved 470 L/kgVS, which is significantly higher. Biomethane potential for co-digestion of SHW with other substrates reported in the literature was quite in line with those of the present study. Borowski and Kubacki (2015) reported 832.9 L/kgVS for the co-digestion of SHW from pig, whereas Moukazis et al. (2018) reported values of about 855 L/kgVS. Hejnfelt and Angelidaki (2009) reported a value of 620 L/kgVS. For sterilized and cooked slaughterhouse waste (at 133 °C and 3 bar for 20 min), the best results were obtained for 5% adding to SS by 618.9 L/kgVS in semi-continuous reactor, that was equivalent to a 60% TS share and approximately 65% VS in the feedstock mixture as reported by Pitk et al. (2013). By adding 14% of grease trap sludge from a meat processing plant with 25.4% TS to SS, Luostarinen et al. (2009) reported a biomethane yield of 788 L/kgVS in a batch digestion test. The synergistic effect of ABP co-digestion with SS was superior to other organic waste supplementation, such as agricultural waste. In the Pagés-Díaz et al. study (2014), the BMP, in a 2L batch test, was obtained 613 L/kgVS for bovine slaughterhouse waste with animal fertilizer, 647 L/kgVS with the organic fraction of municipal solid waste and 461 L/kgVS with agricultural wastes (various crops, i.e., straw and fruit/vegetable waste). The relatively high nitrogen content, the high total solid (TS) content, often excludes the possibility of treating animal by-products in their original undiluted form. Therefore, dilution is typically necessary or, as a more attractive option, co-digestion with less concentrated organic waste types, such as manure or municipal wastewater (Hejnfelt and Angelidaki 2009).

Analysis of variance for methane content indicated that methane percentage was significantly affected by feed mixture. According to Table 2, an increase in the proportion of ABP has led to a significant increase in methane composition. This is due to the increased share of fat waste because lipids produce higher methane percentages than carbohydrates and proteins (Wellinger et al. 2013). However, there is no significant difference between R2, R3 and R4 treatment.

The effect of ABP:SS proportion was significant on VS degradation. The VS removal for co-digestion treatments were about 36.7%, while for SS was about 32.6%. In the AD of alkaline pre-treated mixed slaughterhouse waste, a 47% VS reduction was obtained under mesophilic conditions (Flores-Juarez et al. 2014). Although VS degradation is usually higher for AD of easily biodegradable wastes, such as food and vegetable waste, addition of slaughterhouse waste to SS reduced the effective process time (T90%) (Table 2) to an average value of about 13 days instead of the about 16 days detected for the mono-digestion of SS. The effective digestion time or technical digestion time is an important parameter that provides primary information of hydraulic retention time (HRT) for continuous anaerobic digestion (Kafle and Kim 2013). This figure resulted higher than the HRT reported

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Table 3 Characteristics of digestate at the end of the batch tests

Component	4% TS			
	0%	20%	40%	60%
pH	7.27 (0.06)	7.32(0.07)	7.32 (0.10)	7.33 (0.07)
TVFA (mg/L)	141 (7)	167 (0)	167 (12)	156 (12)
TAN (mg/L)	444 (20)	564 (18)	473 (88)	587 (41)
COD (mg/L)	605 (174)	738 (230)	741 (218)	744 (219)

by Moukazis et al. (2018) that resulted in the range of 6–8 days. One of the reasons of this result can be found in the presence of fiber-containing and lignocellulosic parts such as ruminal content in the ABP composition, leading to an increase in the T90.

All the runs showed a final pH similar to the one of the mono-digestion of SS (Table 3). The final COD value for SS was only 605 mg/L. For the co-digestion runs, it ranged from 736 to 744 mg/L. The initial COD content of the sewage sludge was 2038 mg/L. Thus, an average COD removal of about 70% occurred for the runs with co-digestion of ABP and SS. Also these values resulted in line with those reported by other authors (Moukazis et al. 2018). The total amount of volatile fatty acids resulted quite low, <170 mg/L indicating the absence of specific inhibition risks. In their works, Flores-Juarez et al. (2014) and Moukazis et al. (2018) reported for AD after alkaline pretreatment of SHW a TVFA concentration of 555.5 mg/L and of 420 mg/L, respectively. No sing of ammonia inhibition was observed and TAN was in the stable spectrum, i.e., <1500–7000 mg/L (Hejnfelt and Angelidaki 2009).

4 Conclusion

Co-digestion of animal by-product and sewage sludge resulted to be an effective solution for matching two different aspects: environmentally sound management of ABP; increase the amount of energy recoverable. In particular, the large presence of wastewater treatment plant already equipped with anaerobic digester for the sludge stabilization represent an interesting opportunity also as a consequence of the reduced costs for investment, just limited to the necessary improvements for the introduction of the ABP in the existing digesters. Even at high ABP rates, the biological processes occurred with quite high efficiency and practically absence of inhibition phenomena.

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Application of Synthesized Nanocellulose Material for Removal of Malachite Green from Wastewater



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Abstract A method associated with nanocellulose material derived from sugarcane bagasse as bio-adsorbent in order to decolorize Malachite green dye was carried out through batch process. Objective of this study was to appraise the performance of SB nanocellulose, was synthesized using bleaching treatment of sugarcane bagasse as agro-waste followed by alkaline hydrolysis, acid hydrolysis (using 50% sulfuric acid at 50 °C for 3 h), and freeze drying. The synthesized cellulose was characterized by Fourier transform infrared (FTIR) spectroscopy. The absorbance of the supernatant solution was measured at 617 nm in UV visible spectrophotometer. Adsorption process was carried out by varying the pH value (2, 4, 6, 7, 8), initial dye concentration (1, 5, 10, 15, 20, 25, 50 mg/L) contact time (15, 30, 45, 60, 120, 180 min), temperature (25, 30, 35, 40 °C), and adsorbent doses (2, 4, 6, 8 g/L). In case of SB Nano cellulose, percentage of dye removal with initial 20 mg/L dye solution was 98.35% at normal condition. The adsorption efficiency of the SB cellulose is still over 80% after four times of recycling. Adsorbent has some beneficial features like, it is renewable, inexpensive, high surface area, unique chemical composition, and top of it all these adsorbents exhibit high removal capacity in dye solution.

Keywords Adsorption · Malachite green dye · Sugarcane bagasse (SB) · SB nanocellulose

1 Introduction

With the improvement of technology, most of the countries have boosted their economy through industrialization, and by virtue of increasing industrialization, waste disposal and pollution concern become more and more important. Most industries require large amounts of water for their work. Effluents of these industries are either disposed into bare oceans or rivers, which seriously hampers our ecosystem. Dyes are widely used in the textile, cosmetics, printing, leather, paper, and electroplating industries (Hu et al. 2013). Effluents of those industries contain large amount of untreated synthetic dyes which are often difficult to biodegrade due to its xenobiotic

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properties and complex organic structures (Ma et al. 2012). The discharged dye staff wastewater from those industries can cause great threat to marine life as well as human health due to its toxicity and carcinogenic nature (Attallah et al. 2013). For example, Malachite green (MG) is one of the common types of dye in waste disposal, widely used in the textile industry. Up to now, the main conventional methods for dye removal from wastewater have been used such as membrane filtration, ion exchange, adsorption, chemical coagulation, reverse osmosis, ozonation, and ultra-filtration. (Nada and Hassan 2003; Singh et al. 2011; Silva Filho et al. 2013).

However, the adsorption technique is considered as most efficient, easy operating, inexpensive, and eco-friendly technique for wastewater treatment (Mittal et al. 2010). Carbonaceous material and nanomaterial having high surface area, high adsorption capacity, microporous structure, low cost, and special surface reactivity for the organic compound shows great efficiency in adsorption process.

Cellulose is the most ubiquitous biodegradable renewable natural polymer (Salas et al. 2014). Cellulose nanomaterials (CNs) can be isolated from various natural resources like plant, animal, or mineral plants. Two general type of cellulose nanomaterials (CNs) are commonly known as cellulose nanocrystals (CNCs) and cellulose nanofibrils (CNFs). Carbon nanocrystal particles are highly crystalline in nature (at least one dimension should be equal or less than 100 nm) (Kumar et al. 2014). It can be used as a cheaper adsorbent for removing dyes from aqueous solution directly (Ren et al. 2013; Zhou et al. 2014). Nanocellulose having high surface area, high mechanical strength, chemical inertness, and hydrophilic surface makes it a very efficient material in membranes and filters, for adsorbing impurities from industrial effluents and drinking waters. Due to intrinsic hydrophilicity property nanocellulose has organic fouling and bio-fouling reducing capacity (Tashiro and Kobayashi 1991; Šturcová et al. 2005; Mansouri et al. 2010).

India is one of the agricultural countries in the world. A large number of agro-based industries, such as jute, cotton, and sugar produce large quantities of agro-waste which hamper in proper waste disposal management and environmental ecosystem. In recent years, researchers are giving attention for questing toward maximizing the efficiency of the use of raw materials and minimizing the accumulation of waste by reusing agricultural residues. Sugarcane bagasse is fibrous matter that left after crushing the sugarcane stalks to extract the juice commonly available from the sugar and industry. Sugarcane bagasse contains about 40–55% of cellulose, hemicellulose as much as 26–35% (Wulandari et al. 2016; Mandal and Chakrabarty 2011; Jacobsen and Wyman 2002). In the present research work, sugarcane bagasse has been used as raw material for the extraction of microscopic crystal cellulose and nanocellulose obtained by delignification with sodium chlorite followed by alkylation. Interestingly, an acid hydrolysis treatment of SB has been done to get the more pure cellulose fractions (Sun et al. 2004). To generate nano-cellulose acid hydrolysis of isolated SB cellulose with 50% sulphuric acid was carried out (Wulandari et al. 2016). Characterization of nanocellulose has been made by analyzing of Fourier transform infrared spectroscopy (FTIR) (Wulandari et al. 2016). Additionally, desorption and recycling experiment provided to investigate its good cycle performance. We also discuss on the MG dye adsorption process onto SB cellulose. Thus, this study

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assessed the suitability of cellulose, extracted from sugarcane bagasse in removal of dye from aqueous solution.

2 Materials and Methods

2.1 Raw Bagasse

Sugarcane bagasse (SB) was obtained from the local juice center, near Jadavpur University, Kolkata, West Bengal. It was washed followed by drying in the electric oven at 120 °C for overnight. After that, the SB were ground and sieved to at range 80–100 μm. The adsorbent was stored for further use in batch adsorption.

2.2 Isolation of SB Cellulose

For each gram of raw sugarcane bagasse (SB), 50 ml of 0.75% sodium chlorite (Merck Life Science private limited) solution was used to bleach SB and it was kept for 1 h at 45 °C with continuous stirring. The treated mass was filtered, washed with distilled water until it reached to pH 5 and put into 2% sodium hydrogen sulfite (Merck Life Science private limited) solution for 30 min. It was then filtered and washed with distilled water. The dried mass was then treated with 17% NaOH (Merck Life Science private limited.) solution for 15 min to remove hemicellulose. Finally, this chemically treated mass was filtered and washed with distilled water to remove the alkali until to neutral pH.

2.3 SB Nanocellulose Preparation

Hemicellulose and lignin-free cellulose were acid hydrolyzed for 3 h at 50 °C with constant stirring. For each gram of cellulose, 20 ml of 50% H_2SO_4 (w/w) solution (Merck Life Science private limited) was used for acid hydrolyzation. After that, excess acid was washed with distilled water until it was reached to neutral pH. Hydrolysis process was followed by centrifugation and freeze drying.

2.4 Dye Solution Preparation

In this study, Malachite green (MG) dye (Loba. Chemie.) Stock solution of 1000 ppm concentration was prepared and solutions of different concentrations ranging from 1

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to 50 mg/L were made by further dilutions. The absorbance of solution was measured using UV-V is spectrophotometer (Perkin Elemer—L365).

2.5 Characterization

Fourier transform infrared spectra (FTIR) of SB cellulose sample was analyzed on an instrument (PerkinElmer) in the range of 4000–450 cm^{-1} at a resolution of 4 cm^{-1}. Samples were grounded and blended with KBr. Mixture was then pressed into ultra-thin pellets. Various functional groups present on SB cellulose adsorbent have been shown by The FTIR spectrum with respect to their peak value.

2.6 Batch Adsorption Experiment

The batch adsorption study on MG dye was performed in a BOD shaker (GB Enterprises, India) at different experimental condition such as pH (2–8), initial dye concentration (5–25 mg/L), adsorbent mass (2–8 g/L), and temperature (25–40 °C). The pH of the dye solution was adjusted using 0.1 M NaOH (Merck Life Science private limited) and 0.1 M HCl (Merck Life Science private limited) solution. The isotherm study was done by varying the concentration of dye solution keeping temperature constant and agitated at 120 rpm. The kinetic study was investigated with different contact time. Thermodynamic study was done with varying temperature. The sample mixture solution was withdrawn from the shaker followed by centrifugation. After that, concentration of MG dye was determined by UV-VIS spectrophotometer (Perkin Elmer—L365). The dye removal efficiency of SB cellulose adsorbent and adsorbent capacity (mg/g) was derived according to the following equations:

$$\text{Removal efficiency} = \left(\frac{C_0 - C_t}{C_0}\right) \times 100$$

$$q_e = \frac{(C_0 - C_t) \times V}{m}$$

where C_0 is represented as the initial dye concentration and C_t (mg/L) is indicated as the dye concentration at time t, respectively. q_e is denoted as the amount of adsorbed dye (mg/g) per gram of adsorbent. V is referred to the volume (L) of the dye solution and m is denoted as adsorbent weight.

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3 Result and Discussion

3.1 Adsorbents Analysis—FTIR

By analyzing FTIR spectroscopic spectrum of raw SB and extracted SB cellulose, different characteristics of absorption peaks were analyzed. The peak centered at 1035.57 cm^{-1} for SB is attributed to C–O stretching. Absorption band at 1728.37 cm^{-1} is attributed to the C=O stretching associated with the acetyl and uronic ester groups present in pectin and hemicellulose (Sain and Panthapulakkal 2006; Sun et al. 2005). The peaks at 1603.51 and at 1514.39 cm^{-1} are assigned to the aromatic C=C present in lignin (Garside and Wyeth 2003; Wang et al. 2009). The peak at 1242.56 cm^{-1} as present only in spectra of SB is assigned to the C–O stretching vibration of the aryl group present in lignin (Troedec et al. 2008). The broadband around 3500–3200 cm^{-1} with the maxima centered at 3332.64 cm^{-1} is attributed to the free O–H stretching present in cellulose molecules. The spectra of both samples showed C–H stretching vibration around 2898.75 cm^{-1} (Khalil et al. 2001). From spectra of raw SB, it was observed that the absorption band at 3329 cm^{-1} is attributed to the O–H stretching and that of 2899.95 cm^{-1} is attributed to the C–H stretching vibration. The peak at 1316.29 cm^{-1} is assigned to the C–H bending and C–C stretching. The peak at 1157.17 cm^{-1} arises from C–O stretching. The peak at 1026.8 cm^{-1} is attributed to the C–O–C vibration due to the presence of pyranose ring skeletal. A band at 895.61 cm^{-1} is associated with the C–O–C stretching at *b*-glycosidic linkage between glucose present in cellulose. Remarkably, the absence of the band at 1514.39 cm^{-1} in the spectra inferred that the prepared cellulose are free of residual lignin.

3.2 Effect of pH

As shown in Fig. 1, pH plays an important role for MG removal on SB cellulose. Initially, the pH of the dye solutions was adjusted pH range from 2 to 8 by adding HCl and NaOH solution. With increasing pH value from 2 to 8, dye adsorption efficiency

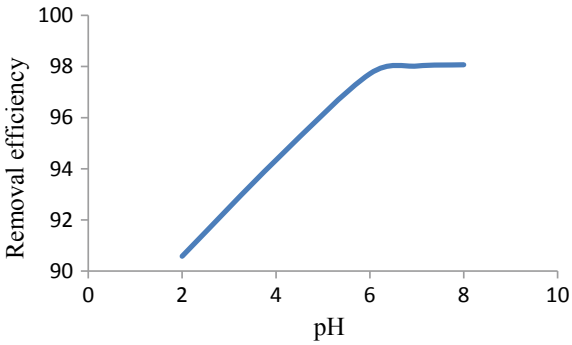

Fig. 1 Effect of pH on % removal

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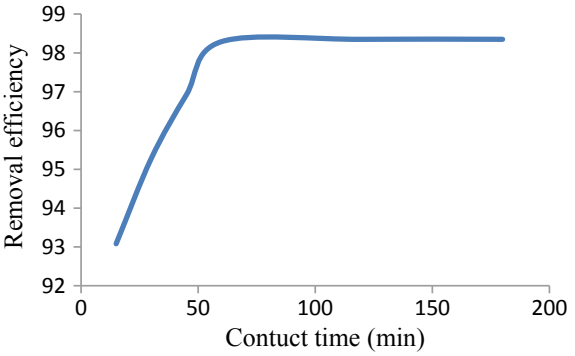

Fig. 2 Effect of contact time on % removal

increases from 90 to 98%. Cationic dyes are favorably adsorbed on negatively charged surfaces (Saliby et al. 2013). Protonation increases in strong acidic solutions. Due to the presence of excess H^+ ion in lower pH solution and having small ionic radius, it can be adsorbed more easily than cationic MG onto SB cellulose surface. With increasing pH, more negative charged adsorption sites will be vacant. For this reason, electrostatic attraction between SB cellulose surface and cationic dye becomes easier (Yagub et al. 2014; Song et al. 2015).

3.3 Effect of Contact Time

Variation in contact time plays significant role in determining the MG dye removal efficiency of SB cellulose. Batch equilibrium studies were conducted at 30 °C by adding 8 g/L of SB cellulose adsorbent to 20 mg/L MG dye of 50 ml solution at neutral pH. The flasks were agitated in BOD shaker at 120 rpm for 2 h. Samples were taken at different time intervals (15, 30, 45, 60, 120 min) and concentration was analyzed by UV-VIS spectrophotometer. The adsorption capacity increases till the contact time increases up to 1 h and then it attained saturation condition after 2 h. It was observed that agitation time increased from 15 to 60 min, and MG dye removal efficiency of SB Cellulose increased from 93.08 to 98.35% (Fig. 2).

3.4 Effect of Adsorbent Mass

The removal efficiency was increased as the adsorbent masses were increased from 2 to 8 g/L at 50 ml of MG dye solution on equilibrium time of 2 h. It was observed that removal of MG dye changes from 88 to 98.34% with increasing adsorbent mass. From Fig. 3, it is readily estimated that by increasing the amount of adsorbent, the number of active adsorption sites on adsorbent surface was increased; therefore, dye

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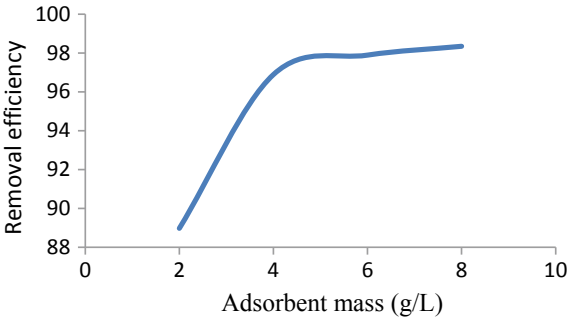

Fig. 3 Effect of adsorbent mass on % removal

removal efficiency was increased. So, in this project work, adsorbent dose of 8 g /L was kept constant for further investigation.

3.5 Effect of Initial Dye Concentration

Figure 4 shows the influence of initial dye concentration on the MG dye removal efficiency by SB cellulose. The effect of initial MG dye concentration (5–50 mg/L) on removal efficiency was conducted in a BOD shaker at 120 rpm while adsorbent dose was constant at 8 g/L. It was found that the dye adsorption efficiency gradually decreased with increasing dye concentration until the adsorption equilibrium condition was reached. The MG removal efficiency on SB cellulose decreased from 99 to 96%. The equilibrium condition was reached within 1 h. Figure 4 showed the plot between initial dye concentration and the percentage of MG dye removed.

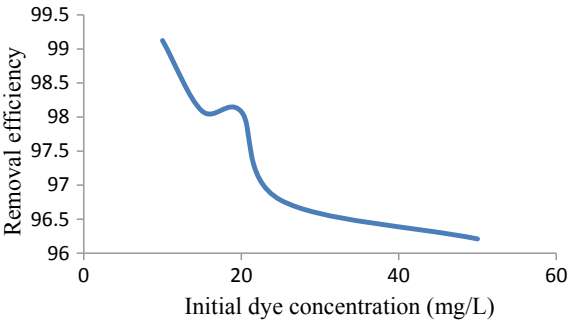

Fig. 4 Effect of initial dye concentration on % removal

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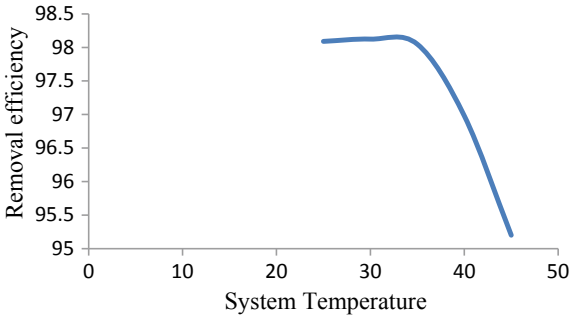

Fig. 5 Effect of system temperature on % removal

3.6 *Effect of Temperature*

In general, the dye removal efficiency increased with the increasing system temperature. In our project work, it was found that the removal efficiency decreased from 98.14 to 95% with the increasing temperature from 25 to 45 °C. Figure 5 showed that maximum MG dye adsorption on SB cellulose was 98.14% at 30 °C. It is well known that the motility of dye molecules may be enhanced by raising the system temperature and it may also reduced active sites on adsorbent surface. At high temperature, uncontrolled molecular movement facilitated desorption process (Ghorai et al. 2014) which reduced the adsorption efficiency.

3.7 *Adsorption Isotherm*

Commonly used equilibrium adsorption isotherm models, Langmuir and Freundlich (Ghorai et al. 2014; Metin et al. 2013), were used to determine the adsorption data of MG on the SB cellulose. Empirical expression of the Langmuir model is given by following equation.

$$C_S/q = 1/(k \times Q_0) + C_s/Q_0$$

where q (mg/g) is represented as the amount of adsorbed dye per unit mass of adsorbent and C_s (mg/L) is denoted as the unabsorbed dye concentration in solution at equilibrium condition. Q_0 is indicated as the maximum monolayer capacity at equilibrium condition and k presented as Langmuir constant (L/mg).

Mathematical expression of the Freundlich isotherm is given by following equation.

$$\log q = \log k_F + (1/n) \log C_s$$

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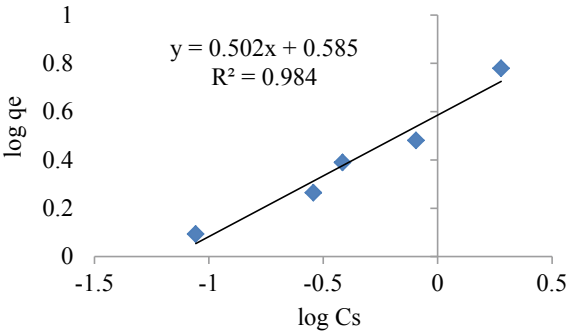

Fig. 6 Adsorption isotherm by using Freundlich model

Table 1 Calculated parameters of Langmuir Isotherm

Temp (°C)	k (L/g)	Q_0 (mg/g)	R^2
30	1.133173	8.161	0.9082

Table 2 Calculated parameters of Freundlich Isotherm

Temp (°C)	K_F (L/mg)	n	R^2
30	3.851	1.989	0.984

where k_F and n are Freundlich constants. The value of K_F (mg/g(L/mg)$^{1/n}$) is indicated the adsorption capacity of the adsorbent. Values of $n > 1$ is indicated the condition of adsorption favorability (Ncibi et al. 2007).

Figure 6 showed Freundlich isotherm model for MG adsorption by SB cellulose. Calculated parameters for Langmuir isotherms and Freundlich isotherm models are shown in Tables 1 and 2. The adsorption of MG dye on SB cellulose fitted the Freundlich model very well with the correlation coefficient $R^2 = 0.984$, better than the Langmuir Isotherm with $R^2 = 0.9082$. Malachite green dye adsorption system process using SB Cellulose well fitted by Freundlich isotherm due to heterogeneous distribution of surface active side on SB cellulose (Vimonses et al. 2009). A value of 1.989 obtained for n indicates the condition of favorable adsorption process (Hameed 2009).

3.8 Recyclability Study

In evaluation of economy in adsorbent application, recyclability and reuse are important factors. Experiment on the recyclability of the SB cellulose adsorbent was done at 30 °C. 8 g/L of SB cellulose adsorbents were added into 50 mL of 20 mg/L dye solutions for 60 min and then taken out from the solutions. After adsorption, the MG dye adsorbed SB cellulose was added into 0.1 M NaOH or 0.1 M HCl solution and was stirred for 60 min at 30 °C. Then, The SB cellulose was washed with deionized

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water two times to remove the residual NaOH or HCl solution. Then, it was dried by vacuum dryer at 80 °C and reused for adsorption. By this process, generated adsorbents were reused for another adsorption process in the subsequent cycles. The adsorption efficiency of the SB cellulose for MG removal was still over 80% after the fourth cycle.

4 Conclusion

Extraction of cellulose from sugarcane bagasse was performed successfully. Malachite green dye removal efficiency on cellulose obtained from sugarcane bagasse was also investigated by adsorption study. It was observed that the removal efficiency depends on the parameters, as in: adsorbate concentration, adsorbent mass, contact time, pH, temperature, and rotational speed. The maximum MG dye removal efficiency of SB cellulose was observed as 98% for 20 mg/L dye solution using 8 g/L of adsorbent within 60 min at 30 °C and neutral pH. Modeling of experimental data was evaluated through two isotherm models: Langmuir and Freundlich isotherm model. It was found that Freundlich isotherm model fitted well for this adsorption process on SB cellulose than Langmuir isotherm model because of heterogeneous surface active side distribution on adsorbent surface. FTIR spectra of SB cellulose indicated the presence of hydroxyl groups, lignin structure, and hemicelluloses structure on the surface of adsorbents. From the results, it can be concluded that extracted SB cellulose was a stable and efficient adsorbent for removal of MG dye from their aqueous solution.

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Status of Sewage Treatment in Bihar and Needs for Improvement



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Abstract With the ever increasing growth in population across the nation, there is a need for proper disposal of solid waste of households. A comprehensive literature survey was conducted to study the status of sewage treatment plants (STP) in different states of India. More emphasis was laid on its status in different districts of Bihar. Existing plants are incapable of handling huge inflow of wastes through sewage pipe lines. If properly developed, STP could not only remove the problem of waste management but it will also provide financial gains. Biogas produced in most of these plants from the digesters is flared off and are not being stored, if done will certainly reduce the cost of cooking fuel. Only primary and secondary treatment of the plants is being done in most of the sewage treatment plants. If tertiary treatment is also provided, this might help in solving the problem of safe drinking water. Conventionally, these left over sludge from the digester still contains a lot of carbonaceous content which can be harnessed by converting them in the form of powders and be utilized in different gasifiers and pyrolyser to produce clean combustible gas. Several districts do not even have a single sewage treatment plant and people are forced to use pit latrines. It was found that districts like Buxar, Muzaffarpur and Bhagalpur are having very old STP which date back to 1885 AD and are insufficient to handle the load of rapidly increasing population. Government initiatives are required not only to properly manage it but also to utilize it in a more effective manner.

Keywords Waste management · Sewage treatment · Sludge · Gasification · Pyrolysis

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1 Introduction

The main purpose of sewage treatment plants construction is to transform the household sewage into an easily manageable waste and the secondary purpose is to retrieve and to re-use the water after treatment of sewage. Untreated sewage contains water; nutrients that are mainly nitrogen and phosphorus; solids, pathogens that includes bacteria, viruses and protozoa; helminthes such as metals, different gases and Oil Street dust parking lots and buildings with toxic chemicals and chlorinated organic.[1] Untreated sewage that comes from rivers and oceans creates threat for human beings and environmental issues.[2] They cause acute illnesses including dysentery, diarrhoea, typhoid, cholera, and hepatitis A in human while direct sewage discharge in river and oceans leads to eutrophication and algal blooms reducing the oxygen content in water.[3] The sewage treatment plant should produce water that is safe for human consumption, to get water that can be used for the consumer with reasonable cost.

2 Current Status of STPs Across the Globe and in India

Latest technologies for water treatment are being used by some of the advanced nations of the world. The ozone technology is being used by United States, whereas AAO and oxidation ditch methods are commonly used in China.[4] In Germany, Federal Water Act (WHG) restricts wastewater discharge into river bodies which leads to that European country which has the highest waste water reprocessing and recycling rate. In Germany, more than 96% of the sewage waste water from households and public facilities are discharged into nearby STP for treatment.[5] Treated waste-water is widely used for irrigation, particularly in the Gulf countries. Currently, an average of 700,000 cubic meters per day is being used to meet irrigation and industrial demand in the countries such as Kuwait, Oman, UAE and Saudi Arabia.[6]

According to Pollution Control Board of India, 816 STPs are located in different States/UTs in the country, out of which only 522 STPs are operational. Table 1 describes the current status of STPs in different states, where inference can be drawn that Maharashtra and Gujarat have the maximum capacity of municipal STPs. It can also be correlated that the developed states are having more number of STPs, so STPs also act as growth parameter, which is quite obvious by the fact that wastes are more recycled and utilized in these states.

[1] www.cpcb.nic.in.

[2] www.indiaenvironmentportal.org.in/files/file/Status%20of%20STPs.

[3] http://cep.unep.org/publications-and-resources/marine-and-coastal-issues-links/wastewater-sewage-and-sanitation.

[4] https://www.sciencedirect.com/science/article/pii/S0160412016301040.

[5] http://www.bmub.bund.de/en/topics/water-waste-soil/water-management/wastewater/.

[6] https://link.springer.com/chapter/10.1007/978-1-4615-3282-8_46.

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Table 1 State wise status of STPs across different states in India

S. No.	State/UT	Capacity of municipal STPs	No. of municipal STPs	Operational capacity (MLD)	No. of STPs operational	Non-operational capacity (MLD)	No. of STPs non-operational	Under construction capacity (MLD)	No. of STPs under constructions	Proposed capacity (MLD)	No. of STPs proposed
1	Andhra Pradesh	247.27	12	156.27	9	–	–	91	3	–	–
2	Arunachal Pradesh	–	–	–	–	–	–	–	–	–	–
3	Andaman & Nicobar Islands	–	–	–	–	–	–	–	–	–	–
4	Assam	0.21	1	0.21	1	–	–	–	–	–	–
5	Bihar	124.55	6	99.55	5	25	1	–	–	–	–
6	Chandigarh	314.5	5	314.5	5	–	–	–	–	–	–
7	Chhattisgarh	–	–	–	–	–	–	–	–	–	–
8	Delhi	2693.7	35	2671.2	34	22.5	1	–	–	–	–
9	Daman & Diu Dadra Nagar Haveli	–	–	–	–	–	–	–	–	–	–
10	Goa	74.58	7	34.5	4	–	–	40.08	3	–	–
11	Gujarat	3062.92	51	2111.64	32	498	4	359.5	8	93.78	7
12	Haryana	852.7	41	805	38	2.7	2	45	1	–	–
13	Himachal Pradesh	114.72	66	79.51	36	35.21	30	–	–	–	–
14	Jammu & Kashmir	264.74	19	145.74	15	2	1	117	3	–	–

(continued)

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Table 1 (continued)

S. No.	State/UT	Capacity of municipal STPs	No. of municipal STPs	Operational capacity (MLD)	No. of STPs operational	Non-operational capacity (MLD)	No. of STPs non-operational	Under construction capacity (MLD)	No. of STPs under constructions	Proposed capacity (MLD)	No. of STPs proposed
15	Jharkhand	117.24	15	117.24	15	–	–	–	–	–	–
16	Karnataka	1304.16	57	1112.05	44	–	–	192.11	13	–	–
17	Kerala	152.97	10	112.87	6	3	1	37.1	3	–	–
18	Lakshadweep	–	–	–	–	–	–	–	–	–	–
19	Maharashtra	5160.36	76	4683.9	60	344.5	10	131.96	6	–	–
20	Madhya Pradesh	482.23	17	475.48	14	6.75	3	–	–	–	–
21	Manipur	–	–	–	–	–	–	–	–	–	–
22	Meghalaya	1	1	–	–	1	1	–	–	–	–
23	Mizoram	10	1	–	–	–	–	10	1	–	–
24	Nagaland	–	–	–	–	–	–	–	–	–	–
25	Odisha	385.54	13	158.04	7	–	–	227.5	6	–	–
26	Puducherry	68.5	6	17.5	3	–	–	51	3	–	–
27	Punjab	1245.45	86	921.45	38	15.2	4	276.7	31	32.1	13
28	Rajasthan	865.92	63	384.5	16	–	–	149.3	11	332.12	36
29	Sikkim	31.88	11	8	1	5	1	18.88	9	–	–
30	Tamil Nadu	1799.72	73	1140.83	33	5.17	1	521.08	28	132.64	11
31	Telangana	685.8	18	634.8	17	–	–	51	1	–	–
32	Tripura	0.05	1	0.045	1	–	–	–	–	–	–

(continued)

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Table 1 (continued)

S. No.	State/UT	Capacity of municipal STPs	No. of municipal STPs	Operational capacity (MLD)	No. of STPs operational	Non-operational capacity (MLD)	No. of STPs non-operational	Under construction capacity (MLD)	No. of STPs under constructions	Proposed capacity (MLD)	No. of STPs proposed
33	Uttar Pradesh	2646.84	73	2372.25	62	89.59	7	170	3	15	1
34	Uttarakhand	152.9	24	90.75	10	–	–	39.15	12	23	2
35	West Bengal	416.9	28	235.36	16	181.54	12	–	–	–	–
	Total	23277.36	816	18883.2	522	1237.16	79	2528.36	145	628.64	70

http://www.bmub.bund.de/en/topics/water-waste-soil/water-management/wastewater/sewage-treatment-plants/

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3 Current Status of STPs in Bihar

Bihar is one of the states that are facing worst condition as evident from the Table 1. In the entire state, only 06 STPs are installed. These STPs are very old and dates back to British rule in India. Prominent towns & cities have been considered for studying the status of STP, out of which Bhagalpur, Begusarai, Hajipur, Buxar and Patna are the prominent ones.

3.1 Sewage Project, Bhagalpur

Water supply system is very poor and identified as a major problem for Bhagalpur town. The current water treatment plant (WTP) in Barari, commissioned in 1885 has design capacity of 17.3 million liters per day (MLD) but it operates only at 12 MLD due to deterioration of the plants and machineries. Underground sewerage network is completely absent in Bhagalpur town. About 70% of the households are using septic tanks, but still around 20% are forced to use pit latrines. The remaining 10% have no other choice but to do open defecation. Wastewater management system in Bhagalpur was built under Ganga Action Plan for reducing the pollution level of the holy river. The total quantity of sewage water that reaches the sewage treatment plant is about 8.25 MLD. No reuse of the treated effluent is performed. Government is planning for the installation of sewage treatment of 47 MLD, funded through the World Bank.[7]

3.2 Sewage Project, Begusarai[8]

Sewerage system does not exist in this town. People are forced to perform open defecation. Households that are having sufficient area and in some of the newly developed colonies, septic tanks are used for waste water disposal and effluents arising from these septic tanks are discharged in open drains which further gets collected in local ponds. A sewage utilization plant with 17 MLD capacity of waste has proposed of 105 km length. Begusarai museum and the Gayatri shakti peeth are the sights for the two pumping stations. The proposed treatment process shall be Activated Sludge process which will be based on Sequential Batch Reactor technology. The STP site will be south east of the town near Wajidpur and the after treatment, effluent shall be allowed to get discharged in river Ganga.

[7] http://igemportal.org/Resim/Wastewater%20Treatment%20Technologies_%20A%20general%20rewiev.pdf.

[8] http://chinawaterrisk.org/resources/analysis-reviews/8-facts-on-china-wastewater/.

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3.3 Sewage Project, Buxar and Hajipur[9]

Bihar government launched different Sewerage projects such as Buxar, Hajipur and Begusarai near Ganga river for improvement this project and financial support. The main objective of this project is rejuvenation of Ganga water quality by preventing from municipal sewage into the river.

The authority board of Ganga river has decided that municipal sewage and industrial waste would be enters Ganga river after 2020 for the project clean Ganga mission. Total Rs. 15,000 crore investment is needed for coming 10 years for the necessary treatment and sewerage infrastructure.

3.4 Sewage Treatment Plant, Patna

Next is the capital of Bihar state, Patna which is the second largest city in eastern India, after Kolkata. Sewerage system was first introduced in Patna town during the year 1936-39 under which a STP of 4.5 MLD was constructed in the year 1937 at Saidpur. At present, the Municipal limits of PMC from Patna Urban Agglomeration Area. The PMC cover an area of 100 km^2 with the present population of 16.83 lakhs as per 2011 census. Patna city covering an area of 100 km^2 is subdivided into 6 Sewerage Zones: Digha, Beur, Saidpur, Kankarbagh, Pahari and Karmali Chak. Saidpur zone covers the central part of Patna City. In this area, the population is very dense therefore, the sewage generation is high. The old Saidpur Zone of Patna as per the existing sewerage scheme is now divided in two zones namely Zone-III & IV A (N). This zone have a STP within its boundary at Saidpur STP (45 MLD plant) site.[10] At present, Saidpur zone has an existing ASP based STP capacity of 45 MLD which is catering a load of 33 MLD with primary and secondary level of treatment which is proposed to be augmented for treatment of 60 MLD. For proper maintenance of the sewerage system, provision has been made for one jetting cum suction machine, submersible dredger pump, safety equipment, and sewer cleaning machine of power bucket type which will help to collect the sludge and will disposed on identifies PMC waste disposal site regularly by packed tractor trolley, mounted tanker and other environmental friendly collection and disposal sources. At present, the technology used is Conventional Activated Sludge Process (ASP). The merits of this method are that the land requirement is less compared to others. Also better control is possible with reduced flies and odour nuisance. At the same time it involves high capital cost, high power requirement and skilled labour. With the present population of 3.64 lakhs which generates sewage discharge of 43.69 MLD, open drains are acting sewers during the dry weather flow.

[9] http://chinawaterrisk.org/resources/analysis-reviews/8-facts-on-china-wastewater/.

[10] http://biomasspower.gov.in/document/download-lef-tside/Biomass%20gasification.

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3.4.1 Problems Identified

As per the visit of the Saidpur Sewage Treatment Plant, some problems with the typical plant of Bihar are identified as under:

- The methane gas produced as a result of decomposition of the sludge is completely flared off into the atmosphere. This can be brought up into use by collecting it in a gas dome but there was no mechanism for that.
- Since the plant is under construction for the expansion of capacity, area which has to be used for sun drying is now being occupied by the government for infrastructure development. Now the digested sludge cannot be sun dried and is now left over in the tank itself which produces risks of blockage of channels.
- The water even after treatment could not meet the requisite standards. This is due to workers' inefficiency and lack of proper reviewing policy.
- Lack of flow of sewage in the absence of sufficient sewer length in the drainage system.
- Power shortage is one of the factors which is being faced by the existing STPs.
- Shortage of manpower both skilled and unskilled type has led to mismanagement.
- Government is not providing enough funds for the basic requirements i.e., repair of machines, etc.

3.4.2 Recommended STP Technology

This SBR based project effluent can be beneficial for utilization for non-domestic purposes such as house flushing, gardening and floor cleaning. The effluents from sewage can be dried and the separated from sewage. After drying, pretreatment process can be applied and that processed sewage sludge may be used as biomass for the gasification plants. Gasification of biomass is a well-known technology and for this different gasifier is available with different designs and capacities according to the requirements. A biomass gasifier is similar as other renewable sources like solar energy and wind energy means it can produce power when required.[11] Whereas large thermal power plants and solar and wind based units are very location specific, Sewage sludge gasifier based systems can be set up at almost any place. Sewage sludge is a CO_2 neutral fuel and, therefore, unlike fossil fuels such as diesel does not contribute to net CO_2 emissions, which makes biomass based power generation systems an attractive option in mitigating the adverse effects of climate change.[12]

[11] https://energypedia.info/wiki/Biomass_Gasification_(Small-scale).

[12] https://en.wikipedia.org/wiki/Gasification.

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4 Conclusions

Bihar state has very few STP and the existing ones are in very poor condition. It can be concluded that the Saidpur STP is working well but still needs some major modifications. The plan of expansion of capacity of the plant from 45 MLD to 60 MLD has affected the regular working to a large extent. There are definitely some implementation shortages which needs an eye by the officials. The overall operations at various stages are its fine screen channels, PSTs or secondary sedimentation tanks needs more labor concern as the final treated water was not up to the set standards. The biomass gasification technology of sewage sludge is theoretically an interesting option for rural development. Dangerous threats exist to the environment and health due to carcinogenic waste involved in the sewage waste. Therefore, at present the application of the gasifier technology for small-scale electricity production in developing countries seems to be justifiable. Each new plant would be a unique tailor-made facility.

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Effluent Water Treatment: A Potential Way Out Towards Conservation of Fresh Water in India



S. Bej, A. Mondal and P. Banerjee

Abstract In modern age, rapid industrialization catalyses the steady magnification of the adverse effects. Released wastewater from various industries is of deepest concern which is highly responsible for aquatic pollution especially in India. An estimated amount of ~61,754 million litres per day (MLD) effluent water is produced in foremost metropolitans in India; however, the sewage management facility is only of ~22,963 MLD (approximately 37% of industrial effluents), and the remaining is disposed of untreated (according to the 2015 report of the Central Pollution Control Board 2015). The unscientific way of disposal causes severe diseases, responsible for environmental and ecological imbalance. This aquatic pollution is heading towards moderate to severe water shortages, brought on by the simultaneous effects of agricultural growth, industrialization and urbanization. In the forthcoming decades, the crisis of freshwater may lead to a major societal problem and political instability, if not the new option is found to supply the clean water. The development of cost-effective and eco-friendly wastewater management technologies and recycling could be the best way to solve the problem of potable water scarcity. Several conventional treatment technologies, i.e. adsorption, chemical coagulation, activated sludge management, membrane filtration, etc., have been implemented to eliminate the pollutants from effluent waters. In addition, it is straightforward, with good effectiveness and ability for degrading contaminants. This paper emphasizes the recent advancement and simultaneous use of wastewater treatment technologies in India to remove pollutants from wastewater like halogenated hydrocarbons, heavy metals, dyes and pigments, pesticides, herbicides, etc., which correspond to the main pollutants in wastewater. Movements like Swachh Bharat Mission (SBM), which has become the

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largest movement towards cleanliness, highly emphasizes the treatment along with recycling of these effluent waters throughout India.

Keywords Effluent water · Water pollutants · Heavy metals · Toxicity · Natural adsorbents · International society of waste management · Air and water

1 Introduction

Rapid industrialization and urbanization have been adversely affecting the global environment in addition to that the quality as well as quantity of the potable water resources for the past few decades. Pollution by inappropriate industrial wastes management is one of the chief environmental problems in India. The basic technical knowledge required to cope up with pollution is already known to us, but unfortunately, less concern about the fact leads us towards self-destruction.

Access of clean water is immensely indispensible for growth and development, as water is a lifeline for all forms of life on this earth, and it is basically acquired from two principal usual sources, natural surface water like rivers, freshwater lakes, streams, etc., and groundwater such as borehole water and well water. So, contamination of these water bodies creates a real day crisis of freshwater. Generally, the industrial development occurring along the banks of rivers exerts pressure on the water resources causing the shortage and contamination of surrounding water bodies. Moreover, disposal of untreated wastewater directly into the water bodies causes the surface and groundwater pollution. Normally, wastewater consists of ~99.90% water and ~0.10% suspended or dissolved solids mainly bio-organic in nature (human waste, vegetable matter, paper, etc.), various toxic metals and pathogens which consume available oxygen from water bodies resulting in the increase of BOD and COD level. The contamination of water bodies by toxic metals is a severe problem for all living organisms. The metals get bio-accumulated in the nature and consecutively get biomagnified next to the food chain. Though metals like Cu, Fe and Zn are vital micronutrients, but excess accumulation leads to several lethal effects (Kar et al. 2008; Nair et al. 2010). The heavy metals such as iron, cadmium, lead, zinc, chromium, vanadium, nickel, copper, platinum, silver, titanium, etc., are commonly released from various industrial sectors like tannery, textile, leather, pigment and dyes, paint, petroleum refining industries, etc. Thus, treating the effluent water in the industrial premises before discharging it into the environment is of extreme importance. Table 1 shows the maximum contaminant level (MCL) standards for some heavy metals established by USEPA (Tripathi and Ranjan 2015).

The amplifying demand of freshwater for various domestic purposes is met by groundwater, which is presently at high jeopardy due to continuous withdrawal. Treated wastewater can be a substitute to the groundwater for some domestic uses. Therefore, mitigation of water pollutants from industrial effluent becomes compulsory before disposing it directly into the environment. A series of approaches have

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Table 1 The MCL values of the most hazardous heavy metals

Name of heavy metal	Toxicity	MCL (mg/L)
(i) Arsenic (As)	Skin manifestations, visceral cancers, vascular disease	5×10^{-2}
(ii) Cadmium (Cd)	Kidney damage, human carcinogen	1×10^{-2}
(iii) Chromium (Cr)	Headache, diarrhoea, nausea, vomiting, carcinogenic in nature	5×10^{-2}
(iv) Copper (Cu)	Liver damage, insomnia, Wilson Disease	25×10^{-2}
(v) Nickel (Ni)	Nausea, chronic asthma, coughing, carcinogen, Dermatitis	20×10^{-2}
(vii) Lead (Pb)	Damages the foetal brain, kidney diseases, circulatory system, nervous system	6×10^{-3}
(viii) Mercury (Hg)	Rheumatoid arthritis, kidney diseases, circulatory and nervous system	3×10^{-5}

been looked into such as coagulation, membrane technique, adsorption, foam flotation, reverse osmosis, catalytic degradation and other bio-techniques for the removal of contaminants from effluent water (Pontius 1990). Out of these processes, adsorption has come out to be one of the safest and cheapest alternative methods. Indian Government has already taken many steps to nurture the matter like 'Ganga rejuvenation' [a part of Swachh Bharat Mission (SBM)], according to the Environment Protection Act, 1986, as a planning, financing and monitoring for effective reduction of pollution and conservation of the river Ganga. This review article deeply concerns about the improper management of generated effluent water from industries in India and emphasizes the primary treatment systems available for treating wastewaters. To properly address the pollutants releasing from the industries, proper management of generated wastes and adoption of greener and cost-effective technology are being encouraged day by day.

1.1 A Historical Perspective

In the year 1900, scientist Louis Pasteur and other researchers showed that sewage-borne bacteria grow due to the contamination of human excrement and are responsible for severe infectious diseases (Henze and Harremoes 1983). Therefore, the contaminated water used to spread in large farms to be decayed by the action of micro-organisms. It was quickly investigated that the land converted to be 'sick' and unproductive. Later, attempts indulged direct disposal of effluents into the surface water which caused the aquatic pollution. But, it was soon realized that environment might not act as an unlimited dumping reservoir. Basic methods of effluent water treatment were first advanced in response to the adverse circumstances caused by the unscientific disposal of effluent water to the nature and public health. Furthermore, due to the urbanization, inadequate land was available for wastewater treatment

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and clearance. Moreover with population explosion, the quantity of effluent water produced per day increases rapidly and goes beyond the self-purification capacity (Spellman 1999; Rosen et al. 1998). Therefore, other treatment methods were developed and resulted an upliftment of the technologies from 1900 to the early 1970s that aims at-

(i) Removal of unwanted suspended materials from wastewater
(ii) Treatment of chemicals along with biodegradable organics (COD and BOD removal)
(iii) Inhibition of lethal pathogenic micro-organisms.

Major objective is to attain efficient and prevalent wastewater treatment technology to get better quality of water. Since 1990, effluent water treatment has been started by increasing scientific knowledge and various Government campaigns which are still continuing, but the emphasis has been shifted to the cause and removal of pollutants to improve the degree of treatment.

1.2 Distribution of Total Water on Earth's Surface

The circulation of total water on the Earth's surface is shown in Fig. 1, which states that only ~3% of water sources on the surface is fresh (among which, ~69% in glaciers, ~30% underground and ~1% in lakes, rivers and swamps); the remaining ~97% exists in the ocean. Hence, it is clear that only 1% of the water source on the surface of Earth is usable.

2 Category of Effluent Water

Effluent water is a side product of domestic, industrial, agricultural activities, surface runoff or any sewer infiltration (Tilley et al. 2016). The qualities of wastewater vary depending on the sources and the degree of contamination. It may be wastewater released from households, municipal wastewater (sewage) coming from societies or industrial wastewater from industrial sectors. Effluent water generally contains

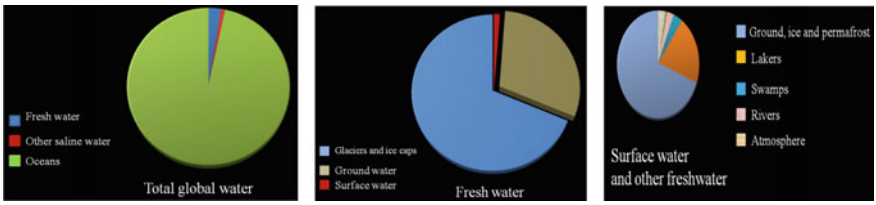

Fig. 1 Distribution of earth's water

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physical, chemical and biological pollutants. Basically, they are categorized into three broad classes: Black water, Grey water and yellow water (CPCB 2005).

2.1 Black Water

It is used to describe the effluents coming from the toilets, contaminated with various pathogens.

2.2 Grey Water

Grey water or Sullage is all kinds of effluent water generated from households or offices, except the wastewater from toilets. It contains lesser pathogens and therefore easier to treat and reuse for other purposes like sanitation, crop irrigation, etc. Reuse of grey water provides enormous benefits to reduce the demand of freshwater and minimizes the generation of wastewater.

2.3 Yellow Water

Water basically mixed with urine gathered from specific channels which are not polluted with either black water or grey water.

2.4 Sources of Effluent Water

Effluent waters originate from various sources like residences (household wastes), commercial sectors (schools, hospitals, offices, hotels, etc.) and industries. Apart from these, wastewaters are generated from non-pointed sources such as storm water, contaminated rainfall runoff from agricultural lands and entrance of the groundwater to the wastewater collection system. The resource of wastewater generally determines the qualities of the contaminated water, based on which the treatment procedures must be designed.

2.4.1 Domestic Sewage

This includes effluent water from homes and offices, typically contains contaminants such as vegetable, faecal matter, oil and grease, detergents, rags and sediment.

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2.4.2 Industrial Wastewater

Industrial effluent water is one of the prime sources of water pollution, includes toxic chemicals, organic and radioactive wastes, large amount of sediments, high-temperature waste or acidic/caustic waste. During the last century, a large amount of industrial wastewater was disposed directly into the environment without any treatment. The main concern is that the local farmers unconsciously use this raw sewage to irrigate their lands, and the agricultural products are marketed locally. Therefore, the pollutants may indirectly enter the food chain causing serious problems to the eco-system and human's life. In Durgapur industrial belt, severe incidents took place due to drastic consequences of wastewater pollution (Javed et al. 2013). Some of them are mentioned below:

(i) In 1973, thousands of fishes and frogs died, and ~240 hectares of cultivated lands were lost in the left bank irrigation canal at the Durgapur Barrage of the Damodar Valley Corporation (DVC).
(ii) In 1978, a huge number of cattle are died after drinking contaminated canal water.
(iii) In 1983, ~500 domestic animals died, and ~8000 quintals of processed crops were demolished. All the three catastrophes occurred due to the disposal of toxic chemicals into the Damodar canal water by the nearby small- and large-scale industries.

2.5 General Characteristics of Industrial Wastewater

A vivid idea of the chemical composition of wastewater is important since this helps to know the probable reactions with the organic and inorganic matters (Roila et al. 1994). Generally, the effluent water released from different industrial sectors can be separated into two broad categories: (i) inorganic industrial wastewater and (ii) organic industrial wastewater.

2.5.1 Inorganic Industrial Wastewater

This kind of wastewater is generated largely in the mining industries, nonmetallic minerals industries and metal surface processing industries (iron pickling, electro-plating plants, etc.).

2.5.2 Organic Industrial Wastewater

Organic industrial effluents are released from several organo-chemical industries, which mainly use organic materials for reactions and contain organic contaminants

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such as phenol, organic sulphur, volatile organic matters, surfactants, etc. Table 2 describes the general parameters of effluent waters coming from different industrial sectors (Kaur et al. 2012).

The large amount of produced effluent water destroys the eco-system, mainly marine lives. Hence, it becomes a burning issue to purify the wastewater properly. Therefore, we should be keen to control the production of the wastewater, consumption of clean water in different sectors and cost of the treatment of wastewater (Fig. 2).

Table 2 Categories of industrial effluent water

Industrial sector	General contaminants
(i) Steel and Iron	High BOD and COD, oil and grease, high pH, acids, phenols, cyanide, heavy metals like Mn, As, Hg, Cd, Ti, V, Sb, Th, Pb
(ii) Leather and textiles	High BOD, solids, sulphates
(iii) Paper and pulp	High BOD and COD, solids, chlorinated organic compounds
(iv) Refineries and petrochemicals	Mineral oils, BOD, COD, phenols, chromium
(v) Chemicals	Cyanide, carbon-based chemicals, heavy metal ions, SS, COD
(vi) Non-ferrous metals	Fluorine, suspended solids
(vii) Microelectronics	Organic chemicals, COD
(viii) Mining	Suspended solids, metals, acids, salts

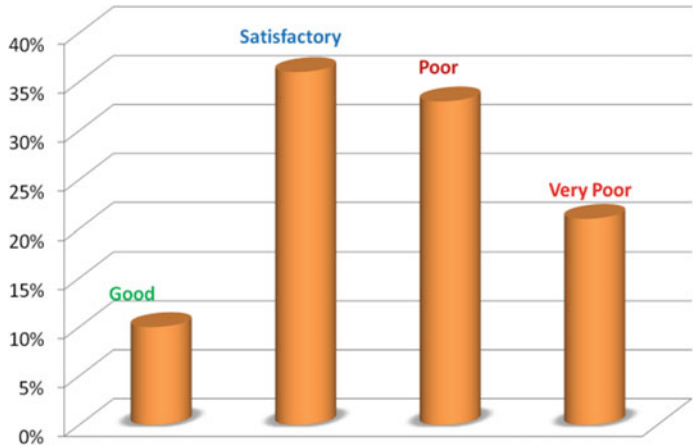

Fig. 2 Wastewater treatment plants in India under different grades

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2.6 *Present Status of Effluent Water Conundrum and Treatment in India*

In India, climate alteration in the monsoon has huge implications on agriculture that makes India more vulnerable because >60% of countrymen are relying on cultivation for survival, and ~two-thirds of the nurtured terrestrial is fed by rain. Simultaneously, the government has launched ambitious programs like 'Smart City Mission', 'Swachh Bharat Mission', and the 'Make in India' campaign which needs to be reviewed from water and environmental aspects. Moreover in urban areas, freshwater resources are at high risk because of the increasing demand of freshwater. Apart from this, contaminants from various industrial sectors pollute the local water bodies making the freshwater endangered. Hence, a proficient solution is essential for viable water treatment. Therefore, reuse of purified effluent water would be of immense significance in achieving freshwater security and water conservation.

In India, a regular rainfall of ~1170 mm occurs corresponding to a yearly precipitation of ~4000 BCM (Billion Cubic Metre). However, based on the constraints like substantial variation in rainfall, evaporation throughout the year, etc., ~1123 BCM (690 from surface plus 433 (28%) from groundwater resources), gained from precipitation, is utilizable. Moreover, ~ 688 BCM of water is used for watering, which may upsurge to 1072 BCM in 2050. The average amount of ground water renewal is 433 BCM in a year, out of which ~212.5 BCM is utilized for watering, and ~18.1 BCM is spent in domestic and industrial usage (CGWB 2011). However, by 2025, the demand of water used in industrial and domestic purposes may rise to ~29.2 BCM (Fig. 3).

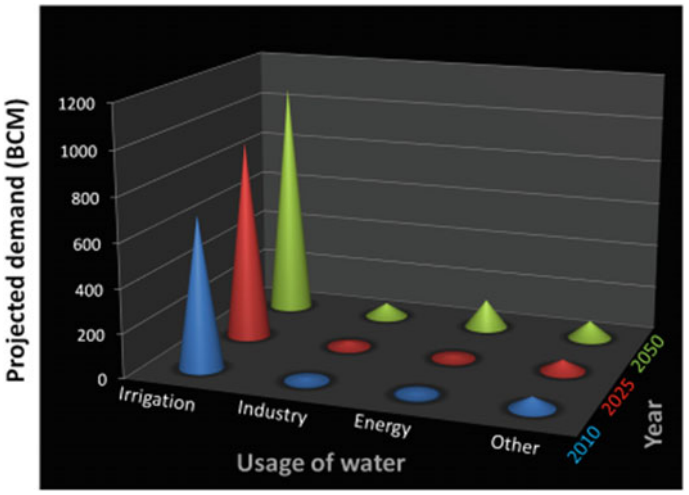

Fig. 3 Projected water demand at different sectors (CWC 2010)

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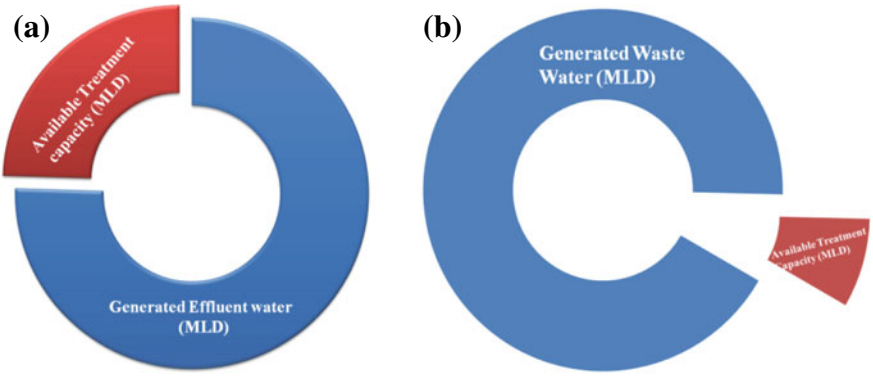

Fig. 4 Treatment capacity and sewage generation in class-I cities (**a**) and class-II townships (**b**) in India (CPCB 2009)

With rapid development of urbanization and domestic water usage, production of grey water is growing day by day. According to CPHEEO (The Central Public Health and Environmental Engineering Organization), ~70 to 80% of the water supplied for domestic usage transfers into wastewater. Survey reveals that wastewater production in class-I cities as well as class-II towns is ~98 lpcd (litres per capita per day). According CPCB (Central Pollution Control Board), the total generated wastewaters by 498 Class-I cities and 410 Class-II towns in India are ~35,558 and ~2696 MLD (millions of litres per day), respectively, while the installed sewage treatment capacity is just 11,553 and 233 MLD, respectively (Fig. 2). Five States in India, viz Delhi, Uttar Pradesh, Maharashtra, Gujarat and West Bengal are the foremost contributors of effluent waters (63%; CPCB 1999, 2007; CWC 2010). Further, according to WWAP and UNESCO (2006), it is anticipated that in 2050, ~48.2 BCM of wastewaters would be produced, which will further widen this gap (Bhardwaj 2005). Thus, entire study reveals that in near future, a double-edged problem will arise to deal with: reduced sources of pure water and increased effluent water production. Hence, there is an acute requirement for effectual water management (Fig. 4).

2.7 Wastewater Treatment Technologies

A host of new technologies for proper management of wastewater is being developed worldwide. However, new methodologies include natural procedures and are intended with feasibility. The techniques described below provide some basic idea on the miscellany, tractability and future utility.

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2.7.1 Physicochemical Treatment Technologies

Physicochemical technique (Gupta et al. 2012) may be described as a treatment process in which biological and physical-chemical processes are mixed to get a hybridized treatment technique (Fig. 5).

The primary treatment includes decontamination and elimination of unwanted toxic elements depending upon some physical methods like screening, sedimentation, coagulation, flotation, etc. Secondary treatment deals with the biological process as aerobic, anaerobic, etc.

In the tertiary treatment, wastewater is converted into freshwater by using methods like distillation/evaporation/solvent extraction/advanced oxidation/precipitation/micro- and ultrafiltration, etc.

Adsorption is the most efficient and a universal technique used in the elimination of a wide variety of contaminants like colour, odour and various organic and inorganic impurities. The main advantage of this process lies in its low cost, straightforwardness and less sludge generation. Apart from this, reverse osmosis processes a widely used wastewater purification technique, but contains comparatively high cost for maintenance.

2.7.2 Bio-chemical Treatment Technology

Bio-chemical technology (Seow et al. 2016) including biofilm technology, aerobic granulation and bacterial fuel cell are a few useful methods for wastewater purification. Biofilm, a cluster of micro-organisms, is devoted to an exterior part. Dental plaque, for example, is one of the biofilms, comprises ~500 microbial species (MSU Center for Biofilm Engineering, 2008). The various species in biofilms, like, fungus, algae, yeasts, protozoa, etc., form groups by creating an 'extracellular polymeric substance (EPS)'. The cells develop three dimensional, hardy communities by making sugary molecular strands which excrete glue-like material to permit them to stick to an exterior of nearly any kind.

The biological wastewater treatment is often carried out by conventional treated sludge systems, which require bulky surface areas for management and biomass segregation units because of the deprived settling nature of the sludge.

Aerobic granules, having compactness, regularity, smoothness and good settling ability, can self-immobilize flocks and micro-organisms into spherical and strong compact structures.

Microbial fuel cell (MFC), a bio-chemical device, uses bacteria as a biocatalyst to transform chemical energy present in biological matter into electricity. MFC shows high energy conversion efficiency due to direct conversion of chemical energy within substrate to electricity.

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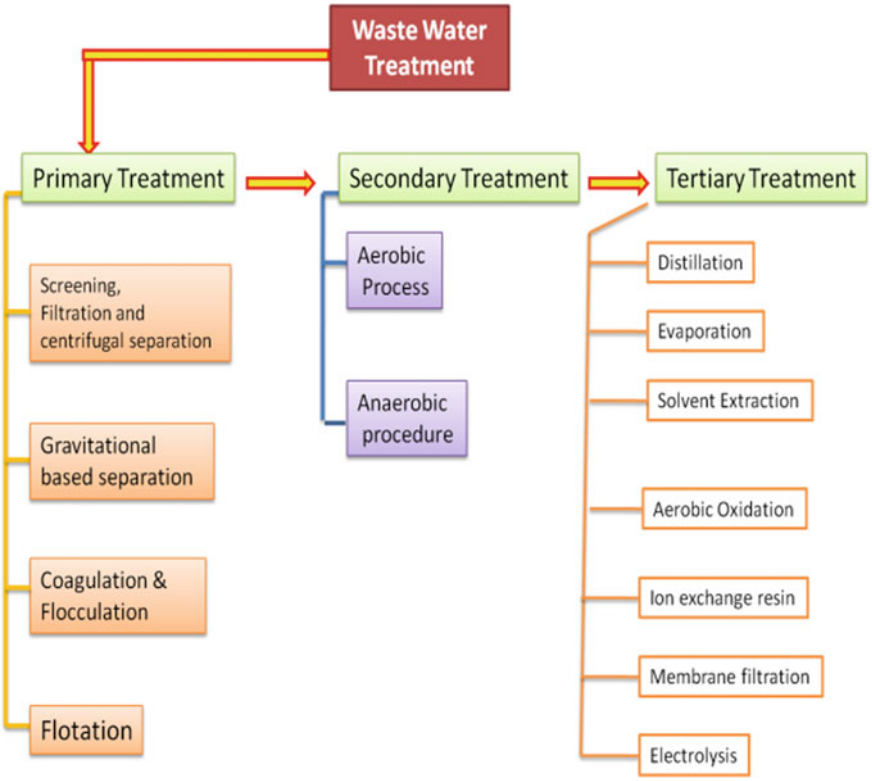

Fig. 5 Steps involved in chemical treatment methodologies are briefly demonstrated using a flow diagram

2.7.3 Bio Mediated Treatment Technology

Aquatic plant-based treatment systems (Dixit et al. 2011) using ponds or artificial wetlands are effective for purifying domestic and industrial drainage water. Biosorption is a proficient substitute of conventional techniques for elimination of noxious metals from effluents released from industries. Slower the flow and longer the retention time, greater will be the removal. Aquatic plants show remarkable absorption of metals (like N, P, S, Ca, Mg, Na, Fe, Mn, Zn, Cu, etc.) and nutrients. Removal of aquatic vegetation on timely basis is an important step; otherwise, died plants will decay releasing their absorbed nutrients to the water, thereby further degrading the water quality.

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2.7.4 Membrane-Based Treatment Technology

Membrane-based separation technique is presently used as a replacement of conventional wastewater treatment processes and is the main market driver (Hamingerova et al. 2015). These technologies provide membrane separation based on selective separation through apertures of various sizes and contain four core membranes: microfiltration, ultrafiltration, nano-filtration (CNT-silicon nitride membranes, Ag particles impregnated membrane) and reverse osmosis (CPCB 2007; Noy et al. 2007). Micro and ultrafiltration are used for unwanted particle removal, whereas nano-filtration and reverse osmosis are used for softening or desalination. Handling of organic and inorganic contaminants typically requires modified sludge treatment by using a dipped membrane.

2.8 Proposed Wastewater Treatment Prototype

Because of the growing demand of potable water supply in the domestic sectors, there is an urgent requisite to prepare an inexpensive, gravitational-based domestic wastewater purification system (Fig. 6) that would convert contaminated water to

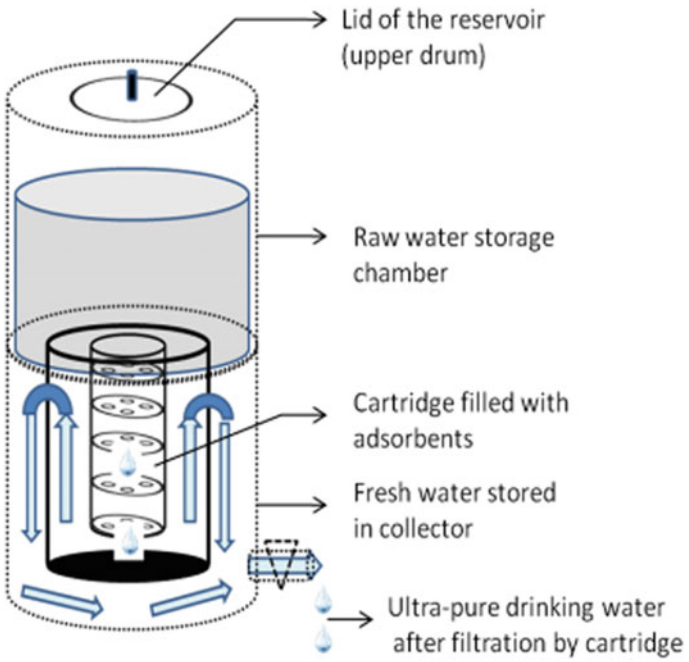

Fig. 6 Domestic wastewater treatment unit

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potable water. The emphasis in this regard is to use naturally abundant adsorbent materials (e.g. sand, gravels, brick dust, etc.) for treatment purposes. The treated water will serve the required domestic purposes like gardening, washing, etc.

2.9 Conclusion

Clean potable water is indispensable for human activities. The demand of healthy drinking water is enhancing proportionally with increasing population. Hence, there is a pressing requirement for an effectual water management and wastewater recycling technology. In this milieu, nanotechnology is fast replacing traditional concepts, which depend on the improvement of newer multi-functional materials with unique properties and specific attraction towards certain contaminants. But, these approaches are convoluted, tedious and costly. Therefore, exploration is going on to develop inexpensive, but effective water treatment techniques. In a developing and heavily populated nation like India, large amount of effluent water is being produced from different sectors. This review article draws attention about concerning issues and technological options connected to the wastewater collection followed by treatment systems.

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Development of an Effective and Efficient Integrated Charcoal Filter Constructed Wetland System for Wastewater Treatment



V. V. D. N. G. Vidanage, A. K. Karunarathna, A. M. Y. W. Alahakoon and S. M. N. Jayawardene

Abstract Effective and efficient treatment of greywater from households and public places is an important and urgent issue to be solved in many developing countries. The higher capital investment of high-tech systems hinder the implementation, thus development of efficient yet affordable and compact wastewater treatment units for greywater treatment can solve the problem to a greater extend. This research developed a compact wastewater treatment system using commonly available construction and biomaterials. The proposed compact wastewater treatment system is consisted of three main components: up-flow anaerobic sludge blanket, charcoal granular media, and a subsurface flow constructed wetland system and is named Integrated Charcoal Filter Constructed Wetland (ICFiWet) system. In the vertical cylindrical reactor, the influent wastewater flows upward through an anaerobic chamber passes through the granular media to the subsurface flow wetland. The ICFiWet system was first tested at household scale (100 L capacity) fed with synthetic greywater. Water quality parameters such as pH, EC, TS, TSS, biological oxygen demand (BOD_5), nitrate N, and phosphate removals were estimated to evaluate the reaction kinetics and performances. The BOD removal was >66% and the system reduced the nitrate (1.77 ± 0.28) concentration by 15.3%. It was also revealed that the system decomposes the complex phosphorous substances to soluble P, leaving about 3 times increase of soluble P in effluent waters. The ICFiWet system was then up-scaled to 15.0 m^3 capacity to treat 5.0 m^3/day of flow. The ICFiWet system was installed in a larger public washroom to treat partially digested effluents. The results showed that the treated effluent achieved the water quality standard that comply with irrigation water quality. Thus, it was concluded that the ICFiWet system could effectively use for greywater treatment in household and public places while recovering the important nutrient phosphorus.

Keywords Greywater · Integrated · Up-flow · Charcoal · Constructed wetland · International society of waste management · Air and water

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1 Introduction

Treatment of greywater from households and public places in developing countries is an urgent issue to be solved. Techniques of greywater treatment should fulfil five main criteria: hygienic safety, esthetic appearance, environment tolerance, technical and economic feasibility, and low cost, and the ability to easily maintain by unskilled workers (Nolde 2000; Gross et al. 2007). Implementation of greywater treatment systems has subsided due to economic and technical challenges (Ammari et al. 2014). Most of the available high-tech wastewater treatment systems are not affordable by the small wastewater generators, particularly households in developing countries because of high installation and maintenance costs (El-Khateeb and El-Gohary 2003). Therefore, greywater is generally disposed to the environment without any treatment as there is no any provision for its treatment (Katukiza et al. 2014).

Releasing wastewater to the environment without any treatment can cause various problems with regard to the environment and human health. Therefore, wastewater should be treated prior to discharge into environment. Generally, natural treatment systems are used for treating greywater as it is economically feasible and environmental friendly (Li et al. 2009; Boyjoo et al. 2013). The use of conventional low-tech wastewater treatment systems such as treatment wetlands and pond systems has gained limited attention due to space limitations in urban and semi-urban communities (Parkinson and Taylor 2003).

Wetlands and pond systems have gained limited attention due to space limitations in urban and semi-urban communities (Parkinson and Tayler 2003). Consequently, there is a demand for development of appropriate and innovative technologies for wastewater treatment and reuse for small communities (Bdour et al. 2009).

Constructed wetlands and granular filtration can be identified as extended natural greywater treatment systems which use natural media for biological degradation and filtration (Albalawneh et al. 2017). Among many small scale and low-cost alternatives (Kamal et al. 2008), constructed wetland system is one that highly preferred by small communities with limited funds. Those can be identified as the systems which have the ability to remove pollutants using interactions of plants and microorganisms (Li et al. 2004). Once the constructed wetlands are designed and established, maintenance costs are less. Also, they add an esthetic value to the environment (Lorion 2001). However, larger land footprint requirement and inability of conventional constructed wetlands to handle diverse range of wastewaters hinder the effective use of this affordable system.

Granular filtration achieves wastewater treatment through three main mechanisms: physical, chemical, and biological. Physical filtration, chemical transformation, and biological treatment due to microbial growth are occurred in granular filtration (Ciuk 2015). This technology is suitable for small communities in developing countries due to the low cost of construction, operation, and maintenance (Manz and Eng 2004). Cost effective and sustainable greywater treatment systems can be achieved by selecting locally available filter materials and using them in simple treatment

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methods (Nansubuga et al. 2015). Charcoal can be used as an effective filter material for greywater treatment (Dalahmeh et al. 2012).

Therefore, an attempt was made to integrate an up-flow anaerobic sludge blanket; a charcoal granular media and a constructed wetland system in one physical entity and developed a new concept: Integrated Charcoal Filter Constructed Wetland (ICFiWet) system. This study presents the design concepts, pilot-scale testing of the ICFiWet for synthetic greywater treatment, and preliminary results of the up-scaled design installed in a public place for secondary treatment of sewage wastewater.

2 Methodology

2.1 Pilot-Scale Design

The ICFiWet system consisted of three main components: an up-flow anaerobic sludge blanket, charcoal granular media, and a subsurface flow constructed wetland system. As shown in Fig. 1, three components were assembled vertically creating an updraft movement of wastewater through successive components.

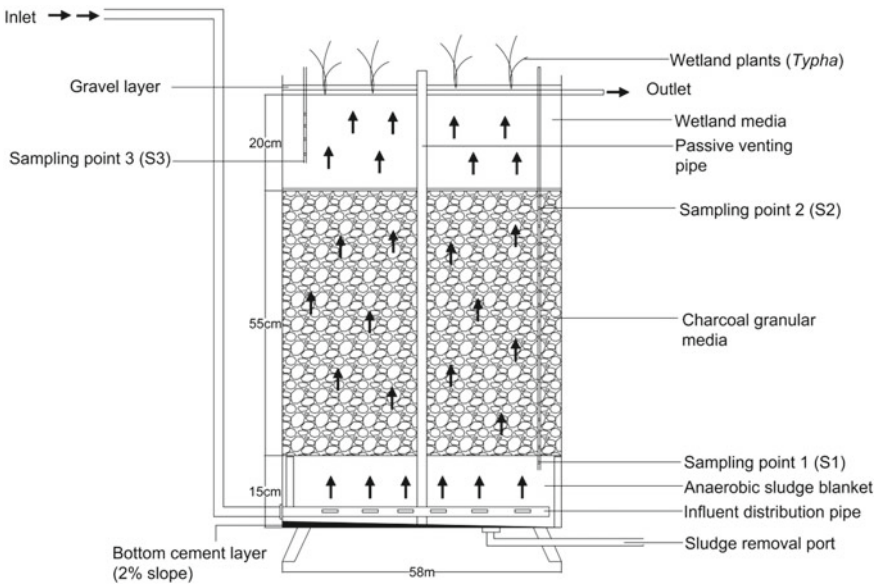

Fig. 1 Experimental setup of the pilot-scale reactor

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2.1.1 Fabrication of the System

The pilot-scale reactor was established using an empty HDPE plastic barrel container having dimensions of 58 cm internal diameter and 92 cm height. A sludge removal port was fixed on the outside wall of the bottom, and 5-cm diameter perforated PVC pipes were fixed on the bottom to evenly distribute the influent. A perforated 4 mm thick plastic baffle was fixed 15 cm above the bottom, leaving the first chamber to be acting as an anaerobic reactor. A layer of softwood charcoal granules with particle sizes in between 0.5 and 3 cm was filled above the baffled up to 70 cm from bottom which acted as the charcoal granular bed. The constructed wetland media was placed above the charcoal bed, separated by a similar plastic baffle as above. Wetland media was prepared with top soil, sand, and charcoal mixture with 2:3:2 weight ratios. The wetland media was planted with *Typha angustifolia* plants which were collected from a microcosm previously grown in a nursery and washed with tap water to remove debris and dead parts.

Perforated stainless steel tubes (5 mm diameter) were vertically inserted into each component allowing water samples to be collected from different compartments.

2.1.2 Influent Greywater Preparation and Flow Rate

The influent for the system was a synthetic greywater solution prepared by mixing 500 g of kitchen/food waste, 8 g of laundry powder, 10 g of pulverized bar soap, 2.5 g of vegetable oils, and 100 ml of kitchen effluent in 100 L of tap water (Travis et al. 2010). A 100 L synthetic greywater solution was supplied to the system with a gravity head as shown in Fig. 1. With this arrangement, 18.3 L day^{-1} of influent passed through the system with a nominal residence time of 5.5 days. In order to avoid depletion of quality, the synthetic greywater solution was replaced every other day.

2.2 Upscaling of the Integrated Charcoal Filter Constructed Wetland (ICFiWet) System

The system was up-scaled and installed at a public washroom (approximately 100 users/day) as a secondary treatment system to treat the partially digested effluents. In the system, the raw sewage first collected in a septic tank and secondly, flows into a soakage pit. However, the soakage pit often overflows due to overloading, thus, the overflowing wastewater pipeline was connected to the ICFiWet system. All components of the up-scaled ICFiWet system was an up-scale of the pilot design. The system was up-scaled to capacity of 15 m^3 to treat 5 m^3 of daily inflow by maintaining 3 days of hydraulic retention time in ICFiWet system. The system was having 3.0 m diameter and 2.8 m depth which included 0.6 m height anaerobic compartment,

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Fig. 2 Construction of the up-scaled ICFiWet system

2.0 m height charcoal granular bed, and 0.2 m deep treatment wetland. The up-scaled reactor was built using masonry bricks, reinforced concrete, and finished with cement rendering. Except 0.3 m of freeboard of the wetland, entire system was constructed underground (Fig. 2).

2.3 Water Quality Monitoring

2.3.1 Pilot-Scale System Monitoring

The pilot-scale Integrated Charcoal Filter Constructed Wetland system performances were monitored for 47 days in order to evaluate grey water treatability. The treatment efficiency of the system was measured in terms of pH, electrical conductivity (EC), total solids (TS), total dissolved solids (TDS) by measuring the water quality at the inflow, outflow, and different layers; sampling point 1 (S1) in the anaerobic sludge blanket region, sampling point 2 (S2) at the top of the charcoal granular media, and sampling point 3 (S3) within the constructed wetland (Fig. 1). Water quality parameters of BOD_5, nitrate and phosphate were measured for the inflow and outflow during the operational period. Greywater samples were tested for pH by probe method (Thermo Scientific, model Orion 2 star), Total Solids (TS) by oven dry method, EC and Total Dissolved Solids (TDS) by probe method (Thermo Orion, model 145A), biochemical oxygen demand (BOD_5) by Winkler Titration method, nitrate nitrogen and phosphate by colorimetric method (Jenway 6305 UV/Vis Spectrophotometer).

2.3.2 Up-Scaled System Monitoring

Sampling points were established in up-scaled system, similar to the pilot-scale system and preliminary treatment efficiency was measured in terms of pH, EC, TS, and total suspended solids (TSS), Salinity, BOD_5 for all five measuring points for a period of 18 days. Additionally, Nitrate Nitrogen and Phosphate were measured for inflow and outflow.

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3 Results and Discussion

3.1 *Performances of Pilot-Scale Integrated Charcoal Filter Constructed Wetland System*

Table 1 illustrates the water quality of the inflow, outflow, and the three sampling points during the operational period. The average pH value of influent wastewater was in slightly acidic range but improved to neutral pH while flowing upward through the three consecutive treatment systems. The pH improvement was greater in first anaerobic sludge blanket indicating acidogenic and methanogenic transformations. A neutral pH of 6.69 ± 0.29 facilitates the optimum conditions for acid-producing bacteria and methane-producing bacteria. As shown in Fig. 3a, the time-dependent average pH of the outflow effluent was varied from 6.71 to 8.04 (7.3 ± 0.30) which is in the environmentally acceptable pH range (between pH 6 and 8.5 for inland

Table 1 Quality of wastewater at inflow, outflow and sampling points in pilot-scale system (±standard deviation, $n = 47$ days)

Parameter	Inflow	S1	S2	S3	Outflow
pH	4.63 ± 0.39	6.69 ± 0.29	6.8 ± 0.29	7.58 ± 0.13	7.3 ± 0.30
EC (mS/cm)	0.37 ± 0.11	1.47 ± 0.72	1.47 ± 0.83	3.12 ± 0.91	1.54 ± 0.74
TS (mg/l)	1908 ± 384	1201 ± 46	1185 ± 633	2646 ± 1637	1208 ± 519
TDS (mg/l)	234 ± 59	719 ± 367	727 ± 428	1586 ± 482	735 ± 482

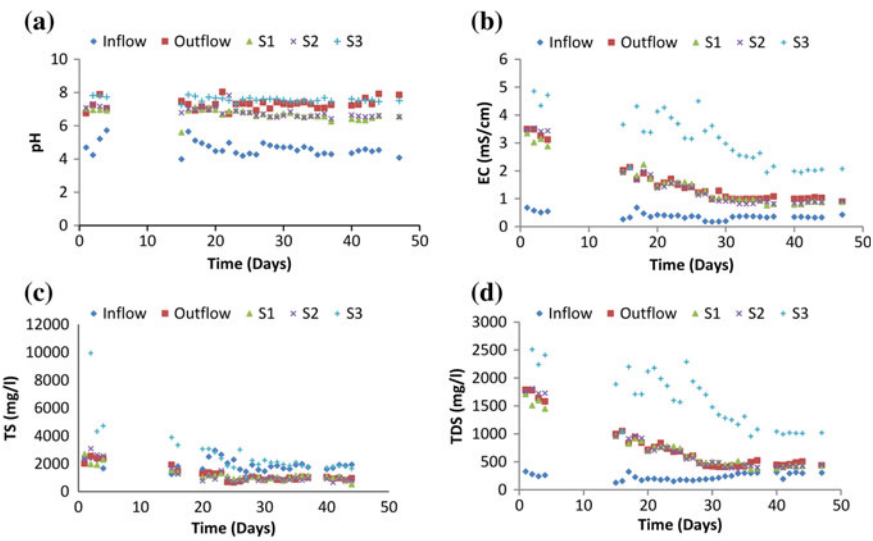

Fig. 3 Variation of **a** pH, **b** EC, **c** TS, and **d** TDS with time in pilot-scale ICFiWet system

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surface waters) of treated wastewater before discharging into the natural environment (National Environmental Protection and Quality Regulations, No. 1 of 2008).

The EC variation of different sampling points of the reactor during the study period is shown in Fig. 3b. The artificially prepared greywater (influent) was having low EC compared to outflow waters. The EC was increased through three consecutive treatment systems because of the consumption of complex organic materials by microorganisms and their breakdown within the sludge blanket. Nevertheless, EC within the wetland is relatively high due to the solubility of different ions included in the wetland filter materials (sand, soil, and charcoal). However, with the time EC within the wetland reduced with washing away of impurities and settlement of the filter materials. EC of outflow water is gradually decreased with time from 3.5 to 0.9 mS/cm during the sampling period.

Figure 3c shows the TS variation of the inflow, outflow and within the reactor. As illustrated in Table 1, influent contains 1908 ± 384 mg/l total solids and effluent contains 1208 ± 519 mg/l with a 45.09% of removal efficiency. As shown in Fig. 3d, TDS concentrations of outflow were higher than that of the inflow due to the microbial digestion and breakdown of complex organic substances.

As shown in Fig. 4a, during the first four days of operation, BOD_5 values of the outflow were greater than inflow due to the dissolution of organics in charcoal and wetland bed media substrates. A higher increase of BOD_5 can be observed during 15th day. Formation of microbial flocs due to prolong storage (3 days) of synthetic greywater was the reason for sudden fluctuation of influent waters. But, effluent water quality, particularly BOD_5 was maintained below 90 mg/l with a time-dependent average of 52 ± 33.11 mg/l with approximately 67% of removal efficiency.

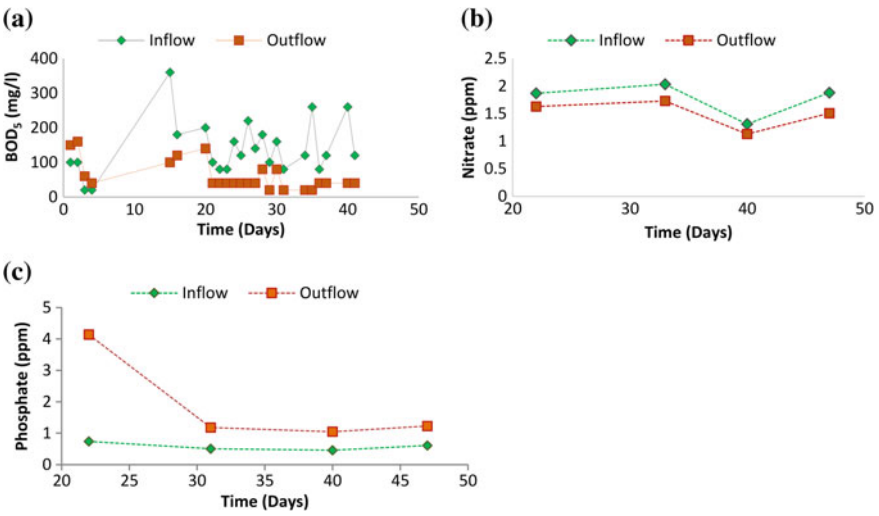

Fig. 4 Variation of **a** BOD_5, **b** Nitrate, and **c** Phosphate concentrations of influent and effluent with time in pilot-scale ICFiWet system

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Table 2 Time-dependent averages of the nutrient concentrations and their removal efficiencies

Parameter	Inflow	Outflow	Removal efficiency (%)
BOD_5 (mg/l)	156 ± 72.55	52 ± 33.11	66.67
Nitrate (ppm)	1.77 ± 0.28	1.50 ± 0.23	15.3
Phosphate (ppm)	0.58 ± 0.11	1.90 ± 1.3	−205.07

This reduction of BOD_5 can occur due to the aerobic and anaerobic degradation of complex organic materials by the microorganisms grown in the filter material surface (Vymazal and Kropfelova 2008; Rani et al. 2011).

Nitrate concentration ranges between 1.31 and 2.03 ppm in the influent wastewater and 1.13–1.73 ppm in the effluent with time-dependent averages of 1.77 ± 0.28 and 1.50 ± 0.23 at influent and effluent, respectively (Table 2). The system shows a 15.3% of nitrate removal efficiency. Nitrate removal is occurred due to biological processes such as denitrification which takes place under anoxic conditions. Anoxic conditions are expected to be present at wetlands except plant root zones and near the surface (Cooper et al. 1996).

Figure 4c illustrates the phosphate concentration variation during the experiment. The influent contains of 0.58 ± 0.11 ppm phosphate concentration which increases to 1.90 ± 1.3 ppm at the outflow as shown in Table 2. This is due to the various microbial activities within the reactor, and complex organic compounds are decomposed into simple forms which release phosphate to the system and limited fixing capacity by filter media and plant.

3.2 Performances of the up-Scaled ICFiWet System

Table 3 shows the preliminary data obtained from the up-scaled ICFiWet system by water quality analysis. While flowing through the three main compartments the

Table 3 Variation of time-dependent water quality parameters of up-scaled ICFiWet system (±standard deviation, $n = 18$ days)

Parameter	Inflow	S1	S2	S3	Outflow
pH	7.93 ± 0.09	7.81 ± 0.12	7.10 ± 0.16	7.06 ± 0.18	7.53 ± 0.16
EC (mS/cm)	3.12 ± 0.49	3.27 ± 0.36	2.00 ± 0.21	1.83 ± 0.30	2.37 ± 0.40
Salinity (‰)	1.72 ± 0.23	1.77 ± 0.16	1.07 ± 0.09	0.98 ± 0.15	1.27 ± 0.20
TS (g/l)	0.81 ± 0.21	0.82 ± 25	1.06 ± 0.35	1.01 ± 0.36	0.64 ± 0.28
TSS (g/l)	0.74 ± 0.36	0.64 ± 0.30	0.58 ± 0.26	0.40 ± 0.36	0.36 ± 0.23
BOD_5 (mg/l)	383 ± 23.5	215 ± 71.6	145 ± 44.7	64 ± 34.3	36 ± 12.0
Nitrate N (ppm)	0.19	–	–	–	3.34
Phosphate (ppm)	9.65	–	–	–	3.71

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BOD_5 of wastewater is reduced from 383 ± 23.5 mg/l to 36 ± 12.0 mg/l which is near to the standard water quality level for surface discharge.

The pH value shows a slight reduction while flowing through three consecutive compartments and it increases slightly at the outflow. However, the outflow pH is lower than the inflow pH and outflow pH is maintained at environmentally acceptable pH range to discharge to the natural environment. EC and Salinity show a similar variation like pH as shown in Table 3. Total solid content increases at S2 (charcoal granular media) region and S3 (wetland media) region due to mixing of filter material and other organic microorganism complexes with flowing wastewater. TSS is reduced gradually from inflow to the outflow through three consecutive treatment systems due to digestion of organic matter by microorganisms.

As this system was fed with a partially digested effluent from a public washroom system, the contribution of ammonia must be high; however, consequently converted to nitrate through nitrification according to data. The inflow of the up-scaled system contains high amount of phosphate (approximately 9.65 ppm) due to heavy usage of detergents for cleaning of public washroom system.

3.3 Conclusion and Recommendation

The pilot-scale Integrated Charcoal filter constructed wetland system shows 67% of BOD removal and the system reduced nitrate concentration by 15.3%. It was also revealed that the system decomposes the phosphorous complexes in influent leaving an increase in effluent phosphate, demonstrating that charcoal substrate and plants have limited capacity to fix phosphate, but recover nutrient for irrigation water use. Thus, it can be concluded that ICFiWet treated greywater can be used in irrigation and home gardening as it contains high amount of soluble phosphate; however, phosphorus adsorption substrate should be used in ICFiWet system if treated water to be discharged into natural waters. In perspective, Integrated Charcoal filter constructed wetland system can be used as a cost effective, efficient wastewater treatment system which can be constructed with locally available materials. High phosphate in outflow water gives an added advantage if the treated water to be used for irrigation/gardening, thus the system shall be coupled with home garden irrigation with treated water.

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A Consolidated Stratagem Towards Defenestration of Coke Oven Wastewater Using Various Advanced Techniques—An Analogous Study



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Abstract Coke oven wastewater produced from steel industry contains hazardous constituents like phenols, cyanides, ammonia, SCN^-, etc., which needs to be treated before expulsion to the environment. Therefore, pre-treatment of these large volume of wastewater is required for maintaining environmental standards. Simulated coke oven wastewater pertaining to effluent characteristics discharged by industrial sector was synthesized. Initially, treatment of wastewater was performed with ozone which was used in combination with activated carbon (AC) and H_2O_2 to increase the degradation of COD. The maximum degradation achieved in the O_3/AC was 76.8% while in with O_3/H_2O_2, the COD removal was 75.8%. The O_3/AC process was found more acceptable in terms of fast rate of COD degradation, time and economy efficiency suitable for handling large volume of wastewater. However, problems of sludge disposal and process hazards diverted the adoption towards microbial treatment using bacterial strain *Alcaligenes faecalis* JF339228 where phenol was degraded up to 80.88% in 76 h from the coke oven mixture. Due to the high toxicity level of coke oven wastewater, only biological treatment fails to treat them effectively. Combined microbial treatment as well as membrane-based separation process (thin-film composite—reverse osmosis membrane) for wastewater purification was also applied. Thin-film composite (TFC) RO membrane was used to treat this solution at pressure of 200 and 300 psi and at different pH of 5, 7 and 8, respectively. The maximum *quantity of* phenol *removed by TFC RO membrane* at 300 psi pressure and pH of 8

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was 76%. Thus, an amalgamated approach of bioremediation and reverse osmosis was sustainable.

Keywords Coke oven wastewater · Ozone · Activated carbon · Alcaligenes faecalis JF339228 · Reverse osmosis

1 Introduction

With the inflation in demand for coal and coke, consumption of freshwater generates coke oven wastewater which results from various onsite operations like quenching, washing, cooling, processing and purification. Other prominent sectors responsible for discharge include petroleum refineries, explosive and phenolic resin manufacturing units, paint and varnish industries, pharmaceuticals plants, textiles units, organic dye processes, metallurgical operations, etc. The complex nature contains a diverse range of hazardous compounds like phenol, ammonia, cyanide, thiocyanate, oil and grease, etc. However, the concentration varies with the classification of coal and the operating conditions involved in the process. These pollutants find their way to surface and groundwater or to the nearby river and the low-level areas. Particularly, phenolic compounds are easily transmitted to the aqueous ecosystem due to their high solubility and volatile nature (Pal and Kumar 2014).

Suitable treatment strategies for coke oven wastewater include coagulation and flocculation, chlorination, chemical oxidation, adsorption, biological degradation and membrane process. Physico–chemical methods have been widely applied due to their high proficiency but cost involvement and evolution of secondary toxicants or dioxins becomes problematic (Kim et al. 2007; Minhalma and de Pinho 2002; Papadimitriou et al. 2006; Staib and Lant 2007). Biological methods are more economical and environmental friendly but cannot be considered initially to handle such extreme levels of toxicity. Biological treatment has been adopted due to its efficacy of degrading phenol and various pollutants into non-toxic end products with reduced operating costs (Lin and Weber 1992). Bioremediation of phenol eventuates through cleavage in the benzene ring by the enzyme secreted by micro-organism. But these bacteria behave disparately in different phenol concentrations and other process conditions. *Pseudomonas sp.* emanates as one of most popularly applied bacteria for bio attenuation of phenol where the latter acts as carbon source and desired energy for cell growth and metabolism (Bandhyopadhyay et al. 2001). Separation using membranes has also emerged to be a potential technology but the drawbacks of fouling have restricted its applicability at preliminary stage. Both physico–chemical and biological treatment techniques are being applied in full-scale industrial use, with satisfactory reports of abatement. Current trends have diverted the treatment technologies to hybrid process like electro catalytic degradation with simultaneous adsorption, solvent extraction, chemical oxidation or irradiation which poses several problems like high process expenses and production of virulent by-products (Bodalo et al. 2008; Spiker et al. 1992). Chemical oxidation process using Fenton's reagent

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Table 1 Characteristic features of four different membranes (Bódalo et al. 2009; López-Muñoz et al. 2010; Kislik 2010)

Membrane process	Membrane pore size (μm)	Applied pressure (kg/cm^2)	Rejected solute size (Å)	Permeates through membrane	Suspended particles
MF	0.2–5	<2	>1000	Water dissolved solutes	Suspended particles
UF	0.02–0.2	1–5	50–1000	Water small molecules	Large molecules
NF	0.002–0.01	5–15	5–75	Water monovalent ions	Multivalent ions
RO	<0.002	20–75	1–10	Water	All solutes

also improves the biodegradability of the wastewater. But the major disadvantage of Fenton's reagent appears to be large consumption of $H_2O_2/FeSO_4$ and generation of sludge (Mandal et al. 2010). Agenson et al. (2003) utilized five different membranes for eradication of alkyl phenols (initial concentration-0.05 mg/L) and achieved removal of 90%. For absolute elimination of complex pollutants, simultaneous advanced oxidation and RO process can be applied. Though membranes have elevated rejecting salt levels, they often demonstrate low rejection for some organic molecules (Kucera 2010). Therefore, their pre-treatment with adsorption processes has been executed. The characteristics of the different membranes are expressed in Table 1.

Kumar et al. (2017) implemented ozone as the oxidizing agent where two sets of experiments—one in combination with activated carbon and the other purged with H_2O_2. In continuation to this study, the eradication of phenol in presence of cyanide and ammonia by an isolated bacterial strain *Alcaligenes faecalis* JF339228 from coke processing wastewater has been attempted in combination with TFC RO membrane.

2 Experimental

2.1 Materials

Phenol, ammonia and cyanide standards were purchased from Merck, India to prepare synthetic coke oven wastewater. For the membrane preparation polysulfone and dimethyl formamide (DMF) were procured. Trimesoyl chloride (TMC, Sigma Aldrich) and *m*-phenylenediamine (MPD, Sigma Alrich) are used for preparing TFC RO membrane. All the solvents and salts were purchased from SRL, India.

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2.2 Preparation of Coke Oven Wastewater

Feed solution was prepared containing 600 ppm of phenol, 200 ppm of ammonia and 60 ppm of cyanide. The pH of feed solution was 7. Cyanide and ammonia stock solutions were synthesized from 1000 ppm standard solution following serial dilution technique. Phenol stock solutions were developed by dissolving requisite amount in deionized water.

2.3 Microbial Culture and Acclimatization

Alcaligenes faecalis JF339228 was isolated from the drainage effluent of Durgapur steel plant and maintained on nutrient agar plates/slants at 30 °C and pH 7.4 sub-cultured every 30 days for further usage. Sterilization experiments were carried out with the autoclave. Acclimatisation of the microorganism was executed in minimal media to adapt to the toxic environment for essential utilisation. For *Alcaligenes faecalis* JF339228 temperature required for growth is 32–35 °C. The plates were kept in the incubation chamber for 10–12 h. Similar conditions were also maintained for liquid nutrient media. The bacterial growth curve was studied over 0–76 h. The collected samples were centrifuged at 10,000 rpm for 10 min to separate the cell pellet from the supernatant part. The cell pellet was used for measuring the OD in UV—visible spectrophotometer at wavelength 600 nm. Supernatant part was utilized for phenol measurement at 270 nm.

2.4 Synthesis of TFC RO Membrane

PSf casting solution contained dissolved PSf in DMF (15% w/v) at 70 °C. Semi-automated casting machine was used to prepare PSf membrane supported on nonwoven polyester fabric of thickness 100 μm by phase inversion method. The membrane thickness was 30–40 μ. Temperature and humidity of the casting assembly were maintained between 33–35 °C and 13–14%, respectively. PSf-supported fabric was exposed to a gelation bath at a temperature of 24–25 °C containing sodium lauryl sulphate (0.1% w/v) in aqueous DMF (4% w/v).

To prepare TFC membrane with MPD, the PSf support membrane adhered on glass slide was plunged into MPD (2%, w/v) aqueous solution comprizing of glycerol (0.5% w/v) and DMSO (1% w/v). After removing the soaked membrane, its surface was then rubbed to eliminate bubbles formed during the wetting process. Further the MPD-rinsed membrane was immersed into the TMC (0.125% w/v) solution in hexane that formed thin-film coating over the PSf layer. The final material was subjected to heat treatment at 70 °C for 2 min. The humidity and temperature were retained at 62 ± 7% and 30 ± 3 °C, respectively. The synthesized membrane was washed

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with water and preserved in aqueous glycerol (10% w/v) solution (Peterson 1993; Kesting 1985; Peterson and Cadotte 1990).

The feed solution was transmitted through these membranes for the removal of phenol from the coke oven mixture at applied pressure of 200 psi and 300 psi, respectively. Each experiment was conducted in triplicate. The permeate flux (J) was calculated as:

$$J = \frac{V}{At}$$

J denotes permeate flux (L m^{-2} h^{-1}) in permeate time, t (h), V signifies permeated water volume (litre, L), A stands for membrane cross-sectional area (m^2). The rejection (R %) was evaluated as:

$$R\% = \left(1 - \frac{C_p}{C_f}\right) \times 100$$

where C_f and C_p are the feed and permeate concentrations, respectively.

2.5 Anatomisation

Scanning electron microscopic analysis was performed with a LEO 1430 VP instrument. Atomic force microscopic measurements were executed in semi-contact mode using a Ntegra Aura, (made by Nt-MDT, Moscow) instrument, involving 'Nova' software for image perusal. Images were captured from different zones of the sample. ATR-IR spectroscopy was conducted using an Agilent Cary 600 series.

3 Results and Discussion

3.1 Treatment of Coke Oven Wastewater Using Ozone in Combination with Activated Carbon and Hydrogen Peroxide

The results obtained by Kumar et al. (2017) depicted that COD removal of 76.79 and 75.8% could be achieved by integrated systems like ozonation conjugated with adsorption by activated carbon and ozonation with hydrogen peroxide. Here, hydroxyl radicals serve a prominent role in eradication of pollutants. Though the cost of ozone consumption is a hindrance, but the catalytic property of activated carbon enhances COD removal. Similarly, incorporation of hydrogen peroxide with ozone

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augments hydroxyl radical generation which favours the removal of pollutants. The combination of Ozone–activated carbon was more preferable in terms of economy, effective COD removal and less consumption of ozone and reaction time.

3.2 *Microbial Treatment of Coke Oven Wastewater*

Figure 1 shows the growth of *Alcaligenes faecalis* JF339228 with time in presence and absence of coke oven wastewater along with degradation of phenol (mg/l). Results indicate that with time, the microbial biomass increases up to 60 h in the minimal nutrient media where glucose is the only carbon source. This amount was continuously reduced to replace the medium with phenol, cyanide and ammonia. When development of microorganisms occurs in presence of two substrates or carbon sources, it has a tendency to exhaust the more reliable one that can support maximum growth. Similar observations are noted in this study where the glucose is consumed prior to the phenol. Earlier, Mandal et al. (2013) have reported that about 2100 mg/l of phenol could be degraded completely in 90.8 h incubation time. This study reveals that 80.88% of phenol could be degraded in a time period of 76 h. The current work suggests that *Alcaligenes faecalis* JF339228 have the potency to degrade phenol under the inhibitory effect of ammonia and cyanide through the enzymatic activity phenol hydroxylase (Jiang et al. 2007).

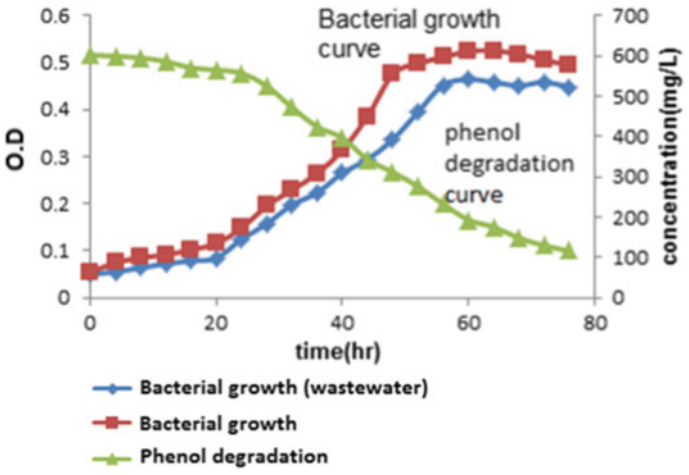

Fig. 1 Bacterial growth curve in absence and presence of coke oven wastewater and phenol degradation curve

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3.3 *Removal of Phenol from Coke Oven Wastewater by TFC RO Membrane*

Initially, the phenol rejection efficiency of the prepared TFC RO membrane was tested with 100, 200, 400 and 600 ppm phenol feed solutions. The pH of the solution was 7. Results depicted from Fig. 2 that the rejection of phenol was almost similar and did not vary marginally with feed concentration. The rejection of phenol was much lower than NaCl rejection capacity of the membrane. Since, TFC RO membrane is negatively charged in nature and the phenol is slightly acidic, the rejection of phenol is governed predominantly by the size exclusion and not by electrostatic repulsion (Srinivasan et al. 2009). Observations also reveal that the concentration of phenol increases with the decrease in permeate flux. At pH 10, the rejection of phenol is higher due to the dissociation nature of phenol into phenolate ions at pH > 8.

From Fig. 3, at an applied pressure of 200 psi, the phenol rejection and the permeate flux by the membrane were lower than 300 psi. The rejection of phenol and flux at pH 8 were higher than that of feed solution of pH 5 and pH 7. Arsuaga et al. (2008) performed experiments with a similar thin-film composite nano-filtration membrane (NF-90) with the phenol feed concentration in the range of 100–500 mg/l. The pH was varied between 2.8 and 5.3 and temperature 20–41 °C. Results revealed that initial organic concentration and operating pressure have a considerable effect on

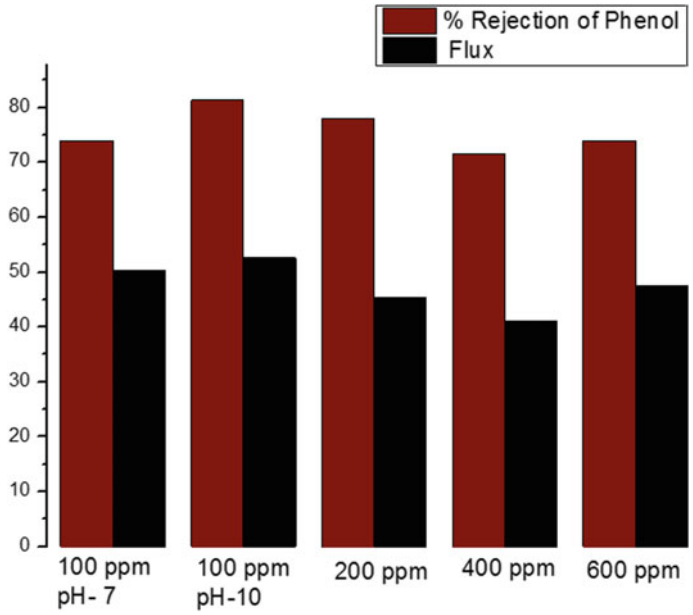

Fig. 2 Percentage rejection of phenol from coke oven wastewater and flux at different concentration

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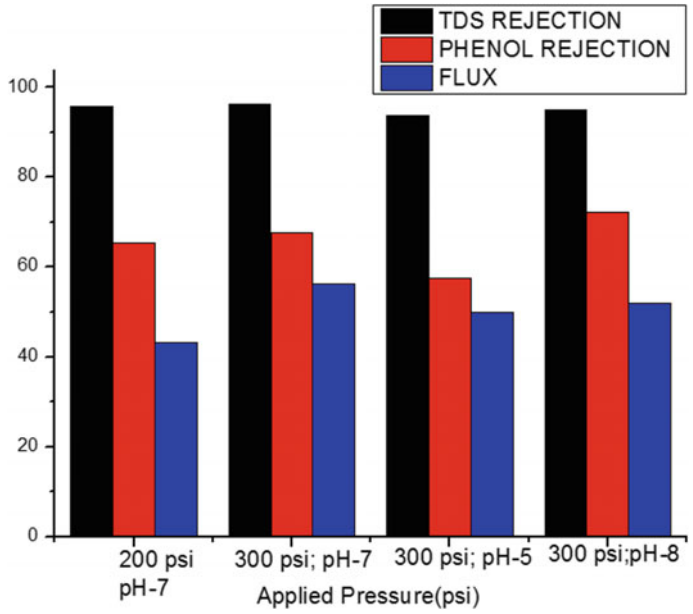

Fig. 3 Rejection of phenol and total dissolved solids at different applied pressure

the permeate flux. On enhancing pressure and deflating organic concentration, the permeate flux increases. However, temperature had no significant influence, but pH has a profound influence on the phenol removal.

3.4 Characterization of TFC RO Membrane

As reported by Jewrajka et al. (2013), TFC RO membrane was synthesized by interfacial polymerization as described in the experimental section. The membrane consists of a typical network-like structure of polyamide which is well reported in the literature with ridges and valleys associated with aromatic C=C stretching of PSf support.

4 Conclusion

Synthetically prepared coke oven wastewater was treated by microbial and TFC RO membrane which was compared to the work reported from ozone–activated carbon treatment. The objective was to remove phenol effectively under the hindering effect of cyanide and ammonia. With the help of coke oven isolated bacterial strain *Alcaligenes faecalis* JF339228, it was found that up to 80.88% of phenol was removed

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which proved its potency as phenol degrader. On the other hand, with the help of TFC RO membrane at 300 psi and pH 8, phenol can be removed up to 75.25%. The rejection of total dissolved solids was found to be 96.14%. The combination of microbial and TFC RO membrane process will be a novel strategy and greater phenolic removal can be achieved by the combination of these two treatment processes. It may be concluded that only RO process is not as efficient and a combination of the above processes is necessary to accomplish desired abatement.

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Studies on Lead Removal from Simulated Wastewater in Packed Bed Bioreactor Using Attached Growth Technique



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Abstract The present study deals with removal of lead from simulated wastewater using a continuous packed bed bioreactor packed with lead-resistant *Acinetobacter sp 158* immobilized on coconut coir chips. *Acinetobacter sp 158* was isolated from battery industry effluent mud, and biocatalysts were made by using attached growth technique. In order to investigate reactor performance, a set of programmed experiments was performed. The potential of bioconversion of lead through immobilized cell was studied by changing initial substrate concentration along with flow rate with an intention to predict removal of lead through judicious modeling and simulation exercise.

Keywords Bioremediation of lead · Immobilized lead-resistant strain · Biodegradable packing matrix · Packed bed bioreactor

1 Introduction

Amongst the various heavy metals, lead is highly carcinogenic and mutagenic in nature. Random discharge of such hazardous element lead and its compounds as industrial waste from a number of industries, viz battery industry, painting industry, coal-based powder generation industry, mining industry, etc., into the environment (Murthy et al. 2012; Samanta et al. 2012; Vesper et al. 1996; Forstner and Wittmann 2012; Adriano 2001). It is needless to mention that mixing of this heavy metal ions into soil and water beyond its threshold hazardous limit is a potential threat to the entire ecosystem. In order to mitigate lead pollution, chemical industries have been forced to follow lead-containing waste discharge limit set up by Environmental Protective Agencies.

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The main constrain arises for abating lead contamination is globally applied chemical-based conventional waste treatments reduce the level of lead up to a definite extent which is beyond that the stipulated one. In order to bring down the amount of lead in industrial waste, industry is highly reluctant to adopt again such expensive chemical treatment techniques which make the end product costly. Bioremediation is the only possible route to bring down the amount of lead of industrial effluent near about the threshold value set by Environment Protecting Authorities in developing countries. In order to achieve the permissible limit, conventional waste treatment techniques should be tied up with biological remediation pathways. Although experimental investigation on small-scale batch mode study of lead bioremediation was reported earlier (Chakraborty et al. 2013; Rhee et al. 2014; Li et al. 2016; Kalita and Joshi 2017), a proper programmed and systematic continuous mode operation is needed from bioprocess point of view for successful application of the technology on an industrial scale.

2 Materials and Methods

2.1 Chemicals

Tryptone–Glucose–Yeast Extract Broth (HIMEDIA, India), Lead nitrate [$Pb(NO_3)_2$] (SRL, India), 99.9% of Ethanol (MERCK, India), and distilled water were used for this investigation.

2.2 Preparation of Growth Media

0.1 kg/m^3 lead-incorporated tryptone–glucose–yeast extract broth was used as growth media.

2.3 Preparation Simulated Wastewater

In the present experiment, a stock solution of lead nitrate solution containing kg/m^3 of lead was prepared by adding metered quantity of lead nitrate in double distilled water. In order to make simulated wastewater of definite concentration, stock solution was diluted according to the need.

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Fig. 1 Raw coconut chips

2.4 Preparation of Packing Matrix

In the present investigation, outer shell of coconut was collected from local market and cut into small chips (shown in Fig. 1). Coconut chips were washed properly and sundried.

2.5 Microorganism

Previously, isolated lead-resistant bacterium *Acinetobacter sp 158* (Bose et al. 2017) was used in the present investigation.

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2.6 Immobilization of the Whole Cell on the Matrix and Its Maintenance

In order to immobilize the whole cell on coconut chips following attached growth technique, 200 ml of culture media and 22.739 gm of coconut chips were introduced in each 500 ml conical flask. These two flasks were autoclaved at 0.2 MPa at 121 °C for 15 min. In order to prepare selective media containing lead metered quantity of UV sterilized lead solution was added into each flask. After that, 20 ml broth culture of lead-resistant *Acinetobacter sp158* was inoculated into each flask in a laminar flow chamber. The open ends of both the flasks were plugged with sterile cotton and placed on rotary shakers by maintaining shaking speed 80 rpm at 37 °C for 48 h. When attached growth was visually appeared, the biocatalyst was loaded into sterile glass column. In order to keep microorganism alive on matrix during shut-down period, the packing portion was submerged in fresh sterile lead supplemented TGY broth.

2.7 Packed Bed Bioreactor Design

A packed bed bioreactor made up of BOROSIL glass column of 615 mm length and 38.8 mm inside diameter was used to treat lead-containing simulated wastewater. In order to support the packing materials, a retaining screen with perforation of 1 mm diameter was inserted at the bottom of the column. In order to collect sample solution from axial direction, the reactor was equipped with three outlet nozzles present 70 mm, 150 mm, and 330 mm, respectively, from the bottom of the column. Simulated wastewater was sent into the packed bed section from the bottom of the column with the help of a peristaltic pump in a predetermined flow rate. In order to maintain aerobic condition, sterile air was sparged into column through air filter after each run. Inlet flow rate of simulated wastewater was measured by rotameter. In order to see overall pressure drop, a U-tube manometer was connected with the packed column. The schematic diagram of bioreactor is shown in Fig. 2. In order to understand the performance of bioreactor, three different operating parameters, viz inlet concentrations of lead (0.05–0.2 kg/m^3), superficial velocities (1.43312–4.29936 m/h), and bed heights (0.07–0.33 m) were considered. After treatment, amount of lead present in simulated wastewater collected from outlet probes was measured using atomic absorption spectrophotometer (Perkin Elmer, Germany).

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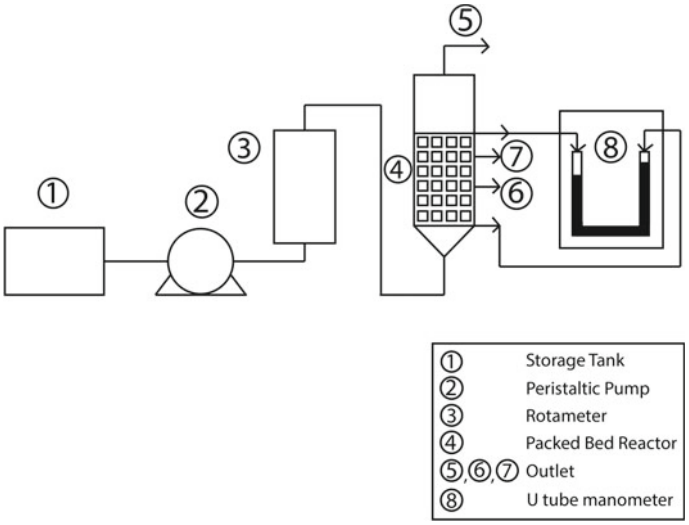

Fig. 2 Schematic diagram of bioreactor setup

3 Results and Discussions

3.1 Analysis of Performance of Data

In order to explain performance of packed bed bioreactor, a family of curves (Fig. 3a–c) has been constructed using experimental data to determine the lead removal capability of the continuous bioreactor. Figure 3a shows a plot of variation of substrate concentration (S) in axial direction (B) using initial substrate concentration as parameter. It is apparent from those Fig. 3a–c that for each substrate concentration, higher the superficial flow rate, lower is the removal of lead. This is an expected phenomenon, higher superficial velocity gives lower residence time resulting in lower removal of lead, and consequently, lower flow rate gives long residence time to convert higher amount of lead. Another set of plot was drawn (Fig. 4a–c) to understand the relation between substrate concentrations and bed height with superficial velocity as parameter. It is revealed that conversion is gradually increased with the increase of initial substrate concentration for a fixed flow rate due to more availability of electron donor in the vicinity of immobilized cells. In the present set of experiment, the maximum removal of lead was achieved to the tune of 32.4% under the operating condition of 0.2 kg/m^3 initial lead concentration and 1.43312 m/h of superficial substrate flow rate.

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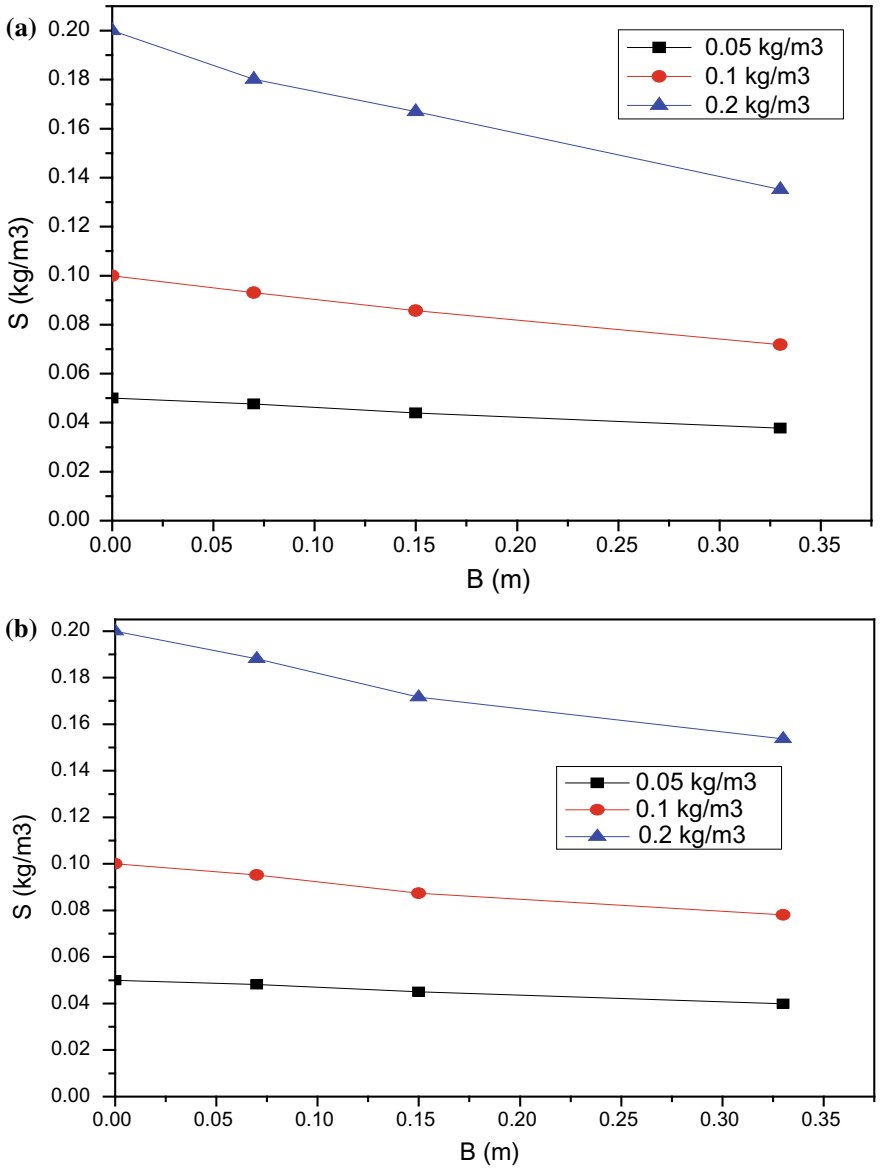

Fig. 3 Variation of substrate concentrations in axial direction using initial substrate concentration as parameter. **a** shows plot for substrate concentration 0.05 kg/m^3, **b** shows plot for substrate concentration 0.1 kg/m^3, and **c** represents plot for substrate concentration 0.2 kg/m^3

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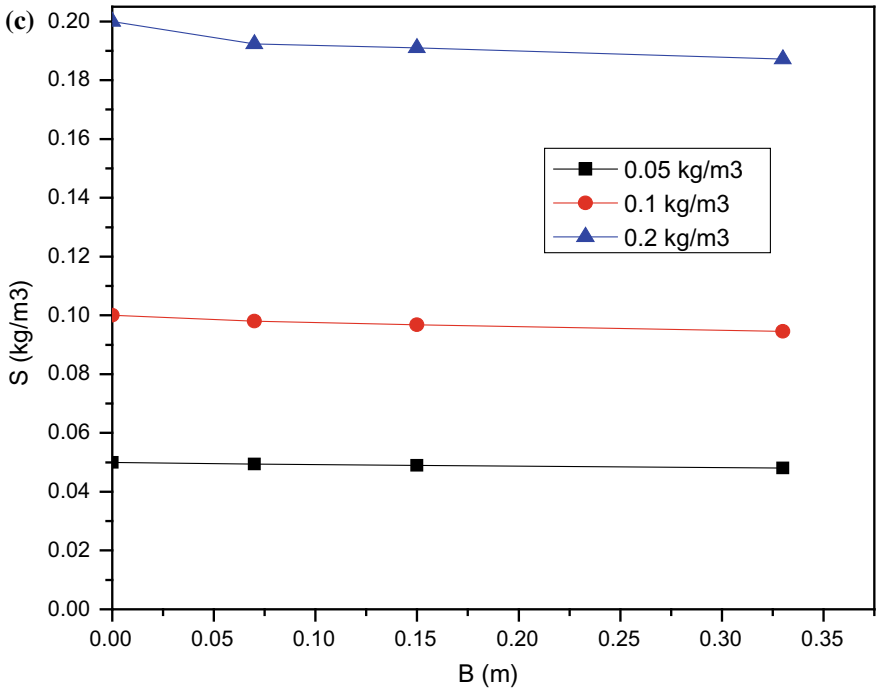

Fig. 3 (continued)

4 Conclusions

The present investigation reveals successful application of *Acinetobacter sp 158* immobilized form on coconut chips as biocatalyst in a packed bed bioreactor to treat lead-containing wastewater in continuous mode. Easily available coconut chip can be applied as packing matrix to make the process economically viable. The promising experimental results are an indication of carrying out an extensive research using broad spectrum of operating variables.

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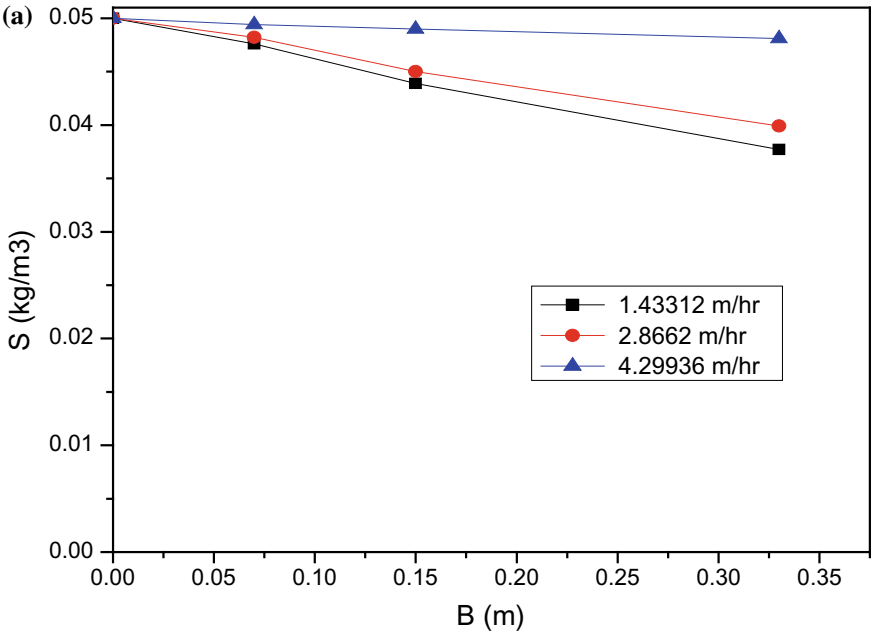

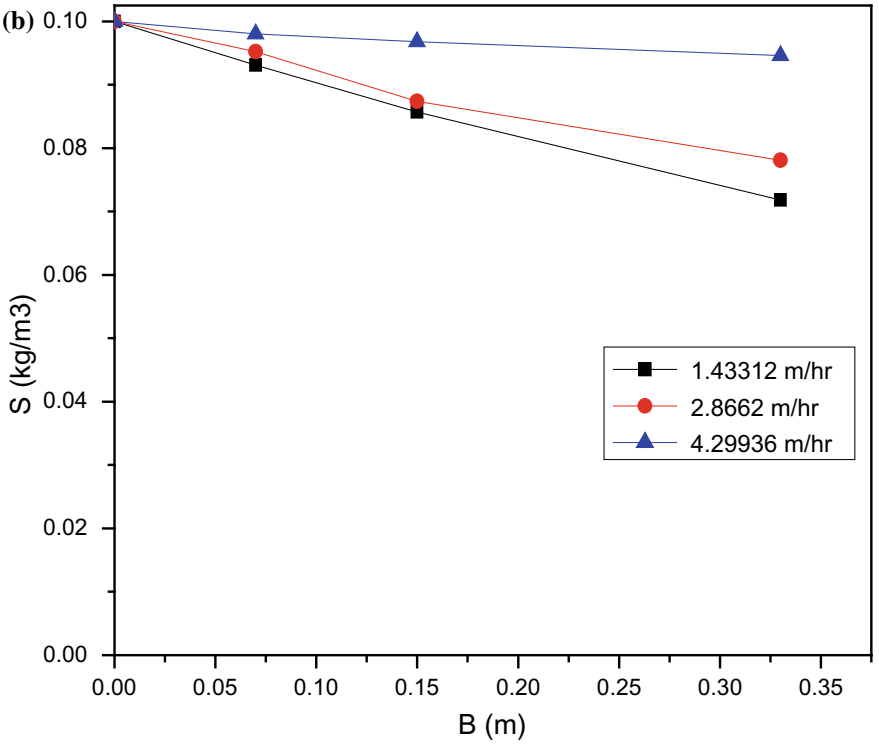

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◀**Fig. 4** Variation of substrate concentrations in axial direction using flow rate as parameter. **a** shows plot for flow rate 1.43312 m/h, **b** shows plot for flow rate 2.8662 m/h, and **c** represents plot for flow rate 4.29936 m/h

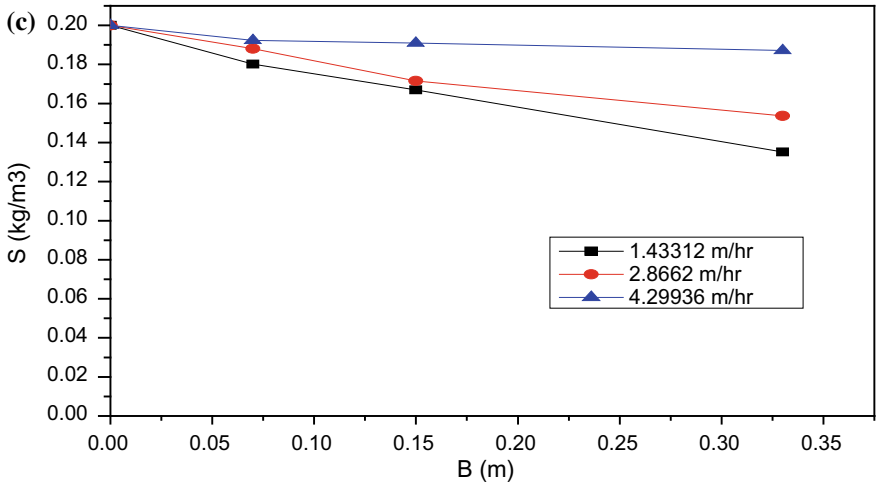

Fig. 4 (continued)

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Sustainable Growth and Survival of *Litopenaeus Vannamei* Through Wastewater Recycling



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Abstract Nowadays, aquaculture activities play a major role in increasing the organic waste and toxic compound in the aquatic water bodies. Along with the development of aquaculture, there is an ever-increasing aquaculture waste both on productivity inside the aquaculture system and on the ambient aquatic ecosystem. Therefore, it is apparent that appropriate wastewater recycling processes are needed for sustainable aquaculture development. Hence, the best environmentally acceptable "biofloc technology" (BFT) has been developed. The present study aims the application of BFT to recycle the wastewater nutrients. Pacific white shrimp, Litopenaeus vannamei, was selected to be culture. Three cement tanks C_1, C_2, and C_3 with a stocking density of 120 PL/m^2 were assigned for the study. C_1 is taken as control and C_2, C_3 as test. In BFT, excess of nutrients in aquaculture systems is converted into microbial biomass, which can be consumed by the cultured animals as a food source and the remaining are used for agriculture purpose. This technology has also the capacity to control harmful pathogens in aquaculture. The microorganisms of biofloc successfully converted the toxic ammonia and nitrite into nutritious diet and maintained the water quality in the safety levels for the shrimp. This study has been made to summarize the features and management aspects of the environmental friendly BFT to achieve sustainable aquaculture.

Keywords Biofloc technology · Sustainable aquaculture · Recycling · Wastewater · International society of waste management · Air and water

1 Introduction

Globally, India occupies the second position after China, with sharing 10.0% of world's aquaculture production (FAO 2016). The vast resources in terms of water bodies and species of fish and shellfish in different regions of the country provide a wide array of culture systems and practices. The shrimp, *Litopenaeus vannamei,* is the major contributor in the aquaculture production. However, intensification of

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the aquaculture activities generates an immense amount of excess organic pollutants that are likely to cause acute toxic effects and long-run environmental risks (Piedrahita 2003). It is reported that effluents released from the aqua farms contain more pollutants than the other industries. A lot of chaos from the public and the environmentalists is due to the discharge of untreated aqua wastages into natural water bodies. Discharge of this untreated water is contaminating the natural water bodies causing outbreak of diseases, imbalancing the biodiversity and ecosystem. To overcome all these challenges and to conserve the ecological sustainability, biofloc technology (BFT) has been developed. Because of economical, environmental, and marketing advantages over the conventional system, BFT has been implemented successfully in shrimp farming. Compared to conventional aquaculture techniques, BFT provides more economical alternative and sustainable technique in terms of minimal water exchange and reduced feed input making it a low-cost sustainable technology for sustainable development (Avnimelech and Kochba 2009; De Schryver et al. 2008). BFT involves the manipulation of C/N ratio to convert toxic nitrogenous wastes into the useful microbial protein and helps in improving water quality under a minimal/zero water exchange system (Ahmad et al. 2017). Moreover, BFT offers a sustainable aquaculture tool by simultaneously addressing its environmental, social, and economical issues. In this context, BFT can also be used in the specific case of maintaining appropriate water quality, and thus, it can reduce the pollution of the pond water. With these positive effects, the present study was undertaken to evaluate the growth and survival of *L. Vannamei* in BFT.

2 Materials and Methods

2.1 Tank and Floc Preparation

Specific-pathogen-free (SPF) seed, *L. vannamei* (PL 9), obtained from a local hatchery. The PL was carried in oxygenated double-layered polythene bags to the laboratory in specific fish transportation tanks. Before releasing the PL, all the tanks were cleaned and disinfected using bleaching powder and dried for 2 days. The biofloc was prepared as per the protocol described by Avnimelech (2012). In brief, on the first day ammonium chloride was added to initiate nitrogen source in the system. On third and fifth day carbon sources were added and on day seven double the quantity of carbon source was added. Due to the addition of carbon and nitrogen source, the color of the water changed to light brown indicating the formation of floc. After tank preparation on the day nine, the PL was brought to farm side and were treated with potassium permanganate, and tank water was added slowly into the seed bags to adjust the salinity and pH; subsequently, the PL was released slowly into the tanks C_1, C_2, C_3 (each with 54.6 m^2) at a stocking density of 120/m^2. Among three tanks (C_1, C_2, C_3), C_1 was taken as control, i.e., without application of biofloc, and C_2, C_3 were taken as test which consist of biofloc. All the tanks were supplied with aeration

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for sufficient supply of oxygen which is necessary for the formation of biofloc and also for shrimp.

2.2 Analysis of Water Quality Parameters

Water samples for the analysis were carried throughout the study period. Surface water temperature was recorded between 6:00 and 9:00 during the morning hours and between 5:00 and 6:00 during the evening hours with the help of Mercury thermometer. Samples were collected in separate reagent bottles and analyzed by standard methods of (APHA 2005). pH of the water was measured by using the laboratory model ELICO pH meter. Transparency of the water column was assessed with the help of Secchi disk. In case of dissolved oxygen, the collected water samples were fixed with modified/Winkler's titration method (APHA 2005). The cones Imhoff were used to measure the quantity of biofloc which have marked graduations on the outside that can be used to measure the volume of solids that settle from 1 L of system water.

2.3 Microbiological Analysis of Water

Microbiological analysis of water was done regularly thrice a week. To observe the Vibrio count, spread plate technique was used. One ml of cultured water was serial diluted and 10^8, 10^9 ml of serially diluted culture water was spreaded on Thiosulfate citrate bile salts sucrose (TCBS) agar and incubated overnight at 37 °C to find out the presence of *Vibrio* spp.

2.4 Feed Management

L. vannamei fed with commercial diet, Blanca feed pellets (CP Aquaculture, India private limited) was used for four times daily at 6 am, 10 am, 2 pm, 6 pm. The feed quantity was estimated depending on the floc volume. No water exchange was done during the culture period except addition of water to refill the water levels after siphoning out the wastes. Sludge was removed regularly in order to control Nitrite and TSS in the system.

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3 Results and Discussions

Water quality parameters, i.e., salinity, temperature, pH, dissolved oxygen, and transparency ranges, are presented in Table 1. Dissolved oxygen (DO) concentration and temperature were similar between treatments throughout the trial. The oxygen dissolved in the system is an important factor not only for the respiration of aquatic organisms but also to maintain favorable chemical and hygienic environment. Muthu (1980) stated that the DO should not be lower than 3.5 ml/l in shrimp culture pond. But in the biofloc system, the aeration should be more than 5.0 mg/l (Avnimelech 2012). In the present investigation, the dissolved oxygen content was ranged from 6.0 to 7.0 mg/l in the system. Continuous aeration was done during the culture period, and therefore, the oxygen level exceeds the limit. The temperature is an ecological factor which influences the hydrological parameters, which in turn influences the metabolism, growth, and other biochemical processes. The optimum range for warm water species is 24–30 °C (Ramanathan et al. 2005). In the present study, the water temperature range varied from 27 to 29 °C. Shrimps are poikilothermic that can modify their body temperature to the environment in normal conditions. The continuous aeration will circulate the equal temperature in the biofloc system. pH is one of the important environmental parameters which decides physiological process of shrimps. The optimum range of pH is from 6.8 to 8.7 and should be maintained for maximum growth and production (Ramanathan et al. 2005). The best condition is from 7.8 to 8.5. If pH changes significantly, it makes shrimp shocked, weakened, and stops eating. If high or low pH extends for a long time, it will make shrimp grow slowly and susceptible to diseases. In the present study, the pH concentration was ranged from 8.0 to 8.5 which is the best condition for shrimp growth. Salinity is the most important factor influencing many functional responses of the organism such as metabolism, growth, migration, osmotic behavior, reproduction. Sudden fluctuation in salinity will affect the osmoregulatory functions of growing organism and lead to mortality. In the present study, the salinity was maintained at 6 to 7 ppt. During the culture period, the salinity was maintained at 6 ppt, but sometimes, it reached 7 ppt. The transparency of water was 15 cm.

The values of ammonia, nitrite, and nitrate were presented in Fig. 1. The results revealed that the ammonia was 0.05 mg/l in the system initially due to the addition of ammonium chloride. After that, it increased to 0.08 mg/l and then gradually decreased. The heterotrophic bacteria present in the biofloc can absorb ammonia 40

Table 1 Water quality parameters

S. no.	Parameters	Range
1	Salinity (ppt)	6–7
2	Temperature (°C)	27–29
3	pH	8.0–8.5
4	DO (mg/)	6.0–7.0
5	Transparency (cm)	15–16

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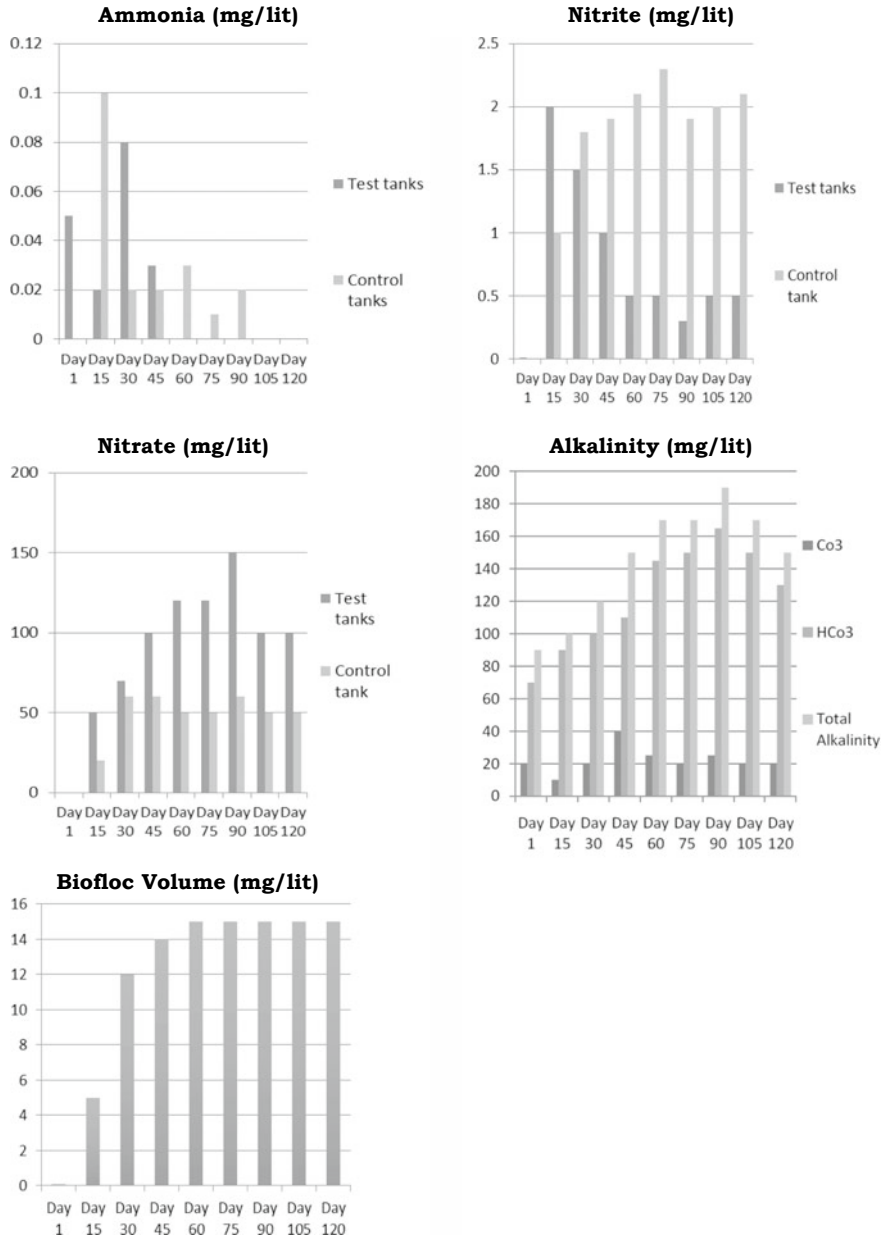

Fig. 1 Water quality parameters

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times faster than nitrifying bacteria. Thus, biofloc has the capability of balancing ammonia concentration in the culture system (Ebeling et al. 2006). In addition, De Schryver and Verstraete (2009) stated that biofloc grown in the bioreactor can convert 98% ammonia into nitrate at a concentration of 110 mg L^{-1} day^{-1}. The ability of heterotrophic bacteria to absorb the ammonia is influenced by the ratio of carbon and nitrogen (C/N ratio) in water where the ammonia will be absorbed quickly when C/N was higher (Schneider et al. 2006). The nitrite level was 0.01 mg/l, and then it increased to 2.0 mg/l after 15 days of culture. By increasing the carbon source, removing sludge, and decreasing the feed quantity controlled the nitrite level to 0.5 mg/l. The low value of nitrite in the biofloc system is probably due to the conversion of ammonia to nitrite by heterotrophic bacteria which in turn utilized by micro-algae for growth (Avnimelech 1999; Ebeling et al. 2006). This is an indication that the nitrification process occurred in the culture medium (Stickney 2005). Nitrate, which is the final product from the nitrification of ammonia, is the least harmful nitrogenous compound for shrimp (Van Wyk and Scarpa 1999). In the present study, nitrate ranged between 100 and 150 mg/l. Lower nitrite and higher nitrate concentrations were recorded, due to the formation of biofloc. The total hardness of the water was 1800–1850 mg/l. When alkalinities are maintained from 40 to 160 mg L^{-1} in the BFT system, no significant effect on the TSS, ammonium, nitrites, and nitrates has been determined (Piérri 2012). pH increases when the alkalinity increases above 160 mg L^{-1}, as well as the tendency of increase of heterotrophic and ammonium oxidant bacteria increases with a decrease in nitrites oxidant bacteria (Piérri 2012). Thrice during the culture period alkalinity was reduced to 100 mg/l, in order to increase it sodium bicarbonate was added to maintain the C:N ratio at 15:1. Calcium and magnesium were maintained at a rate of 1:2.5. No H_2S was observed during the entire culture period. In the initial days, the color of the water was light brown and gradually changed to brown color and then to green color. In the day one, the floc volume was 0.1 ml/l, and it increased to 15 ml/l. The quantity and quality of floc were monitored regularly.

The floc volume was presented in Fig. 2. The microscopic observation of floc shows rotifers, copepods, algae, bacteria, etc. But sometimes protozoans like zoothamnium and vorticella were also observed in the floc. Few yellow colonies of Vibrio spp were seen in microbiological analysis; however, there is no disease outbreak throughout the culture period. In aquaculture, the principal source of waste is ultimately the manufactured feeds that are necessary to increase production beyond natural levels (Iwama 1991). According to Avnimelech (2012), reducing the feed quantity and increasing the floc volume reduces the aquaculture waste and also the feed cost. Hence, the adoption of this technology increases the efficiency of feed utilization, because organic and inorganic metabolites, as well as unused or partially used food, are recycled by microorganisms into microalgae and bacterial biomass, which tend to coalesce into flocculated material (bioflocs).

In the present study, biofloc tanks achieved a survival rate of 77% and the growth rate was 27 g with a total production of 135 kgs. Large amounts of manure are required to meet the nitrogen requirements of agricultural crops. For regional agricultural field crops, aquaculture manure is also used as principal nitrogen source for better

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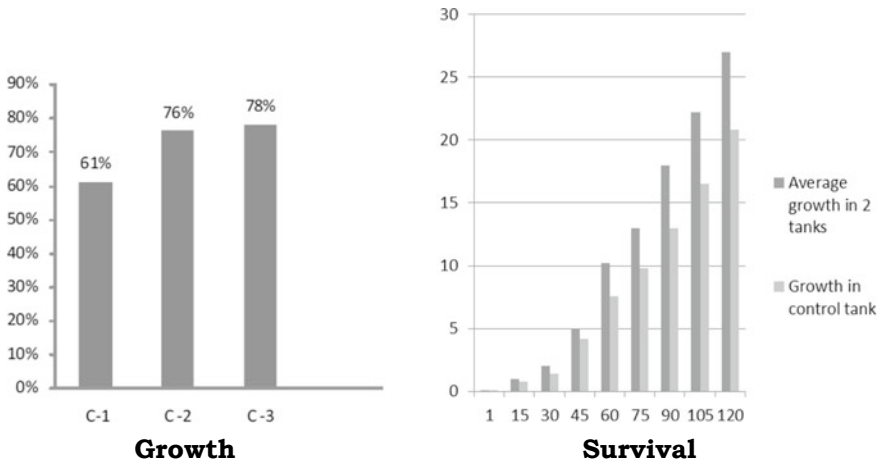

Fig. 2 Growth and survival

effects. On-site, smaller-scale agricultural ventures or non-commercial gardening seem more appropriately scaled for using aquaculture wastes (Yeo et al. 2004). The post-harvested water was used to grow vegetables present near the pond or else the same water can be reused to culture the next crop.

4 Conclusion

Biofloc technology is an environmental and sustainable technology used in aquaculture to maintain water quality through converting nitrogenous waste into bacterial proteinaceous biomass after the addition of carbohydrate sources and also can be subsequently consumed by the cultivated aquatic organisms. In the present study, the biofloc system can maintain the good water quality parameters and recycles the wastewater in shrimp culture. Hence, the BFT is an eco-friendly approach reducing pollution; as there is zero or minimal water exchange to eradicate the environmental pollution and economic problems associated with aquaculture.

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Reuse of Washing Machine Effluent Using Constructed Wetland: The Circular Economy of Sanitation

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Abstract Currently, due to the practice of traditional linear economic model, water resources are under extreme pressure. The lack of technically efficient and economically feasible solutions for water and wastewater treatment and poor management of water assets are responsible for the lack of access to safe water in both rural and peri-urban communities. The present study attempts to achieve the fundamental principles of circular economy which consists of regeneration and restoration by treating the laundry wastewater using constructed wetland and its reuse for various other purposes. The composition of detergents used in a domestic washing machine constitutes of wide range of chemicals. Consequently, the produced laundry wastewater contains varieties of compounds including surfactants, softeners, alkalis, bleach, hydro-tropes, xenobiotic organics, sodium, phosphorus, nitrogen and micro fabrics from clothing. Based on the calculation of water balance on a domestic washing machine, the water consumption has been approximated to be 5000 MLD, while consumption of detergents was estimated to be 3800 TPD (equivalent to 3000 TPD of COD) approximately. Evidently, the treatment of laundry wastewater is the need of the hour. At IIT Bombay, the constructed wetland technology having the horizontal subsurface system entitled 'CW4Reuse' has been developed for treatment and management of effluents. In the present study, 'CW4Reuse' has been utilized for treatment of laundry wastewater from a family consisting of five members (approximately 75 L/d). The wetland bed has a plan area of 1 m^2 and a depth of 0.5 m. *Canna Indica* (family: *Cannaceae*) has been used as the vegetation system for effluent treatment. The qualitative and quantitative analysis of the laundry wastewater showed a significant removal of BOD, COD, TSS, VOC_S heavy metals, nitrogen, phosphorus and pathogens (proxy: MPN). The treated laundry effluent can be reused for gardening, vehicles cleaning and flushing.

Keywords Laundry wastewater treatment · Water reuse · Xenobiotic organics · VOC_s · Constructed wetlands · Surfactants · Detergents

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1 Introduction

Water is a limited natural resource and is essential for the survival of all elements of earth's ecosystem. It plays a crucial role in supporting the day-to-day demands of urban, industrial and agricultural sector and thus holds a special position in a nation's economic growth. This wonder liquid also serves as the basic building block of sustainable development and contributes to the socio-economic growth, healthy environment and survival of living beings. However, in the present situation, due to the ever-growing population, industrialization and other economic actions, the demand as well as usage of freshwater supply has increased many folds. Consequently, it has laid the natural water resources under extreme pressure. For instance, it was found that the consumption of freshwater due to domestic activities contributes up to 70–80% of the total volume of wastewater, and out of domestic usage of freshwater as mentioned above, laundry wastewater constitutes up to 33% (Asano 2002; Harrison 2007; Mohamed et al. 2014a, b).

In the twenty-first century, the issues associated with the water shortage and freshwater supply are of increasing concern worldwide (Fragkou and McEvoy 2016; Hoekstra 2016; dos Santos et al. 2018). Furthermore, the higher carbon and energy footprints as well as high operation and maintenance cost associated with centralized wastewater treatment plants pose a significant challenge towards wastewater reclamation and reuse (Martínez-Huitle et al. 2015). In order to deal with the current situation of water shortage, there is an urgent need of sustainable and strategic planning where the wastewater would be considered as the valuable economic good rather than a waste product. The goals of sustainability can only be achieved by implementing the aforementioned concept of waste to wealth rather than following the traditional linear economic model.

In such scenario, the development of decentralized wastewater treatment systems would be one of the best possible solutions which could be implemented at a small scale with a closed loop of wastewater recycling and reuse facilities (Piratla and Goverdhanam 2015; Capodaglio 2017; Wael et al. 2017). It is a pressing need of today to develop efficient water and wastewater treatment systems that are capable of recycling and reuse of treated effluents (Mekala et al. 2007; Garcia and Pargament 2015). Additionally, the treatment system should be environment friendly, easy to use and should involve low operation and maintenance cost.

In the context of freshwater consumption in domestic activities, washing machines occupy the foremost position. It was estimated that approximately six litres of water are consumed per kg of laundry (dos Santos et al. 2018). It is worthy to note that in the past few decades, the concept of wastewater reclamation and reuse has gained significant attention within the scientific communities, and efforts are being made to recycle and reuse the large volume of effluents coming from various industries such as pharmaceuticals, dairy, leather, agricultural sector and textile industries (Szpyrkowicz et al. 2005; Özcan et al. 2008; Babu et al. 2009; Hajjaji et al. 2013; Rodrigo et al. 2014; Ganiyu et al. 2015; Elabbas et al. 2016; Benazzi et al. 2016; Solano et al. 2013). But, the treatment, recycle and reuse systems dedicated to the laundry effluents are

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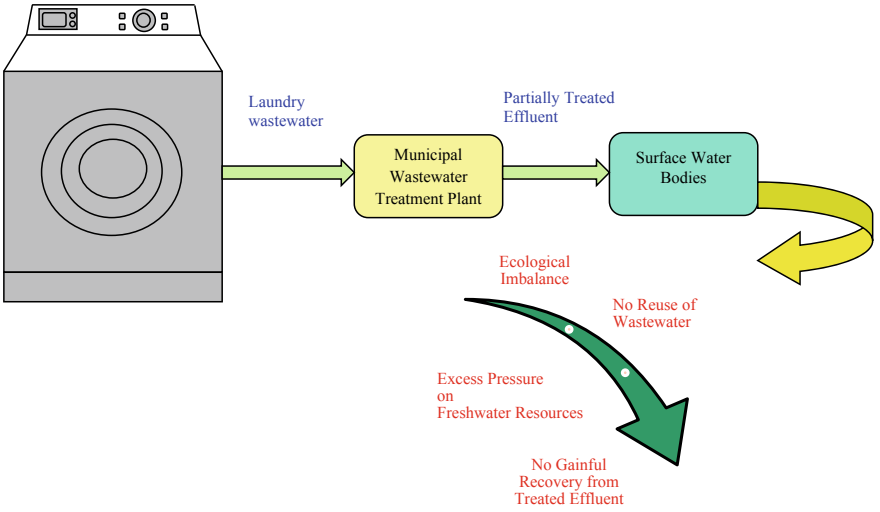

Fig. 1 Current Indian scenario of laundry wastewater

still in the nascent stage, and most often, they are discharged into municipal sewer lines without any prior treatment (Sheth et al. 2017; Durán et al. 2018). In this modern era, nearly every household and industry uses washing machines for cleaning and washing of textiles and in this process generates a huge volume of wastewater which often gets discharged into sewer pipelines despite of having diverse composition which needs special attention before treatment and disposal (Braga and Varesche 2014) Fig. 1 shows the current Indian scenario of laundry wastewater treatment.

Various treatment techniques have been used for treatment of laundry wastewater consisting of physico-chemical methods, oxidation techniques, biological (both aerobic and anaerobic) and integrated methods (Jardak et al. 2016). However, most often such treatment systems are accompanied with high operation and maintenance cost, higher carbon footprint, skilled labours and are energy intensive in nature. Thus, it is imperative to look for sustainable laundry wastewater treatment technologies that would involve low-cost infrastructure and would be easy to operate and maintain without compromising with the water quality. The decentralized wastewater treatment technologies consisting of on-site treatment facilities or sequential treatment systems could be a viable approach for dealing with the heavily loaded washing machine effluents. The natural eco-centric treatment technologies such as constructed wetlands (CWS) would be one of promising solutions for treating the laundry wastewater and the further reuse of treated effluents for high-end purposes.

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2 Characterization of Laundry Wastewater and Its Environmental Implications

The laundry wastewater consists of miscellaneous composition and primarily includes surfactants, organic dyes, nitrogen, phosphorus, alkalis, bleach, fillers, suspended solids, micro-fibres, pathogens, micro-plastics and xenobiotic compounds which pose a serious threat to the environment as well as to the living organisms present in the receiving water bodies (Howard et al. 2005; Goel and Kaur 2012; Hidalgo-Ruz et al. 2012; Tripathi et al. 2013; Zavala et al. 2014; dos Santos et al. 2018; Durán et al. 2018). However, the main ingredients of laundry wastewater consist of surfactants, bleach, additives and softeners (Jakobi and Lohr 1987; Abu-Zreig et al. 2003). The quality of laundry effluents depends upon the type of laundered material and the cleaning agents used during washing (Bering et al. 2018). The use of powder detergents often results into significantly higher pH and an elevated concentration of salts like carbonates, bicarbonates, sulphates and chlorides in comparison with liquid detergents (Goel and Kaur 2012). The chemical composition of powder detergent particularly the fillers and builders used during the preparation process might be responsible for such higher pH and concentration of various salts as mentioned above. In a study conducted by Patterson (2004), it was reported that due to the higher solubility of sodium salts and cost-effectiveness, a variety of sodium salts are used in laundry detergents. Some of them include sodium sulphate, sodium tripolyphosphate and sodium carbonate. However, the powder detergents were found to contain exceptionally high content of sodium and phosphorus salts. Primarily, the usage of sodium sulphate as the fillers in laundry powders significantly contributes to the high salinity and electrical conductivity (EC) of laundry wastewater as compared to liquid detergents. The water quality analysis as reported by the author revealed that the usage of powder detergent for laundry purpose resulted into the higher total dissolved solids (TDS), pH, EC, chlorides and sulphates in the laundry effluent. The discharge of such untreated or partially treated laundry effluent negatively affects the soil structural properties as well as the plant growth.

The occurrence of linear alkylbenzene sulphonate (LAS), one of the most widely used anionic surfactants, in water bodies was found to be toxic for aquatic organisms (Spirita Sharmili et al. 2015). The acute toxicity test conducted on the Danio rerio, commonly called as the zebra fish reported that the presence of LAS in the receiving streams causes adverse impacts on the gills and hence arises the respiratory problems in such freshwater organisms. Similar findings have also been reported by Sobrino-Figueroa (2013). In their study, the author revealed the genotoxic characteristics of commercial laundry detergents and anionic surfactants. The environmental impacts occurring due to the discharge of partially treated or treated laundry wastewater have been shown in Fig. 2.

Vasanthi et al. (2013) documented modifications in the biochemical constituents of the fish species *Cirrhinus Mrigala* in the presence of commonly used household detergent known as Tide. Kidney was reported as the most affected organ during the toxicity study. The occurrence of detergents in the natural water bodies adversely

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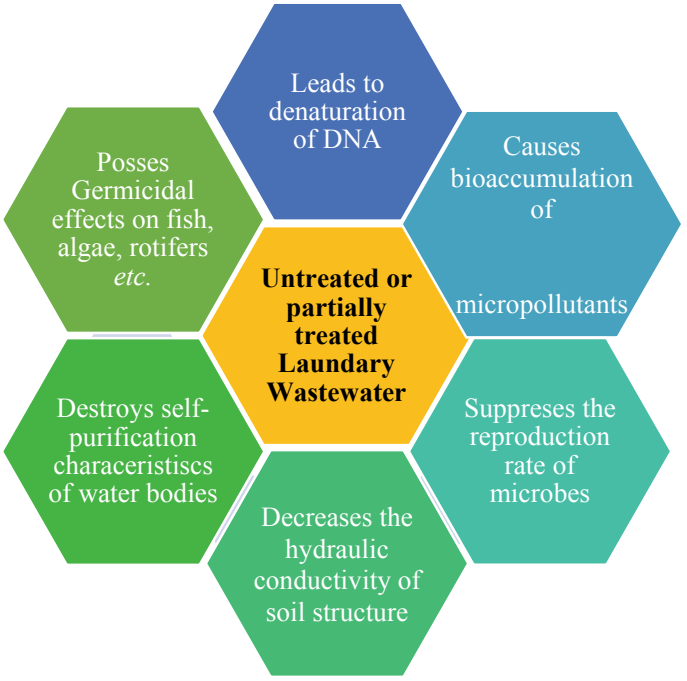

Fig. 2 Environmental implications of untreated, treated or partially treated washing machine effluent

impacts a wide range of aquatic organisms at different trophic hierarchy ranging from micro-algae to macrophytes (Sobrino-Figueroa 2018). The toxicity of the compounds is attributed to the presence of surfactants, enzymes, bleaching agents and silicates.

The toxicity of wheel detergent for mussel (*Lamellidens marginalis*) was determined using the concept of lethal dose 50 (LC 50) and was found that asphyxiation is the common phenomenon of death caused due to the gills impairment (Shingadia and Sakthivel 2003). In connection with the above-reported literature, the acute and chronic toxicity study performed by Saxena et al. (2005) for four different detergents demonstrated that the ill-effects of untreated laundry wastewater for aquatic organisms are not only limited to the gills damage, but it also has the potential to alter the hormonal secretion, reduction in the red blood cells count and surface behaviour.

It has been reported that the anionic surfactants found in laundry wastewater have the potential to bind with peptides and DNA and thus may induce changes in the folding pattern of poly-peptides chain of aquatic organisms present in the downstream, thereby affecting their metabolic functions (Ivanković and Hrenović 2010). With perspectives of human toxicity, it was found that the amphoteric character of anionic surfactants eases their accumulation in living tissues (Cserháti et al. 2002). Similar results have also been reported by Tolls et al. (1994). The fabric softeners used in detergents contain quaternary ammonium complexes as one of the major

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components, and it is noteworthy that these compounds are potential germicides as well as toxic even at a concentration of mg/L for different aquatic lives such as fish, mussels, rotifers and algae (Lawrence 1970; Waters 1982; Di Nica et al. 2017). The study conducted by Effendi et al. (2017) revealed the suppressing effect of detergents on the bacterial growth in the marine environment. The occurrence of linear alkylbenzene sulphonate in water bodies destroys the organoleptic characteristics and hinders the self-purification process of receiving streams (Cserháti et al. 2002).

In many developing countries, there is a common practice of discharge of laundry wastewater into the soil system which leads to various adverse effects on soil structure and its various physico-chemical characteristics. The highly saline nature of laundry wastewater owing to the substantial use of detergents decreases the hydraulic conductivity of the soil system when discharged untreated (Gross et al. 2008). It has also been found that the composition and permeability of soil also get negatively affected when irrigated with washing machines effluent containing high levels of sodium ions (Mohamed et al. 2018). The high concentration of alkaline laundry detergent increases the soil pH, thus affecting the biological functions of soil micro-organisms (Sivongxay 2005; Travis et al. 2010). Furthermore, it has also been demonstrated that the alkaline laundry wastewater causes dispersion of oil particles and ultimately increases its cation exchange capacity (Anwar 2011).

In addition to above, the occurrence of micro-plastics as well as fibres in the aquatic ecosystem shed during the washing and cleaning process has become one of the worldwide issues nowadays (Cole et al. 2011; Kang et al. 2018a, b). It was approximated that greater than 1900 fibres get discharged off from a single cloth in a washing cycle, thus representing the potential of laundry effluents to be the major source of micro-plastics pollution (Andrady 2011). The ill-effects of micro-plastics on marine flora and fauna are well documented in the various studies and currently are of a serious concern around the globe (Browne et al. 2008, 2011).

3 Constructed Wetlands: The Natural Eco-Centric Treatment Technology

The wetland system that has been designed and constructed aiming at the treatment of water and wastewater by imitating the natural processes within the controlled environment is referred as the constructed wetland (CW) (Vymazal 2011a, b). There are various advantages of CW which include low costs, easy operation and maintenance, low energy consumption, robust, highly efficient for a wide range of contaminants, sustainable, green technology and high ecological value (Carvalho et al. 2017). The few advantages of constructed wetlands have been shown in Fig. 3. Due to these unique characteristics of this eco-centric technology, appreciable progress has been observed in the application of CWs in last few years (Vymazal 2014; Wu et al. 2014; Fu et al. 2016).

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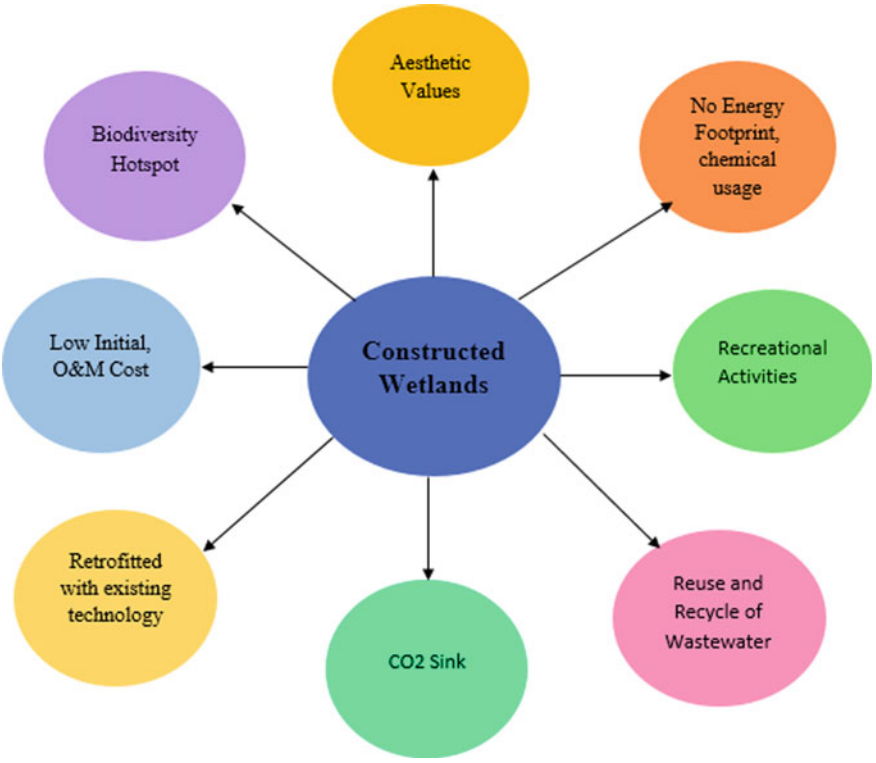

Fig. 3 Advantages of constructed wetlands owing to their application for water and wastewater treatment

The recent advancements in these engineered system have made CWs a promising alternative to the conventional treatment systems for providing access to clean water and sanitation to small communities, households, schools, colleges, etc. (Garcia et al. 2010). Furthermore, it can also be implemented as a decentralized treatment systems in the regions that are deprived of centralized public sewage treatment systems and are economically developing (Brix 1999; Vymazal 2009). Constructed wetlands are suitable for small growing communities (<200,000) and for medium size population (200,000–500,000). Globally, it has been found that constructed wetland can be successfully used for providing efficient treatment to wide varieties of wastewater ranging from urban wastewater to landfill leachates and from municipal to industrial wastewater (Doherty et al. 2015).

Constructed wetlands can be classified on various basis; however, the prime criteria for categorization are hydrology (surface flow and subsurface flow), the type of vegetation growth (emerged, submerged and floating) and flow direction (vertical and horizontal) (Vymazal 2011a, b). Constructed wetlands with surface flow are also commonly known as free surface CWs. It consists of open water surface having floating, submerged or emerged vegetation (Kadlec 2009). The various processes

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consisting of both physico-chemical and biological were found to be responsible for treatment of wastewater in surface flow CWs (Merz 2000).

In these systems, generally, the organic removal was carried out by microbial degradation, while suspended solids get removed due to physical processes (Kadlec et al. 2017). The satisfactory removal of nutrients particularly phosphorus can also be achieved by using surface flow CWs but at lower removal rates (Vymazal et al. 1998). Mostly, such surface flow CWs are used for providing tertiary treatment to storm water runoff and municipal sewage (Vymazal 2011a, b).

The horizontal subsurface flow constructed wetlands (HFCW) consist of an inlet where the wastewater is introduced into the system and is allowed to flow quietly approximately on a horizontal path through the porous medium under the wetland beds planted with the emergent vegetation to the outlet of the system (Vymazal 2009). During the course of wastewater movement under the beds, it comes in contact with the complex matrix of an anoxic, anaerobic and aerobic zone (Vymazal 2011a, b). The roots and rhizomes provide oxygen to the substrate material and constitute the aerobic zone (Brix 1987). In this case, the system structure is wrapped with liners in order to avoid any leakage (Vymazal and Kropfelová 2008a, b). The HF CW is very effective in elimination of organic, suspended solids, heavy metals and microbial contamination (Vymazal 2009).

Generally, the pollutant degradation is carried out under both aerobic and anaerobic conditions. However, the anaerobic processes play a prominent role in decomposition and removal of contaminants (Brix 1990; Vymazal and Kropfelová 2008a, b). The fundamental advantage of HWCWs is that they are capable of treating the diluted influents derived from combined sewage (Vymazal 2011a, b). The flow within the porous media is sustained by the gravity, and hence, no electrical power is required to maintain the desired flow.

Another important component of a wetland system is substrate which is also known as support matrix (Yang et al. 2018). The substrates are well known for their crucial role in enhancing the treating efficiency of the wetland system. Some of them include providing surfaces for bio-film development, support for the growth of macrophytes, adsorbent for contaminants elimination, etc. (Wu et al. 2015). Apart from conventional pollutants, they are also acknowledged for the exclusion of emerging pollutants like pharmaceuticals, xenobiotics and toxic metals (Dordio and Carvalho 2013; Hu et al. 2015). The traditional substrates, like different types of soil, gravel, were used as the supportive system for the vegetation growth with low or negligible functions on pollutant removal (Wen-Ling et al. 2011). Furthermore, the low removal efficiency and frequent clogging of the traditional substrate have led to the development of new matrix material like construction wastes, clay aggregates and waste tire fragments (Scholz and Xu 2002; Calheiros et al. 2008; Mateus et al. 2012; Chyan et al. 2013; Shi et al. 2017). The vegetation system is one of the unique characteristics of constructed wetlands, and it distinguishes this eco-centric technology from other traditional treatment systems like soil filters, oxidation ponds and aeration channels (Vymazal 2011a, b). These are the essential component of wetland systems owing to their numerous properties in relation to treatment processes and efficiency (Brix

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1997). Some of the most commonly used plant species are *Phragmites Australis, Phalaris Arundinacea, Canna Indica* and *Typha Latifolia* (Vymazal 2011a, b).

4 The Potential Role of Constructed Wetlands for Treatment of Laundry Wastewater

The ability of CWs for the treatment of wide range of wastewater wetlands with diverse composition is well evident in past studies. Apart from municipal wastewater (Coleman et al. 2001; Brix and Arias 2005), it could also be used for treating and recycling of wastewater coming from various industries like petrochemical (Yang and Hu 2005), textile (Bulc and Ojstršek 2008), tannery (Calheiros et al. 2007), mining (Gerth et al. 2006), dairy (Mantovi et al. 2003), laundry (Davison et al. 2006), distillery (Billore et al. 2001), etc. In addition to above mentioned, wetland systems are also found to be capable of treating of extensive range of pharmaceuticals (Matamoros et al. 2007; Li et al. 2014), endocrine disruptors (Chapman 2003; Wirasnita et al. 2018), nutrients (Kang et al. 2018a, b; Ndulini et al. 2018), pathogens (Gersberg et al. 1989; Karim et al. 2004) and organic micropollutants (Matamoros et al. 2008; Carranza-Diaz et al. 2014).

In spite of the proven potential, the role of CWs for treatment, recycling and reuse of laundry effluents is still unexplored. As per author's knowledge, the fate, behaviour and transformation of laundry pollutants using dedicated constructed wetlands have not been studied till yet. However, there are few studies available where the discrete removal and decomposition of few surfactants (both anionic and cationic) and xenobiotic compounds have been reported (Huang et al. 2004; Šíma and Holcová 2011; Dordio and Carvalho 2013; Vymazal 2014; Thomas et al. 2017; Pérez-López et al. 2018).

The major research gap found in the literature is the lack of appropriate technology for treatment, processing and reuse of laundry effluents. Currently, the most common practice is to discharge the laundry effluents to municipal sewer lines without any prior treatment which ultimately leads to serious environmental issues Thus, there is need of development of sustainable treatment technology for treatment of laundry wastewater aiming at gainful reuse of treated effluents

5 Innovative Approach for Treatment of Washing Machine Effluents Using Constructed Wetlands—A Way Towards Circular Economy

In light of the above-mentioned facts, an attempt has been made to investigate the treatability of laboratory-scale constructed wetland for treatment of washing machine

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effluents coming from an urban household. The salient advantages of the wetland system include low cost, easy operation and maintenance and no energy requirement.

In the present study, horizontal subsurface flow-based constructed wetland system entitled 'CW4Reuse' at IIT Bombay has been employed for the treatment and management of washing machine effluent. The laundry effluent is generated from a family consisting of five members which are approximately estimated to be 75 L/d. The plan area of the wetland bed was 1 m^2, whereas the depth of the bed was restricted to 0.5 m. *Canna Indica* (family: *Cannaceae*) has been used as vegetation system for effluent treatment. The physical and chemical analysis carried out in laboratory-scale reactors showed significant removal of BOD, COD, TSS, VOCS heavy metals, nitrogen, phosphorus and pathogens (proxy: MPN). The obtained water quality was found to be consistent with USEPA standards. The treated laundry effluent can be reused for gardening, vehicles cleaning, floor washing and flushing. The current work is in the progress.

6 Conclusions

The laboratory-scale constructed wetland presents a promising solution for treatment of laundry effluents. Furthermore, the effluent water quality parameters are found to be within the permissible limits as demonstrated by the regulatory standards The treated effluents can be further reused for various household activities like vehicles cleaning, gardening, toilet flushing, floor washing, etc. The current study would be helpful in dealing with the issues of water scarcity in urban and peri-urban regions and would also result into the minimization of freshwater consumption.

7 Future Scope of Work

The facets associated with the tertiary treatment of the treated effluents will be investigated in the coming future for recycle and reuse of laundry effluents for high-end applications.

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Removal of Methylene Blue Dye by Using Lemon Leaf Powder as an Adsorbent



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Abstract Wastewater from textile industries is a major cause of water pollution in most developing countries. In order to address the issues of water pollution and high cost for treatment processes, the use of an inexpensive and environmentally benign adsorbent has been studied. Dyes accumulate in wastewater could affect aquatic life, human health, and overall ecosystem adversely. In this project, the lemon leaves powder adsorbent is used to remove methylene blue dye. The adsorbent has been investigated in a batch type and design expert software experiments (Box-Behnken method) to evaluate the process parameters are agitation time, adsorbent size, adsorbent dosage, initial concentration, temperature and at a pH of 5.0. The results of experiments show that the maximum percentage removal of methylene blue by using lemon leaves powder is 90.7% found to be in optimum conditions are concentration of dye is 150 mg/L, temperature of the solution is 313 K, adsorbent dosage is 11 g/L. Maximum adsorption capacity (q_{max}) of lemon leaf powder is found to be 19.19 mg/g.

Keywords Lemon leaves · Methylene blue dyes · Concentration of dye solution · Sorbent dosage

1 Introduction

Dyes are the most harmful pollutants from different processing industries—textile, paper, food, plastic, and cosmetic industries. The removal of these dyes from effluents is a major task and it creates environmental problem. Very low concentration of dyes is effected the light penetration in water bodies and photosynthesis. At the same time, some of the dyes act as carcinogenic and mutagenic in nature (Saha 2010). The conventional methods are used for removing dyes and heavy metals from aqueous solution are coagulation, flocculation, membrane separation, and adsorption, etc. (Hymavathi and Prabhakar 2018). These conventional techniques used for dyes removal are expensive, have average efficiency, and are running in sequential steps (Hasan 2008). Earlier, the adsorbent used in adsorption process is activated carbon,

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which is expensive. Different studies have been made on the possibility of adsorbents using mineral sorbents, activated carbon, peat, chitin, rice husk, soy meal hull, and agrowastes (Deepak et al. 2017).

Adsorption is the adhesion of molecules (ions and atoms) to the surface of a solid or liquid or accumulation of ions on the surface of adsorbent. The material that is being adsorbed or concentrated is called adsorbate and the solid which adsorbs adsorbate is called adsorbent. It is also called surface phenomenon. The adsorption operations can be batch mode and/or continuous mode. Depending on the nature of the forces between adsorbate and adsorbent, the adsorption is of two types—physisorption and chemisorptions.

In physisorption, the binding is by weak Vander Waal's forces. Hence, it is called Vander Waal's adsorption. This force is due to the fluctuating dipole moments on the interaction between adsorbate and adsorbent. In chemisorption, the forces of attraction between adsorbate and adsorbent are as strong as chemical bond.

1.1 Methylene Blue

It has been described as "the first fully synthetic drug used in medicine". It was first prepared in 1876 by German chemist Heinrich Caro. The drugs and dyes are worked in the same way of treatment purpose. This use is no longer recommended because side effects such as vomiting, headache, shortness of breath, high blood pressure, red blood cell breakdown, etc. Methylene Blue is used in redox indicator, water testing, biological staining and aquaculture.

In the current study, removal of methylene blue by lemon leaf powder is investigated through batch experimentation at different levels of initial solution pH, dye concentration, and different sizes of adsorbent.

2 Materials and Methods

2.1 Methylene Blue Preparation

An accurately weighed quantity of dye dissolved in distilled water to prepare a stock solution (1000 ppm). Solution used in the experiment for the desired concentration obtained by further dilution. Dye concentration is determined by using absorbance values measured before and after the treatment at 507 nm with UV visible double beam spectrophotometer.

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2.2 Lemon Leaf Powder (Adsorbent)

The lemon leaves can be used to treat nerve disorders like insomnia, nervousness, and palpitation. Lemon leaf will serve as a good and better alternative to Valium and other synthetic sedatives *which by the way have side effects. To get maximum result from lemon leaf, take the preparation* daily for at least one month. The lemon leaf is also used for de-worming. The lemon leaves can be blanched and used to infuse teas, wrap seafood or meat and roasted, steamed or grilled.

2.3 Batch Adsorption Process

Adsorption experiments are carried out in a 500 mL of conical flask containing known amount of adsorbent with dye solution. The flask is then shaken using mechanical rotating shaker at 120 rpm. After that the solution is filtered and the residual dye concentration is measured at λ max using UV Visible spectrophotometer.

Batch adsorption studies are performed to study the effects of adsorbent size, contact time, pH, concentration, temperature, and adsorbent dosage. The effects of concentration, temperature, and adsorbent dosage are studied by using design method. The adsorbent (lemon leaf powder) is weighted by using weight balance. The adsorbate (methylene blue) solutions are prepared and maintained pH by using pH meter. After the weighting of adsorbent and preparation of adsorbate solution in conical flask, put that conical flask in incubator shaker for agitation purpose and to maintain parameters such as time, temperature, and rpm. After the collection, the sample is filtered using filter paper. The resulted solution is analyzed by using UV visible double beam spectrophotometer.

The percentage removal and the amount of dye adsorbed are calculated as follows (Hymavathi and Prabhakar 2017):

$$\text{Percentage removal of dye} = ((C_o - C_f)/C_o) \times 100$$

where, C_o is initial concentration (mg/L) and C_f is final dye concentration (mg/L)
Amount of dye adsorbed $= (C_o - C_f)\ V/W$, $V =$ Volume of dye solution (mL),

$$W = \text{Amount of adsorbent(g)}$$

3 Design of Experiments

Factorial experimental design was used to optimize the preparation conditions and dye removal efficiency. RSM designs allow us to estimate interaction and even

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Table 1 Levels of different process variables for removal of methylene blue onto lemon leaf powder

Factors	Level of Box-Behnken		
	Low (−1)	Middle (0)	High (+1)
Initial concentration (mg/L) (*A*)	50	100	150
Temperature (K) (*B*)	293	303	313
Adsorbent dosage (g/L) (*C*)	2	11	20

quadratic effects and hence give us the idea of the (local) shape of the response surface under investigation.

The parameters (time, adsorbent size, agitation, and pH) are done by single-step process to get optimum values. These values are attached to each run of design experiment.

Box-Behnken design is used to optimize the number of experiments with maximum efficiency for an RSM problem involving three factors—initial concentration (*A*), temperature (*B*), and adsorbent dosage (*C*) and three levels (high, middle, and low) as given in Table 1. The levels were fixed based on the preliminary experiment trials and also the available literature. The experimental parts are as shown in Figs. 1 and 2.



Fig. 1 Experimental parts weighing balance and pH meter

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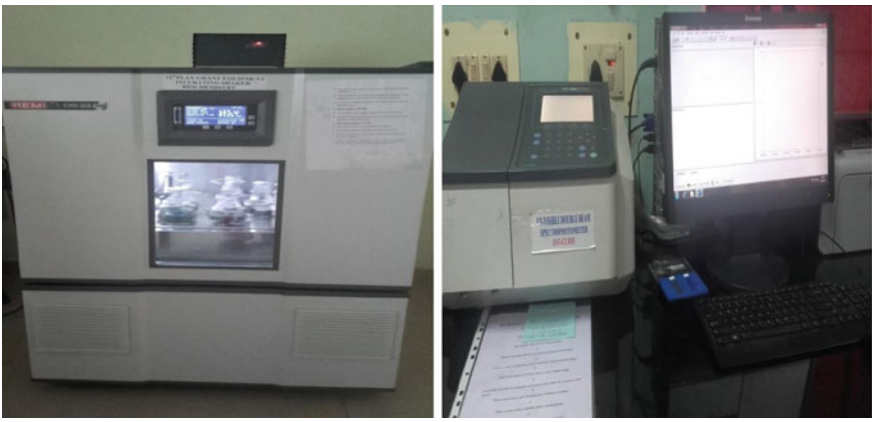


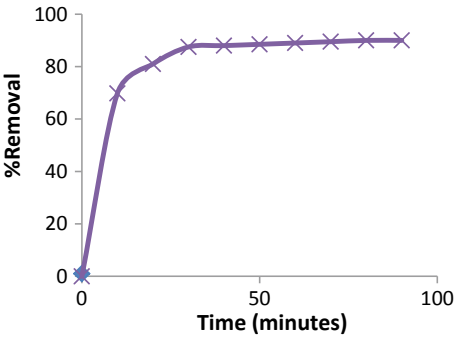
Fig. 2 Incubator shaker and UV visible double beam spectrophotometer

4 Results and Discussion

4.1 Effect of Agitation Time

The solution pH is adjusted with 0.1 N NaOH and 0.1 N H_2SO_4 in each flask containing 50 mL solution with 50 mg/L of Methylene blue dye. A required amount of 74 μm particle size of lemon leaves powder is added to the contents of the flasks and the flasks are agitated at constant speed and at room temperature, on an orbital shaker. Flasks are withdrawn periodically; the content filtered and final concentration of dye is estimated by using Eq. 1. The effect of agitation time is shown in Fig. 3.

Fig. 3 Effect of agitation time



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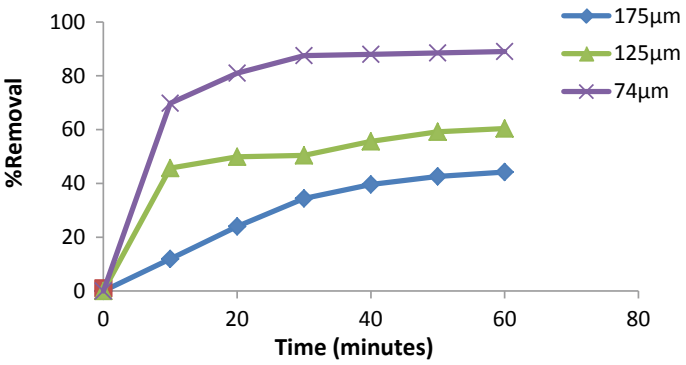

Fig. 4 Effect of adsorbent size

4.2 Effect of Adsorbent Sizes

A 50 mL of the stock solution of 50 ppm taken and with various sizes of adsorbents (175,125 and 74 µm) of adsorbent is taken into 250 mL conical flask, maintaining pH of 5.0, at room temperature and kept for agitation at 120 rpm using an orbital shaker. At the end, the equilibrium time of 80 min samples is withdrawn and filtered using whatman filter paper and tested for its optical density using UV spectrophotometer. The effect of adsorbent sizes is shown in Fig. 4.

4.3 Effect of PH

In order to find the effect of pH, the experiments conducted at various pH values from 2 to 11 in acidic and alkaline conditions, respectively. The pH value is adjusted using 0.1 N NaOH and 0.1 N H_2SO_4. For this work, we have taken 50 mL of 50 ppm of methyl blue dye and 1 g of adsorbent, at room temperature and the sample withdrawn from the shaker at the time of 80 min. The collected sample is tested for its optical densities using the UV visible spectrophotometer. The effect of pH on percentage removal of MB by LLP is shown in Fig. 5.

The experimental and model-predicted responses are given the model (Box-Behnken model) in Table 1. Levels of three process variables for methylene blue removal using lemon leaves are shown in Table 2. The process variables—initial dye concentration, adsorbent dosage, and temperature are studied experimentally, and the complete set of data is fitted to a quadratic model in Eq. 1. Figure 6 % Removal—Predicted versus actual model normal plots for residuals.

$$R1 = 85.80 + 4.43 * A + 1.17 * B - 2.13 * C + 0.29 * AB - 1.70 * AC - 0.36 * BC - 0.25 * A^2 - 0.89 * B^2 - 0.3 * C^2 \quad (1)$$

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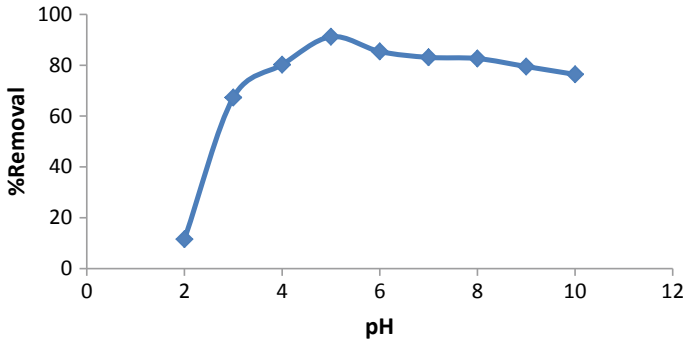

Fig. 5 Effect of pH on percentage removal of MB by LLP

Table 2 Results from Box-Behnken for Methylene blue onto Lemon L

	Sum of squares	d*f*	Mean square	*F*-value	*p*-value Prob > *F*	
Model	221.06	9	24.56	541.40	<0.0001	Significant
A-concentration	157.18	1	157.18	3464.49	<0.0001	
B-temperature	10.97	1	10.97	241.90	<0.0001	
C-dosage	36.25	1	36.25	799.08	<0.0001	
AB	0.32	1	0.32	7.16	0.0317	
AC	11.56	1	11.56	254.81	<0.0001	
BC	0.51	1	0.51	11.27	0.0121	
A^2	0.26	1	0.26	5.63	0.0494	
B^2	3.33	1	3.33	73.31	<0.0001	
C^2	0.39	1	0.39	8.56	0.0221	
Residual	0.32	7	0.045			
Lack of Fit	0.32	3	0.11			
Pure error	0.000	4	0.000			
Cor total	221.38	16				

The R^2 adjusted is 0.996 and R^2 predicted is 0.977; the difference of regression coefficient is <0.2 is well the acceptable norm and the signal. Optimum levels of the three variables studied in the experiment and the model have been presented in Table 3.

There is a good correspondence between the experimental and model-predicted values of the optimum operating conditions.

A comparison of percentage removal of methylene blue—actual versus model-predicted and normal plots for residuals is shown Fig. 6. The residuals, the difference

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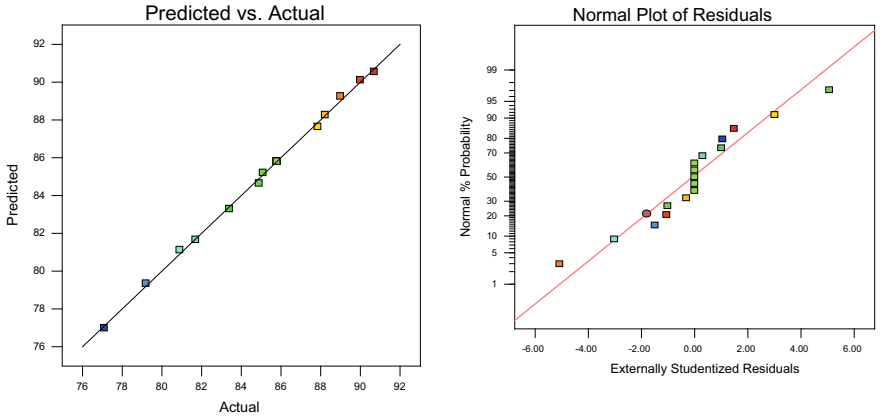

Fig. 6 % Removal—predicted versus actual model normal plots for residuals

Table 3 Optimum levels—methylene blue on to lemon leaves powder

Name of the variable	% Removal of methylene blue	
	Experimental	Optimum values
Dye conc. (Co) mg/L	150	149.63
Sorbent dosage (w), g/L	11	9.6
Temperature (T), K	313	307.5
% Removal	90.7	90.55

between the experimental and observed responses and the predicted responses are examined using the normal probability plots of the residuals. If the model is adequate, the points on the normal probability plots of the residuals should form a straight line.

5 Conclusion

Effectiveness of *Lemon leaves to remove Methylene blue* dyes is thoroughly investigated in the present work and the outcome is promising. Operating parameters, such as concentration of dye solution, initial solution pH, sorbent dosage, and temperature are optimized are shown below.

Optimized conditions	Time (min)	pH	% Removal	q_{max} (mg/g)
Concentration of dye = 150 mg/L	80	5	90.7	19.19
Temperature = 313 K				
Adsorbent dosage = 11 g/L				

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Lemon leaves are a good, low-cost, and easily available sorbent for the treatment of methylene blue.

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Development of a Low-Cost Column Type Filter Based on Agricultural Waste for Removal of Fluoride from Water



C. M. Vivek Vardhan and M. Srimurali

Abstract Population explosion and subsequent increase in demand for food have resulted in adoption of modern methods of agriculture, thereby generating huge quantities of agricultural wastes. India being an agricultural nation generates large amount of Rice Husk warranting proper utilization before disposal. Concomitantly, fluorosis caused due to consumption of excessive fluoride is posing a serious threat to mankind. Therefore, in this study, an attempt has been made to develop a low-cost column type filter based on Rice Husk for removal of fluoride from water. Lanthanum was used to enhance the fluoride removal capabilities of Rice Husk Ash. Continuous-flow column studies were conducted and investigated for its potential in removing fluoride from water. It was observed that 37.8 L of water of initial fluoride concentration 10 mg/L could be brought down to permissible limits in 1890 min and can be safely consumed. The developed low-cost filter utilizes an agricultural waste and protects people from fluorosis especially of rural and isolated communities.

Keywords Adsorption · Defluoridation · Water · Low-cost · Lanthanum

1 Introduction

Agricultural wastes are generated in huge quantities in agriculture-based nations such as India. It is estimated that the annual generation of Rice Husk in India is about 24 million tons (Pandey et al. 2012). Though a minor portion of it finds application in production of silica, cement and refractory bricks, majority of it is dumped and remains non-utilized. Therefore, an effective way of utilizing the same is required. On the other hand, contamination of groundwater with fluoride and the resulting fluorosis is a major threat faced by mankind. Fluoride has dual impacts on living organisms. In lower concentrations, fluoride is very beneficial as it assists in formation of bones

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and prevents dental decay, whereas, in higher concentrations, it causes serious health issues such as skeletal fluorosis, dental fluorosis, mental derangements, dwarfishness, etc. Therefore, it is imperative that fluoride has to be removed from water before consumption. The World Health Organization (WHO) has stipulated a maximum permissible limit of 1.5 mg/L of fluoride in drinking water. Various technologies are available for defluoridation of water and are partially successful to various extents. But, as fluorosis is not yet completely eradicated, the focus has recently shifted to use of rare earth materials as adsorbents for defluoridation with a fairly reasonable degree of success (Vivek Vardhan and Srimurali 2015, 2016, 2018). However, research is still deficient on achieving a dual advantage of simultaneously utilizing waste and removing fluoride from water. Therefore, in this study, an attempt was made to employ Rice Husk Ash impregnated with Lanthanum for removal of fluoride from water in continuous-flow mode and thereby develop a filter using endemically available wastes. Thus, the main objectives of this work are to impregnate Lanthanum on to Rice Husk Ash and to test it for fluoride removal at varying rates of flow rates, initial fluoride concentrations and bed depths.

2 Materials and Methods

2.1 Chemicals

All reagents used in the present investigation were procured from E. Merck Ltd, India and were of analytical reagent grade. Sodium fluoride of 221 mg was dissolved in distilled water and made up to 1 L in a volumetric flask to prepare a stock fluoride solution of 100 mg/L. Stock solution was diluted appropriately to obtain fluoride solutions of required working concentrations.

2.2 Adsorbent

Rice Husk Ash (RHA) was procured from a local rice mill and was sieved to a mean size of 475 μm.

2.3 Adsorbent Preparation

Lanthanum carbonate of varying weights was mixed with 0.05L of distilled water, and 0.1 N HCl was added to it dropwise until Lanthanum Carbonate got dissolved completely. To this solution, 0.1 N NaOH was added under constant stirring until precipitates were visually observed. RHA of mean size 475 μm and 20 ± 0.2 g weight

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was added to this mixture. This mixture was mixed for 6 h in a magnetic stirrer. Subsequently, it was decanted, dried and heated at 300 °C for 4 h in a muffle furnace. It was thoroughly washed with distilled water and dried. The obtained material is Lanthanum-Impregnated Rice Husk Ash (LIRHA).

2.4 Continuous-Flow Experiments

Fixed bed down-flow column studies were performed using a Pyrex glass column of inner diameter 2.54 cm and depth 1 m. Cotton was placed at the base to support aggregates. The column was filled with aggregate of mean size 600 μm to a depth of 30 ± 1 cm at the base. On its top, LIRHA of varying depths of 20 cm, 30 cm and 40 cm was filled. Aggregate of mean size 600 μm and of varying depths of 30 ± 1 cm, 40 ± 1 cm and 50 ± 1 cm was filled on the adsorbent to ensure an equally distributed flow of tap water spiked fluoride solution onto the sorbent bed. The set-up of the column is depicted in Fig. 1. Aqueous fluoride solutions of various concentrations of 5 ± 0.1 mg/L, 10 ± 0.1 mg/L and 15 ± 0.1 mg/L were passed

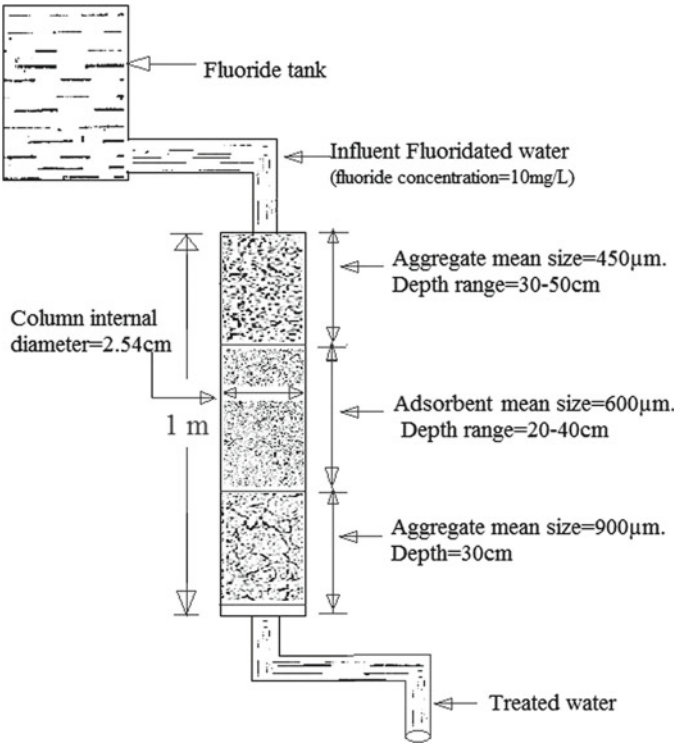

Fig. 1 Column set-up block diagram

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through it. Flow rates of the solution were varied at 10 ± 0.2 ml/min, 15 ± 0.2 ml/min and 20 ± 0.2 ml/min. At regular intervals of time, effluent samples were collected and analysed for residual fluoride concentration, until the effluent concentration of fluoride equalled the influent concentration.

2.5 Analysis of Continuous Sorption Experiments

Analysis of breakthrough curves gives an insight into the performance of fixed-bed column. The time taken for breakthrough and time taken for complete exhaustion of column gives characteristic information for determining the performance and dynamics of adsorption of a column (Chen et al. 2013). Breakthrough of the column is considered to have occurred when the effluent concentration (C_t) has reached about 0.1% of influent concentration (C_o), and exhaustion of column is considered to have occurred when effluent concentration has reached about 95% of influent concentration (Kundu and Gupta 2007). However, from fluoride removal point of view, 15% fluoride removal (i.e. up to effluent concentration of 1.5 mgF^-/L) is considered for analysis. A breakthrough curve is obtained by plotting values of (C_t/C_o) versus (t) (Han et al. 2009). Effective effluent volume (V_{eff}) can be calculated from Eq. (1) (Ramavandi et al. 2014).

$$V_{\text{eff}} = Q \cdot t_{\text{total}} \tag{1}$$

where Q is volumetric flow rate (ml/min), and t_{total} is flow time (min). The value of total mass of fluoride adsorbed (q_{total}) (mg) can be obtained from the area under the breakthrough curve, found by integrating the adsorbed concentration (C_{ad}, mg/L), within the functioning time limits (Ramavandi et al. 2014) (Eq. 2).

$$q_{\text{total}} = \frac{Q}{1000} \int_{t=0}^{t=\text{total}} C_{\text{ad}} \mathrm{d}t \tag{2}$$

where $C_{\text{ad}} = C_o - C_t$.

The maximum fluoride adsorption capacity (q_{eq}) can be calculated as follows, as given in Eq. (3)

$$q_{\text{eq}} = \frac{q_{\text{total}}}{m} \tag{3}$$

where m is dry weight of adsorbent used in column (g).

Fluoride was analysed using SPADNS method (APHA 2005), using a spectrophotometer, Evolution 201.

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3 Results and Discussion

3.1 Continuous-Flow Column Studies

To evaluate the practical applicability of LIRHA for defluoridation, in continuous-flow mode, fluoride-rich water was passed through columns consisting of varying depths, at different flow rates and different influent fluoride concentrations.

3.1.1 Effect of Bed Depth

LIRHA bed depths were varied, and the corresponding variations in related parameters such as time for exhaustion of column and effective volume of water treated were evaluated and presented in Table 1. Increase in bed depth resulted in increase in the effective volume of water treated and took more time for the column to get exhausted. Breakthrough curves were drawn between t versus (C_t/C_o) for various bed depths, and the plots are presented in Fig. 2. It is clear from this figure that with

Table 1 Values of column parameters obtained at different bed depths, flow rates and initial fluoride concentrations for defluoridation using LIRHA

Q (ml/min)	(C_o) (mg/L)	Z (cm)	t_{total} (=Total flow time in min)	V_{eff} (ml)	q_{total} (mg)	q_o (mg/g)
15	10	20	2790	41,850	273.1	4.149
15	10	30	5130	76,950	468	4.739
15	10	40	6930	103,950	770.3	5.85
10	10	30	12,780	127,800	783	7.928
20	10	30	1890	37,800	270.1	2.735
15	5	30	11,700	175,500	484.3	4.904
15	15	30	2790	41,850	343.1	3.475

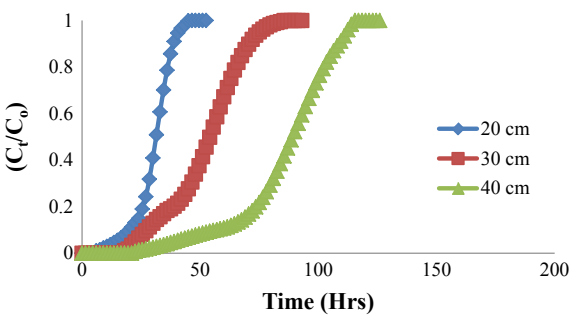

Fig. 2 Breakthrough curves for the effect of bed depth on defluoridation of water using LIRHA

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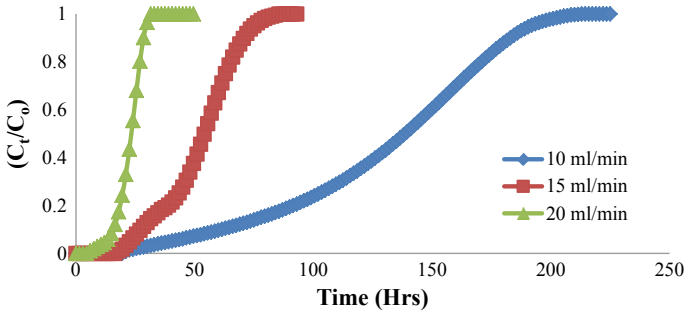

Fig. 3 Breakthrough curves for the effect of flow rate on defluoridation of water using LIRHA

increasing bed depth, the slope of column gradually decreases, marking a broadening of the mass transfer zone, resulting in increased fluoride sorption.

3.1.2 Effect of Flow Rate

Rate of flow of influent fluoride solution into the column was varied, and the corresponding variation of dependent parameters is presented in Table 1. It can be observed from this table that with increase in flow rate, the column gets exhausted rapidly because it gets saturated rapidly. Figure 3 shows the breakthrough curve drawn between t versus (C_t/C_o) for varying flow rates. From this figure, it can be seen that, with increasing flow rate, the breakthrough curves become steeper, and the uptake of fluoride too decreases. This could be due to adsorption taking place, only through film diffusion, because of lesser residence time (Ye et al. 2018).

3.1.3 Effect of Initial Fluoride Concentration

Concentration of fluoride in the influent aqueous solution was varied, and its impact on defluoridation in continuous mode was studied. The influence of variation of initial fluoride concentration on the effective volume treated, and uptake of fluoride and sorption capacities are presented in Table 1. From the table, it can be observed that, with increase in influent fluoride concentration, the adsorption capacity of column too increased gradually. Higher fluoride concentration effectively overcomes mass transfer resistance and therefore transfers fluoride effectively on to the surface of LIRHA. Breakthrough curves were plotted between t versus (C_t/C_o) for different influent fluoride concentrations and are presented in Fig. 4. From this figure, it can be seen that with increase in initial fluoride concentration, the gradient of the breakthrough curve increases, resulting in decreased mass transfer zone. This indicates that intraparticle diffusion controls the adsorption process (Manna et al. 2018).

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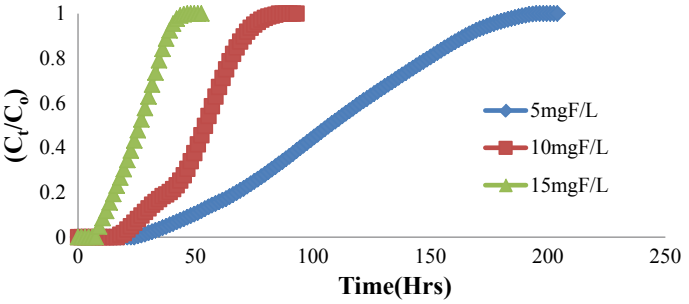

Fig. 4 Breakthrough curves for the effect of initial fluoride concentration on defluoridation of water using LIRHA

4 Concluding Remarks

The aim of this work is to simultaneously utilize the agricultural waste Rice Husk Ash and to remove fluoride from water.

Continuous-flow column studies demonstrated that LIRHA is capable of removing fluoride from water to less than the permissible limits.

Thus, the agricultural waste, Rice Husk can be effectively utilized for removal of fluoride from water, especially in rural and isolated communities.

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Oxidative Photocatalytic Degradation of Methylene Blue in Wastewater



Ajit Kumar Tallapaka, Jyothi Thati and Sailu Chintha

Abstract Aqueous methylene blue (MB) dye solution was subjected to photocatalytic degradation by ultraviolet (UV) irradiation with titanium dioxide (TiO_2) catalyst. Batch experimental studies were conducted with 250 ml of different methylene blue concentrations of 20, 30, and 40 mg/l, with catalyst loadings of 25, 50, and 100 mg, at different pH of 3, 7, and 9 to find the degradation of dye. A maximum degradation of 86% methylene blue dye was achieved for concentration 20 mg/l using 100 mg TiO_2 catalyst irradiated for 190 min in presence of UV light of wavelength 254 nm.

Keywords Photocatalysis · Titanium dioxide · Advanced oxidation process · Methylene blue · International society of waste management · Air and water

1 Introduction

In this modern society, any kind of wastewater stream from industrial processes or households contains organic chemicals because of its vast usage, disposal of the same without proper treatment results in exposure to humans and environment (Belgiorno et al. 2007). In textile manufacturing and dyeing industries usage of water and dyes are very high among the quantity 50% of the dyes are send out to wastewater which causes the environment pollution (Lin et al. 2012). Dyes have global usage in textiles, leather, plastics, paper, food and cosmetic industry to color their products, which could be characterized by strong odor, high chemical oxygen demand (COD) and broad range of pH (Mohabansi et al. 2011). So, the treatment of wastewater generated in textile industry has got great attention because of its considerable impact on creating environment pollution. Textile processing unit effluent is usually released to municipal sewage treatment plants or directly into waterways (Cooper 1993). The conventional techniques currently used can only transplant the non-bio-degradable mass into sludge, which causes other types of pollution which need to be treated further (Stock et al. 2000). In these circumstances, traditional dye wastewater treatment processes have become very demanding for existing plants. As a consequence

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of these problems, advanced oxidation process (AOP) contemplated as an implied technology for dyes' wastewater treatment. The concept of AOP was proposed in the 1980s since then different advanced oxidation technologies have been studied and applied for treatment of industrial wastewater and also for municipal wastewater (Deng and Zhao 2015). Among the available technologies, heterogeneous photocatalysis using an irradiated dissipation of titanium dioxide (TiO_2) is considered as an alternate process for removing organic compounds from wastewater (Chladova et al. 2011).

Oxidative photocatalysis is one of the AOP and an alternative method for collapsing the organic pollutants in air and water. In this process, it includes light, photocatalyst, and an oxidizing agent to achieve the desired chemical reaction (Hassaan and El Nemr 2017). Titanium dioxide is found to be more productive for photocatalytic degradation of organic pollutants due to faster electron transfer to molecular oxygen. TiO_2 is a selective photocatalyst for the environmental engineering application; due to its capacity to provide total mineralization, nontoxic, low-cost, reusable, photostable, alkali, resistance to acid and organic solvents (Ameta et al. 2013; Gültekin and Ince 2007). For TiO_2 preparation, there are many procedures available, often used methods are sol-gel method, hydrothermal processing and gas-phase reaction.

In sol-gel method, high purity materials are used and, when it is transformed into liquid state by mixing with a solvent, it has lot of benefits such as uniformity of products, low cost and easy control of chemical stoichiometry and microstructure (Mohabansi et al. 2011).

Various classes and types of dyes are used in textile industry; among them, Methylene Blue, which is a cationic dye was selected for degradation studies in this work. Because, methylene blue is considered as a toxic dye and it can bring up very harmful influences on the living things due to inhalation. Problems include breathing complications, vomiting, diarrhea, and nausea (Lin et al. 2012). The structural formula of methylene blue is given in Fig. 1 (Mohabansi et al. 2011) (Table 1).

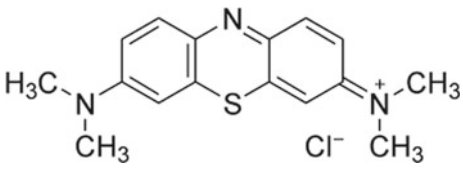

Fig. 1 Methylene blue structure

Table 1 Methylene blue properties (Mohabansi et al. 2011; Deng and Zhao 2015)

Properties of Methylene Blue	
Chemical formula	$C_{16}H_{1s}N_3SC1$
Chemical name	3.7-bis(Dimethylamino)-phenothiazin-5-ium chloride
Molecular weight	319.85
Melting point	100–110 °C
Density	1.1 g/cm^3

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This current research work mainly aims on the effective removal of MB dye from wastewater using oxidation photocatalysis using titanium dioxide as catalyst.

2 Experimental Work

2.1 Materials

Methylene blue (MB) analytical grade purchased from Fisher scientific, titanium dioxide (TiO_2), and distilled water.

2.2 Method

Experiments were conducted in a borosilicate glass batch reactor of capacity 250 ml placed in a special UV cabinet equipped with UV light emitting 254 nm wavelength. The extent of degradation of MB was analyzed by UV spectrophotometer (Schimadzu model UV-1800). For obtaining calibration data, the MB dye solution concentrations were calibrated initially at 664 nm wavelength corresponding to the maximum absorbance noticed. In the present work, TiO_2 was considered as a photocatalyst for the deterioration of methylene blue dye in wastewater (Lin et al. 2012). Parameters studied were weight of catalyst, concentration of dye, and pH irradiated for 190 min.

- Weight of (TiO_2) nanocatalyst (25, 50, 100 mg).
- Methylene blue concentration of (20, 30, 40 mg/l).
- pH range of (3.0, 7.0, 9.0).

The residual amount of MB was determined by the use of a UV spectrophotometer (Shimadzu, model UV-1800). According to the characteristic absorbance peaks recorded with spectrophotometer, MB concentration was determined at 664 nm by the UV detector (Figs. 2 and 3).

$$\% \text{ degradation} = \frac{C_{MB0} - C_{MB}}{C_{MB0}} \times 100$$

2.3 Preparation of Catalyst

Titanium dioxide (TiO_2) nanocatalyst was produced by the ultrasonic-assisted sol-gel method using titanium (IV) iso-propoxide (98%) as precursor. Briefly, titanium

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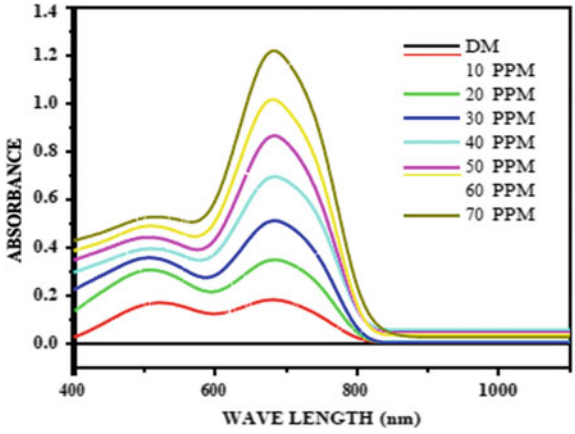

Fig. 2 Maximum absorbance of MB dye solution for different concentrations at 664 nm

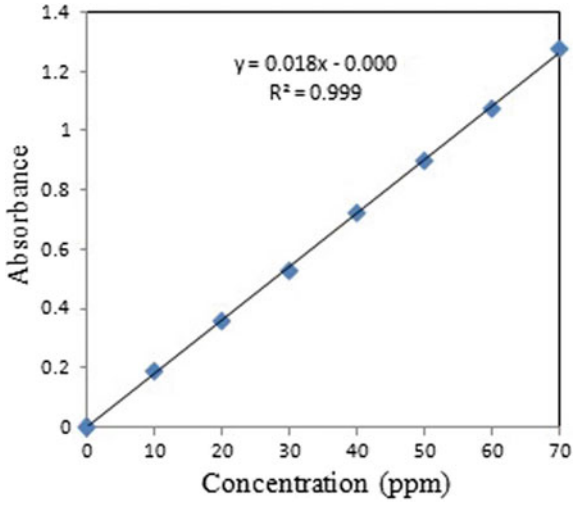

Fig. 3 Calibration curve for MB dye at 664 nm

iso-propoxide (TI) is dissolved in 2-Propanol to yield TI solution. A second solution is then prepared by mixing 2-Propanol with water, and this solution was slowly adding up to the TI solution to form the TiO_2 gel. The gel was changed into a yellow block crystal after drying at 105 °C for 5 h in oven. The resulting powder was then subjected to calcination at a temperature of 500 °C for 6 h (Karami 2010).

2.4 Characterization Studies: X-Ray Diffraction (XRD)

The XRD pattern of nanocatalyst (TiO_2) in Fig. 4 shows the presence of three main peaks at $2\theta = 25.3°$ (101), 26.1°, and 37.0°, which is an attributive indication of an

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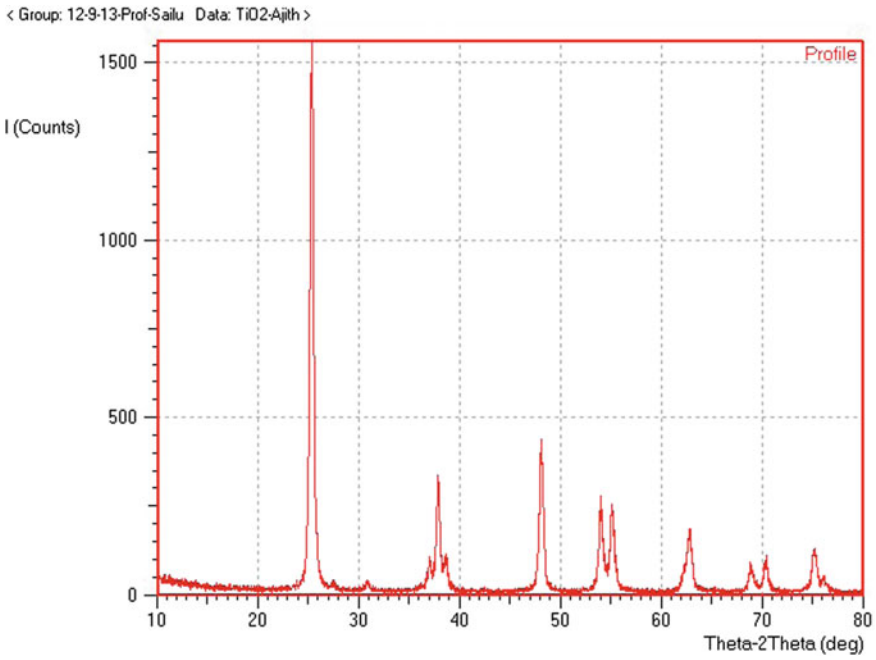

Fig. 4 XRD photograph of (TiO_2) catalyst

anatase TiO_2. Contrarily, minor diffraction peaks noticeable at $2\theta = 27.5°$ (110) and 31.5°, which correlates to rutile TiO_2. The outcome is in correspondence with its mineral configuration bearing anatase to rutile ratio of 83:17 (Karami 2010).

2.5 Analysis by Scanning Electron Microscope (SEM)

Scanning electron microscope is used for the characterization of the morphology of surface and particle size. SEM analysis results the particle size as 156–382 nm (Fig. 5).

Particle size, zeta potential were analyzed by nano particle analyzer (Horiba model SZ-100 series); From the analysis the catalyst (TiO_2) mean particle size (388.8 nm) and Zeta potential (−39.6 mV) were noted (Fig. 6).

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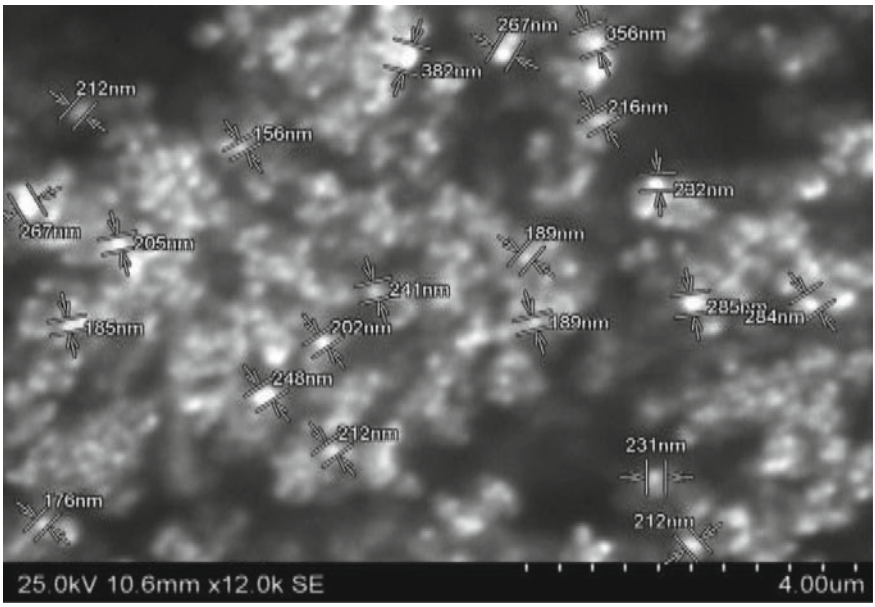

Fig. 5 SEM micrograph of (TiO_2) nanocatalyst

3 Results and Discussion

3.1 Effect of MB Dye Concentrations and TiO_2 Catalyst Loading

The influence of catalyst is shown in Figs. 7 and 8 and it is clear that for nano sized catalyst (TiO_2) prepared has substantially removed MB dye with in considerable time of 190 min. A considerable % of removal was observed with 100 mg catalyst for 20 mg/l of MB solution and to the extent of 86%. Using TiO_2 as photocatalyst, 20 ppm methylene blue in water was irradiated for 10 h and achieved 57.06–84.14% of degradation (Ameta et al. 2013). This is because of the photocatalytic activity of TiO_2 catalyst apparently depends on numerous factors, such as the pore size and number, surface area, the amount of hydroxyl content in TiO_2 catalyst, and so on (Yu et al. 2000).

3.2 Effect of PH

An important parameter in the photocatalytic reaction is the pH of solution. The effect of pH on the degradation of MB was investigated over a pH range of (3.0, 7.0,

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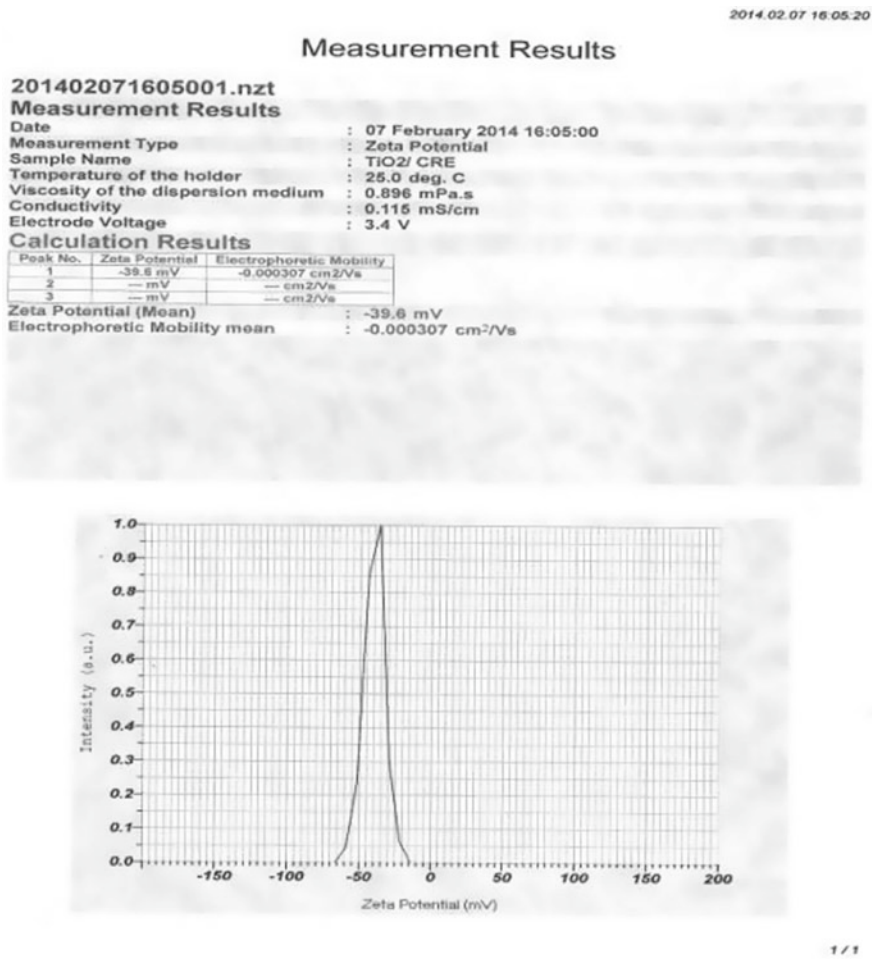

Fig. 6 TiO_2 catalyst nanoparticles analysis

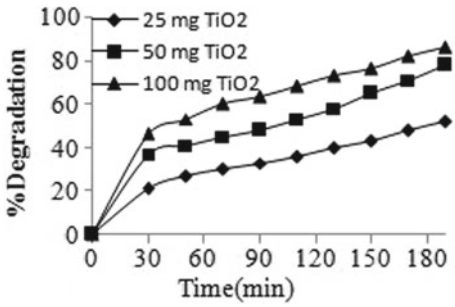

Fig. 7 Methylene blue degradation with time at TiO_2 catalyst loading

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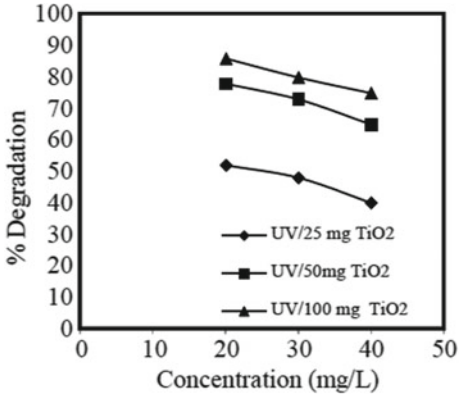

Fig. 8 Methylene blue degradation with concentration at different catalyst loadings

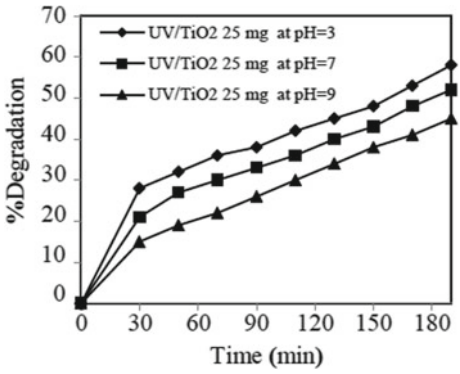

Fig. 9 Methylene blue degradation with time at different pH levels

9.0) using 25 mg/250 ml of TiO_2 in 190 min irradiation. With increasing pH, the degradation of methylene blue has decreased (Fig. 9). Based on nature of the organic pollutants, an increase of the pH will have a positive or negative effect on their degradation rate and consequently the mineralization rate of the solution. The pH is a complicated parameter since it is correlated to the ionization state of the surface and has a significant influence on the removal of organic pollutants (Mohabansi et al. 2011; Aziz et al. 2019).

4 Conclusion

The deterioration of methylene blue dye solution was studied by oxidative photocatalysis. The degradation was strongly influenced by the factors such as TiO_2 catalyst loading, initial dye concentration, and pH of the solution. The maximum degradation (86%) of dye solution (20 mg/L of initial dye concentration) was achieved using

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100 mg of TiO_2 in 190 min of irradiation under UV light. The deterioration of methylene blue dye is efficient in acidic solution, and it was more at pH of 3. This method is promising to use for the removal of methylene blue dye present in wastewater.

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Bioremediation of Textile Azo Dyes by Marine Streptomyces

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Abstract The present study was carried out to explore the efficiency of marine *Streptomyces sviceus* in the bioremediation of reactive textile azo dyes by considering Congo red-21 as model dye. *Streptomyces sviceus* shows optimum decolourization of Congo red-21 in nutrient glucose broth at 96-h duration under static conditions. Toxicity of the degraded metabolites of Congo red-21 was assessed through phytotoxicity, genotoxicity, acute toxicity and cytotoxicity assays. The *Allium cepa* roots treated with Congo red-21 dye exhibited chromosomal aberrations like polyploidy interphase nucleus and vagrant chromosomes. In contrast, no significant changes were noticed with degraded sample of Congo red-21. These results demonstrate the non-toxic nature of the degraded sample of Congo red-21 on the growth of higher plants and further confirm the bioremediation potential of marine *Streptomyces sviceus*.

Keywords Bioremediation · Mitotic index · Acute toxicity · Streptomyces · MTT assay

1 Introduction

Textile industries predominantly employ chemical dyes compared to natural dyes because of their wide spectrum of colours and cost economy in production due to synthesis. Among the different textile dyes, azo dyes represent 70% and are widely used for dyeing different types of textile fabric material (Chen Cheunbarn et al. 2008). Azo dyes are integral part of textile industry, and they damage ecosystem through textile effluents during dyeing process. The release of azo dyes into the natural environment results into the conversion of azo group to toxic aromatic amines which are highly carcinogenic and mutagenic to humans (Jadhav et al. 2007; Lade et al. 2015). Further, the release of textile dye effluent into water stream changes the pH scale and increases the BOD, COD and total organic carbon of the water bodies (Mathur and Pradeep 2007; Lade et al. 2012).

The conventional wastewater treatment processes are unable to remove the reactive dyes due to their stability, colourfastness and resistance towards degradation.

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The recalcitrance of the reactive azo dyes is mainly due to the presence of ($-N=N$) which are of synthetic origin (Bafana et al. 2008). Due to their synthetic origin and complex fused aromatic structures, the reactive azo dyes are highly difficult to degrade by utilizing conventional effluent, treatment procedures such as pH neutralization, coagulation followed by biological treatment (Anajeneyulu et al. 2005).

For the last ten years, bioremediation is being adopted as an effective alternative method for degradation, mineralization and detoxification of azo dyes. Bioremediation is considered as an eco-friendly and cost competitive alternative to physicochemical degradation of textile effluents (Raja et al. 2016). The effectiveness of biodegradation depends on the adaptability and bioremediation potential of selected organisms (Gupta et al. 2011). Several microorganism including bacteria, fungi, algae and actinomycetes have been utilized for the degradation and mineralization of azo dyes.

Currently, there has been an intensive research on the application of marine actinomycetes in the degradation and mineralization of azo dyes. Actinomycetes are gram-positive filamentous bacteria widely distributed in terrestrial and marine ecosystem. Actinomycetes have a profound role in the marine system due to their adaptation to the low concentration of carbon substances for their growth and their ability to degrade xenobiotic compounds. The quantitative data on the decolorization and mineralization of reactive azo dyes by actinomycetes and its enzymes is limited. Thus, the development of novel decolorization method by exploiting the marine microbial community is need of the hour for effective removal of azo dyes from textile effluents. Keeping in view the significance of marine actinomycetes, the present study is designed to assess the bioremediation potential of marine ***Streptomyces sviceus*** by using congo red-21 as a sample dye.

2 Materials and Methods

2.1 Materials

The reactive azo dye Congo red-21 was collected from the retail vendors at Madanapalli and Puttur towns of Chittoor district, A.P., India. ***Streptomyces sviceus*** was isolated from marine sediment samples collected from the Bay of Bengal coastline of Nellore district of A.P. state. All other chemicals and solvents used were of analytical grade procured from SD fine and Sigma chemicals.

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3 Methodolgy

3.1 Decolourization of Congo Red-21 Under Static/Shaking Conditions

Streptomyces sviceus was cultivated for 48 h in 250 ml conical flask containing 100 ml of nutrient glucose broth, and the medium was supplemented with 400 mg/l of Congo red-21. The dye degradation activity of *Streptomyces sviceus* was determined under static and shaking conditions (150 rpm) at 28 ± 2 °C in orbital shaking incubator. An aliquot (3 ml) of the culture medium was withdrawn at regular time intervals and subjected to centrifugation at 10,000 rpm. The supernatant was collected and used for measuring the percentage of decolorization (Parvez. R et al. 2015).

3.2 Assessing the Toxicity of Dye and Degraded Metabolites

The bioremediation potential of *Streptomyces sviceus* KN_3 was assessed through genotoxicity, acute toxicity and cytotoxicity assay of Congo red dye and its degraded metabolites. Toxicity of the Congo red-21 dye and its degraded metabolites was analysed using *Allium cepa* as in vivo model.

3.3 Cytogenetic Analysis

The cytotoxicity of control and degraded Congo red-21 dye was assessed through the cytological changes in the cells of Allium cepa roots. The seeds were soaked in distilled water for 2 h and further placed on wet filter paper at 23–25 °C for germination under dark conditions. After germination, the Allium cepa seedlings were divided into three groups. Control group treated with distilled water, Group-II with untreated Congo red-21 dye and Group-III with treated Congo red-21 dye. After 72 h of treatment, root tips were carefully cut and fixed in a freshly prepared Carnoy fixative (3:1 v/v absolute alcohol and glacial acetic acid) and stored in 70% ethyl alcohol at 40 °C for 24 h.

Root tips of Allium cepa were thoroughly washed and hydrolyzed in HCl at 60 °C for 4–6 min. The tips were washed and stained with Fulgent reagent for 2 h (Navya et al. 2013). The deeply stained terminals of root tips were squashed in a drop of 45% acetic acid on a glass slide. After covering with cover slip and sealing, the slides were examined for measuring mitotic indices and frequency of mitotic abnormalities.

$$\text{Mitotic index(MI)} = \frac{(\text{Number of dividing cells in all phases of mitosis}) \times 100}{\text{Total number of counted cells}}$$

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$$\text{Abnormalities of Mitosis (\%)} = \frac{(\text{Total number of abnormal cells}) \times 100}{\text{Total number of dividing cells}}$$

3.4 Phytotoxicity

Toxicity of Congo red-21 and its degradation metabolites on germination of plants was assessed by using green gram and fenugreek seeds. The seeds were treated daily with 5 ml of parent Congo red-21 dye (400 mg/L) and its degraded metabolites. The length of root, shoot and the percentage of seed germination were recorded after 10 days.

3.5 Acute Toxicity Test

To study the effect of Congo red dye and its degradation metabolites, on fish mortality and their behaviour, acute toxicity test was conducted using zebrafish as in vivo model. The Congo re-21 dye degraded by the *Streptomyces sviceus* strain KN_3 was subjected to centrifugation at 10,000 rpm for 30 min. The supernatant was collected, filtered through membrane filters. About 100 ml of clear filtrate was taken in a beaker, and then, 24-h-old neonates of zebrafish were added. The experiment was carried out at room temperature for 48 h under dark conditions, and the number of immobile organisms was counted after exposing to light for 30 s.

3.6 Cytotoxic Activity Assay

The cytotoxic activity of the degraded metabolites was assessed by MTT assay (Lavanya et al. 2014) The effect of degraded dye sample on the cell viability was assessed through mitochondrial dehydrogenase activity (3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide) (Claiborne et al. 1979). Raw 264.7 cells (**Murine macrophages**) were seeded (2×10^4 cells/well) and incubated for 24 h at 37 °C in 5% CO_2 atmosphere for the adherence of the cells to the flat bottom of the 96-well plates. The cells were treated with different concentrations of Congo red-21 control and degraded sample (25, 50, 75 and 100 μg/ml) for 24 h. At the end of the incubation, media was removed and washed with 0.01 M PBS (pH 7.4) followed by the addition of 25 μl of MTT solution (5 mg/ml in PBS) to each well and incubated for 3 h at 37 °C. After incubation 0.1 ml of extraction buffer (20% SDS in 50% dimethylformamide) was added and incubated for 30 min to extract the purple-blue MTT Formosan crystals. The absorbance was measured at 540 nm using micro-plate reader (Biotek-255907), and the percentage of cell survival was calculated.

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4 Results

The effect of static and shaking conditions on rate of decolorization of reactive azo dyes was analysed at different time intervals (0–96 h). The maximum decolorization of Congo red-21 was noticed at all-time points under static conditions. *Streptomyces sviceus* showed 70% of decolorization under shaking condition, and the rate of decolourization was accelerated to 90% under static (Fig. 1).

4.1 Effect of Congo Red-21 and Its Degraded Metabolites on Root Elongation

The effect of Congo red-21 control dye and its degraded sample was tested on the root elongation of Allium cepa. The root growth was totally blocked in the presence of control dye, and on the other hand, the effect of dye properties on the root growth was reduced to 50% after degradation by *Streptomyces sviceus* (Fig. 2). The average length of Allium cepa root accounts to 4.36 cm after 72 h of growth in the presence of water. In contrast, the dye control restricted the root growth to a level of 0.85 cm, whereas in the presence of degraded sample, the root growth was 2.86 cm which was found to be nearly 60% of root length with water (Table 1).

4.2 Cytogenetic Analysis of Congo Red-21 Dye and Its Degraded Products

Allium cepa is considered as a remarkable genetic model to assess the genotoxic effects of Congo red-21 and its degraded metabolites. The inhibitory effect of Congo red-21 dye on elongation of root length was due to the aberration in mitosis of growing cells. From the microscopic observation of the section cuttings, it was observed that the number of undivided cells was high in Congo red dye treated root tips. The

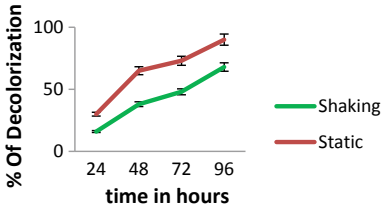

Fig. 1 Rate of decolorization of Congo red-21 under static and shaking conditions [Values are expressed in the mean ± SEM of three independent experiments. Statistical significance 1% level ($p \leq 0.01$)]

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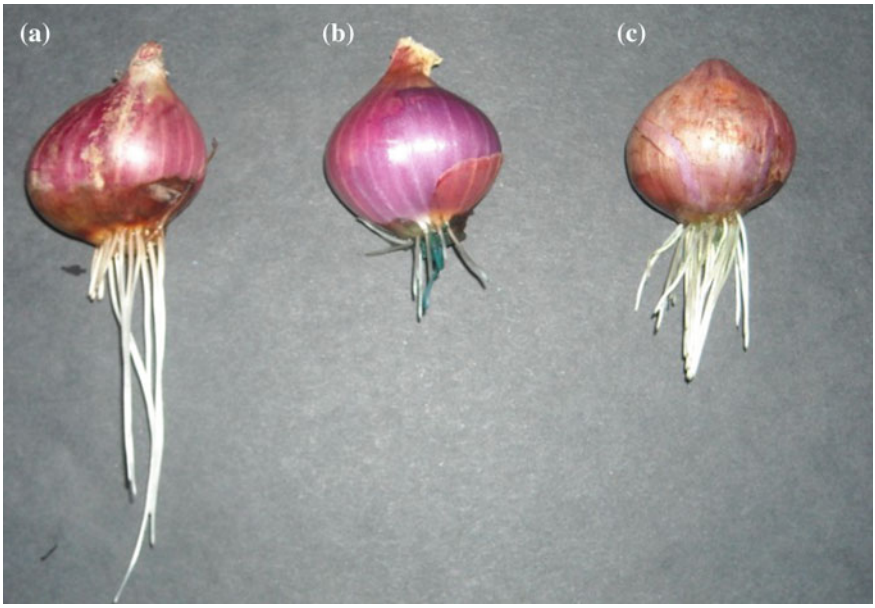

Fig. 2 Influence of Congo red-21 dye and its metabolites on root elongation of *Allium cepa.* **a** Water control, **b** Congo red-21 dye control, **c** Congo red-21 dye degraded sample

Table 1 Elongation of Allium cepa roots

Particulars		Root length ± SD (cm)
Water control		4.36 ± 0.26
CR-01 dye control		0.85 ± 0.32
CR-01 degraded sample	(400 mg/l)	2.86 ± 0.30

number of dividing cells and mitotic index (MI) was found to be high in the roots treated with degraded dye sample which indicates the nontoxic nature of degraded dye was represented in Table 2.

In order to detect the genotoxicity of Congo red-21 and its metabolites, the four phases of cell division were considered to measure the chromosomal aberration. The Allium cepa roots treated with Congo red-21 dye exhibited polyploidy interphase nucleus, C-metaphase, spindle disturbance at anaphase, disoriented chromosome, sticky chromosome and vagrant chromosomes (Fig. 3). In contrast, no significant changes were noticed with degraded sample of Congo red-21. The results demonstrate the nontoxic nature of the degraded sample on the growth of higher plants and further confirm the bioremediation potential of *Streptomyces sviceus* (Fig. 4).

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Table 2 Mitotic index of Allium cepa root tip cells exposed to Congo red-21 dye and its degraded metabolites

Treatment	Number of cells analysed	Number of dividing cells	% of Mitotic index
Water	172	82	47.67
Congo red-21 control dye (400 mg/l)	91	9	9.89
Congo red-21 degraded with *Streptomyces sviceus*	158	45	28.48

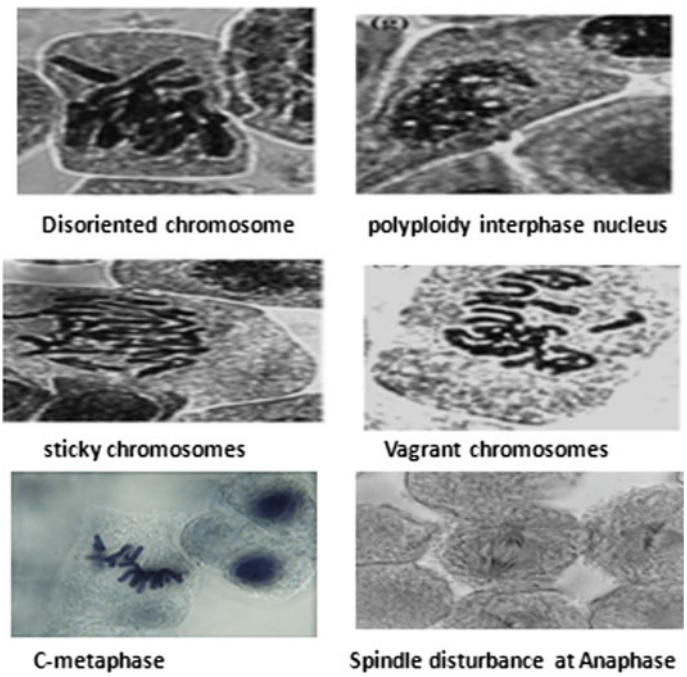

Fig. 3 Photomicrographs of meristematic cells of *Allium cepa* roots treated with the Congo red-21 dye

4.3 Phytotoxicity of Congo Red-21 Dye and Its Degraded Products

The germination percentage of green gram seeds was studied to assess the phytotoxicity of degraded metabolites of Congo red-21. The seedlings of green gram showed 2.1-fold (80%) higher germination rates with degraded Congo red-21 sample in comparison with control dye (38%) (Table 3). The length of plumule and radi-

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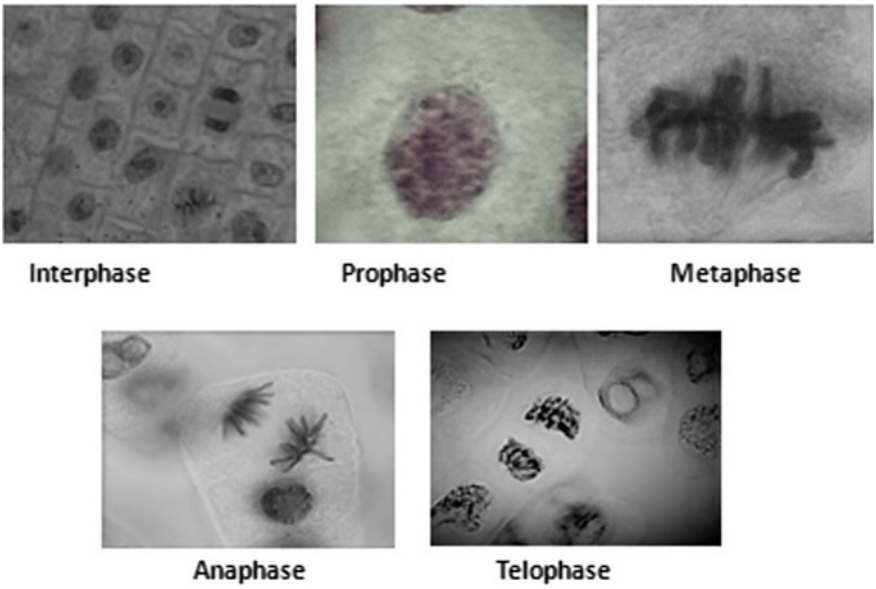

Fig. 4 Photomicrophs of meristematic cells of Allium cepa roots treated with Congo red-21 degraded with *Streptomyces sviceus*

cle was observed to be significantly affected by Congo red-21 parent dye than their metabolites, indicating less toxic nature of degradation metabolites as compared with parent dyes (Fig. 5).

4.4 Acute Toxicity Test

The acute toxicity assay was carried out in water containing Congo red-21 (400 mg/L) and different concentrations (100, 250 and 400 mg/l) of degraded Congo red-21 sample. The results of the toxicity assay are tabulated as per cent death of zebrafish. The percentage mortality was found to be high at all concentrations. In contrast, the degraded sample with 400 mg/l dye concentration showed mortality from 3 to 11% at different time intervals (Table 4). These results suggest that release of untreated Congo red-21 dye is a critical concern to the environment and human health, whereas dye treatment with *Streptomyces sviceus* could be used for detoxification and mineralization of azo dyes (Fig. 6).

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Table 3 Influence of Congo red-21 dye and its degraded metabolites on germination of green gram seeds

Samples	Percentage of germination										Average shoot length (cm)	Average root length (cm)
	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Day9	Day10		
Control (water)	0	29	42	53	67	79	88	100	100	100	17.9 ± 0.351	3.5 ± 0.351
Degraded Congo red-21 Dye	0	20	31	39	47	54	62	69	77	80	16.1 ± 0.833	2.9 ± 0.436
Congo red dye	0	6	10	13	18	24	30	32	36	38	10.2 ± 0.100	1.8 ± 0.361

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Fig. 5 Effect of Congo red-21 dye and its metabolites on the growth of green gram seedlings

Table 4 Effect of Congo red-21 dye and its degraded metabolites on mortality of fish

Time (h)	Mortality degraded sample (%)				
	Distilled water	Congo red-21 control 400 mg/l	Degraded sample		
			100 mg/l	200 mg/l	400 mg/l
6	0	52 ± 0.2	0	0	9 ± 0.1
12	0	80 ± 0.4	0	10 ± 0.4	17 ± 0.1
24	0	87 ± 0.3	0	22 ± 0.6	40 ± 0.6

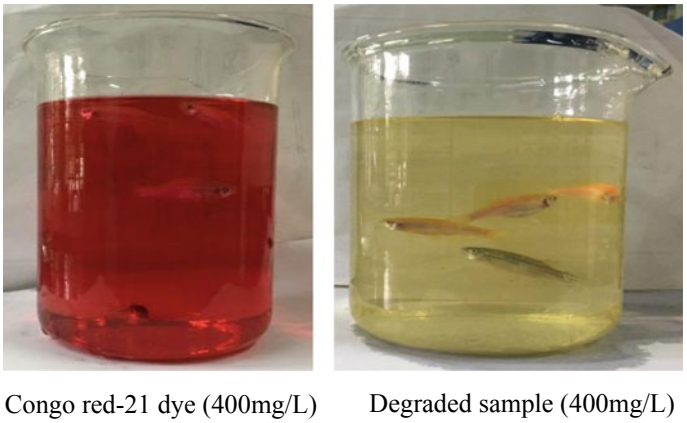

Fig. 6 Toxicity of Congo red-21 dye and its degraded metabolites on existence of zebrafish

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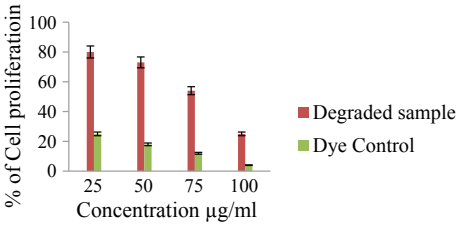

Fig. 7 Cytotoxicity of Congo red-21 and its decolorized sample against RAW 264.7 cells (values are expressed as the mean ± SEM of three independent experiments statistical significance 1% level ($p \leq 0.01$))

4.5 Cytotoxicity of Degraded Products

MTT assay was carried out to analyse the toxic nature of Congo red-21 dye and degraded metabolites on the cell proliferation of RAW 264.7 macrophages. The assay was performed with different concentrations (25–100 µg/l) of degraded product.

The proliferation of RAW 264.7 macrophage cell lines was inhibited due to the toxic nature of Congo red-21 control dye. In contrary to the parent dye, 30–80% of cell proliferation was noticed with varying concentration of degraded samples shown in (Fig. 7). The visibility of cell proliferation even at higher concentration of degraded products confirms mild interference and nontoxic nature of the degraded product and further, the bioremediation potential of *Streptomyces sviceus* strain KN_3 (Fig. 8).

5 Discussion

The discharge of azo dyes, through textile effluents, into the water stream and soil may escalate the pollution. The environmental and health hazards of textile dye effluents have been a subject to research scrutiny for a long time. The present research originated based on the need to gaze into bioremediation potential of *Streptomyces sviceus isolated from marine sediment samples.*

The cytotoxicity, mutagenicity of the azo dyes were analysed though root shape, elongation, mitotic index and chromosomal aberrations (Misra and Fridovich 1972). The decrease in root growth to an extent of 45% represents the toxic of the xenobiotic compounds on the plants (Wierzbicka M. 1999). Our results demonstrate the cytotoxic nature of Congo red-21 dye and nontoxic properties of its degraded metabolites. Mitotic index (MI) is the hallmark for estimating the frequency of cellular division and inhibition of mitotic activities which are the indices to mark the cytotoxicity of the synthetic as well as natural compounds (Amin et al. 2002). Reduced MI is due to the inhibition of DNA synthesis, and decrease in mitotic index is considered as an important indicator to pollution in affected environments, particularly at the sites

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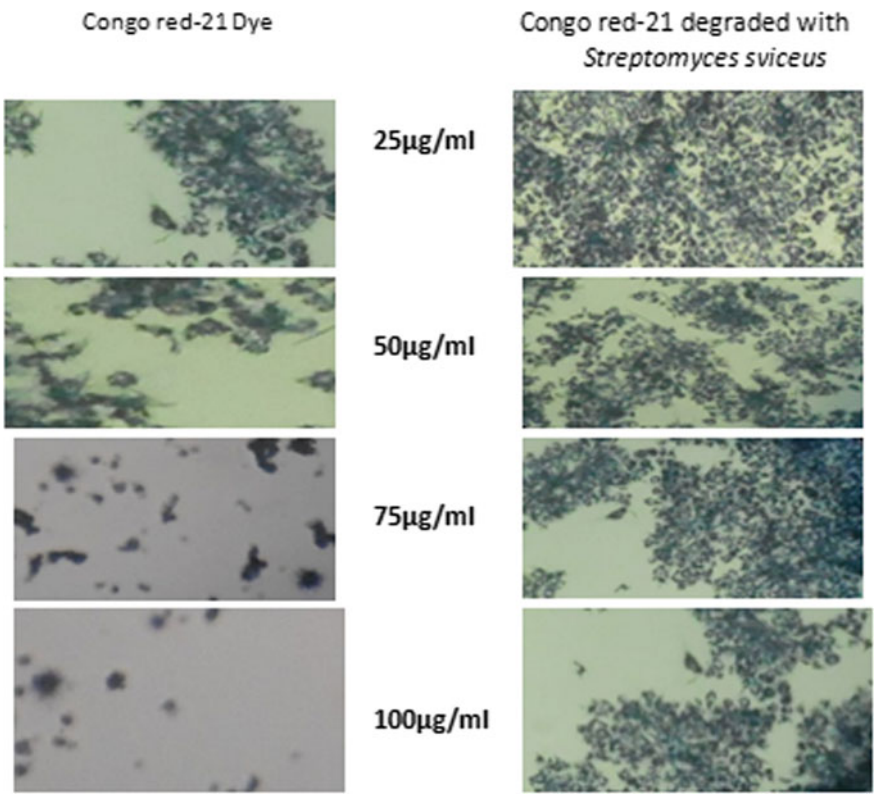

Fig. 8 Proliferation of RAW 264.7 cells in the presence of Congo red-21 dye and its degraded products

contaminated with azo dyes (Marcano et al. 2004). In the experimental study, mitotic index of degraded Congo red-21 sample was lower than that of water control, and in contrast, the mitotic index was improved significantly in *Allium cepa* meristematic cells treated with degraded dye sample. Decrease in mitotic index was reported with orange red dye and CI disperses blue 291 (Tsuboy et al. 2007). The reduced MI is attributed to the onset of prophase, blocking one or more mitotic phases (Pillai et al. 2011). Chromosomal aberrations were assessed to detect the genotoxic activity of Congo red-21 dye and its degraded metabolites. The meristematic cells treated with Congo red-21 dye represented the most common aberration like polyploidy interphase nucleus, C-metaphase, sticky metaphase with chromosomal adherence, spindle disturbance at anaphase and vagrant chromosome. The chromosome adherence may be an indicator for genotoxic effect of azo dye which may result in irreversible cell damage and necrosis. The disturbance at spindle prevents the migration of the chromosome towards the pole and chromosomes become attached to results to each other through bridges and results in the condensation and chromosome, stickiness (Pillai

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et al. 2011). Chromosome adherence or stickiness indicates the toxic effects of xenobiotic compounds which are irreversible and leading to death (Kalyani et al. 2008). This report is in correlation with our results, where reduction in mitotic index was noticed with Congo red-21 dye. These results clearly suggest the cytotoxic effect of Congo red-21 dye and the nontoxic nature of degraded metabolites.

The bioremediation potential of *Streptomyces sviceus* was assessed through phytotoxicity assay. The phytotoxicity of the dye was detected by measuring the potential of Congo red-21 dye and its metabolites on the germination of green gram seeds. The results show that the degraded metabolites were not toxic to germination of green gram seedlings and good growth of plants was observed when compared to control.

Evaluating the toxicity of azo dyes before and after degradation of bacteria is necessary as the dye and their metabolities are phytotoxic and toxic to aquatic and human health (Phugare et al. 2011). Acute toxicity tests by using Daphnia magna or zebrafish as in vivo model are well-known screening method for analysing the lethal toxicity of xenobiotics and their metabolites to animal and human health. The relative toxicity of Congo red-21 and its degradation product after treatment with *Streptomyces sviceus* strain KN_3 were studied by acute toxicity with zebrafish.

The cytotoxic effect of Congo red-21 dye and its degraded metabolites on RAW 264.7 macrophages was studied by MTT assay. Befana and chakrabarti 2008 reported the cytotoxicity of DR 28 dyes at different levels of biodegradation by biodegradation by *Bacillus velezensis*.

The mouse fibroblast cell line was used as in vitro model for assessing the cytotoxicity of red 141 and reactive red 2 dye degraded by *Bacillus lentus* (Kumar and Bhat 2012). Our results explained the nontoxic nature of degraded sample by promoting cell proliferation of RAW 264.7 cells.

6 Conclusion

From the present study, it can be concluded that *Streptomyces sviceus* is highly potential in the detoxification of the reactive azo dyes, particularly Congo red-21 dye. Thus, the present research study provides ample evidence for bioremediation of azo dyes by marine Actinobacteria.

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Use of Sewage to Restore Man-Made Waterbodies—Nutrient and Energy Flow Regulation Approaches to Enabling Sustainability



Seema Sukhani and Hoysall Chanakya

Abstract Sewage ingress into lakes and man-made waterbodies have for long been considered a "Tragedy of the Commons", and numerous attempts have been made to avoid them. Agriculture development and urbanization send nutrient and C laden run-off/sewage into these waterbodies causing eutrophication. This study shows that with minor interventions involving anaerobic digestion for C/N removal and managing trophic levels to lower bacterial biomass at the inlet points can reduce the daily nutrient and energy budgets into these waterbodies while providing much needed water to compensate for daily evaporation (2.5–4 m/year) and maintaining water levels in them. From an understanding of regulating trophic levels, this minimal nutrient and energy input to the waterbody can be managed to raise fish and birds or only harvested fish so as to primarily keep the water quality at a desirable level while also sustaining the waterbody round the year without need for freshwater inputs for long periods, thus converting the "tragedy of the commons" to a "blessing of the commons".

Keywords Man-made waterbodies · Restoration · Lakes · Anaerobic digestion · Protozoa · Ecosystem · Trophic levels · International society of waste management · Air and water

1 Introduction

Sewage ingress or its increasing use to fill up man-made waterbodies alters the balance of the aquatic or near freshwater ecosystems such as lakes and tanks causing them to function less efficiently. It contains significant quantities of nutrients which are otherwise limiting in natural waterbodies and mechanisms to handle these needs to be sought. Such nutrient ingress results in higher primary productivity in terms of excess growth of algae, plants and cyanobacteria and this phenomenon is known as eutrophication. Disposal of sewage has been a major issue in urban and peri-urban areas and its entry into waterbodies is becoming inevitable. Nutrient inputs into such

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waterbodies have always been considered a liability, while in reality it can now be converted into a blessing. With installation of self-managing sewage treatment systems within a lake, most of these nutrients can be converted into useable resources in terms of energy, fodder and human food including food for other animals (biogas, algal biomass, fish and water birds). However, there is a gap in understanding the balance between nutrient/C loads in effluent of treatment system and their effect on aquatic ecology and self-purification capacity of waterbodies. In this paper, we attempt to show how to convert this "Hardins-Tragedy of the Commons" to a "Blessing of the Commons".

It is now well understood that aquatic ecosystems such as lakes and tanks operate as semi-closed input-output ecosystems (Hannon 1973). The focus while understanding management of lakes had been directed to eutrophication (primary producers), predators (zooplanktons) and improving water quality. Effects of primary producers both in bottom-up (nutrient input to fish/birds) and top-down cascade (fishes-phytoplankton/bacteria) types of aquatic systems have been used in management of tanks. Not until recently, new water quality indicators and control methods had been investigated, and one of emerging approach now uses fish biomass and its harvesting as an important indicator for nutrient harvest and control systems for water quality management (Sosa-López et al. 2005). Such indicators and knowledge about different trophic cascades can be a decisive factor for site-specific management plans for solving water quality problems and re-establishing biotic community (Hansson et al. 1998). However, very little research effort is invested in understanding changes among food web properties across environmental conditions of such man-made aquatic ecosystems. Inspiration can be taken from marine biology where focus has not only been on establishing direct control on producers but integration of other trophic levels and developing a holistic picture. Thus, the completion of a food chain provides an equally effective control mechanism for reducing eutrophication or nutrient ingress in such aquatic systems. Another important factor which has not been receiving proper attention is the impact of secondary treated water on food webs. Most of the organisms' energy is stored in organic carbon bonds within the plant and animal biomass and ~45–55% of dry weight of living entities in freshwater accounts for carbon (Vitousek et al. 1997). This C can very well said to be currency of energy transfer (Dodds 2002). Thus, here we will attempt to understand carbon balance and metabolism at different trophic levels of lake which have an integrated two-stage input sewage treatment unit upstream and trophic levels as shown in Fig. 1.

The main objective is to understand change in flow of carbon and organisms from grazing or production food chain to mineral food chain when selective biological intervention is made and how subsequent trophic levels will be affected.

2 Discussion

2.1 Raw sewage cannot be let directly into the lakes. In Fig. 1, two scenarios have been shown which highlight the effect of quality of influent on lake ecology.

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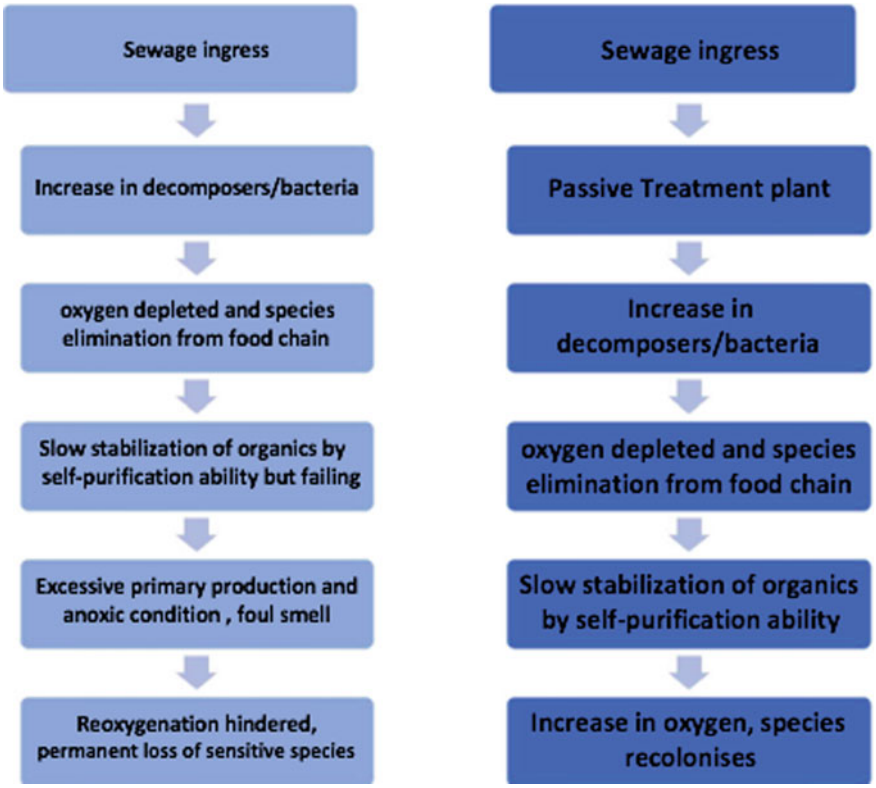

Fig. 1 Effect of quality of influent on lake ecology

1. Near saturation or more load will cause DO to drop significantly. The self-purification process is slow (as the only basis of material exchange is through diffusion and organisms), thus a considerable area from point of discharge will seem polluted. Often the only organisms to flourish will be sewage bacteria, fungus, certain worms and fly larvae. Some species of animals (catfish) and plants (floating hydrophytes, e.g. water hyacinth) may also survive, but it will eradicate endemic species in that area especially fishes. Facultative anaerobic bacteria also thrive in such environment giving off foul smell. Phytoplankton, which can survive in severe organic pollution, will start metabolizing intermediates/exudates (acetate) of anaerobes, hindering reoxygenation. Without any aid and continuous discharge, lake area will remain anoxic and obviously polluted.
2. Treatment plant near the discharge point will bring the influent quality near sub-saturation level. Any leftover organic pollutant apparent after this point will disappear within a short distance in the lake through natural process. Mild pollution can be actually beneficial to waterbody, as it will increase the nutrient and energy supply to micro-organisms and enhance primary productivity. It will not only make the water reusable, but also give returns in terms of energy-rich algal

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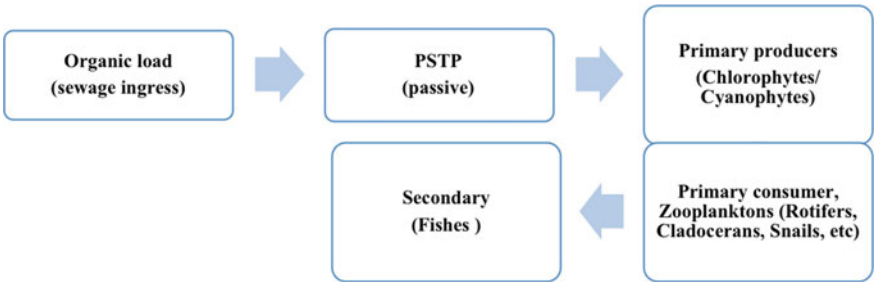

Fig. 2 Schematic of treatment plant and trophic levels in lake

biomass or animal fodder and top most trophic level, i.e. fishes which can be used for human/animal consumption.

2.2 We are using trophic cascade concept to understand aquatic ecology modification due to changes in water source and using simple 3-level cascade in lakes after treatment. This cascade from phytoplankton to fish attempts to simplify the true representation of real-world complexity of food web for the current discussion without diminishing the importance to look at this as a complex interlinked system. Thus, these generalizations will be a foundation in understanding complex interactions of other minor groups and their interactors with the ones mentioned above (Fig. 2).

2.1 Passive Treatment Sewage Plant

Proposed unit is two stages with first stage to be anaerobic and second stage to be phytoflagellate/protozoan driven. In the anaerobic reactor, the phenomenon causing mixing is sludge upwelling as shown in Fig. 3. The details of design and laboratory scale systems that provide the necessary mass/energy balance are published elsewhere.

This reaction system is followed by action of phytoflagellates and protozoans, which play a dual role being grazers on planktons and heterotrophic bacteria, while also stabilizing inorganic carbon through photosynthesis. These communities may itself regulate plankton biomass and turbidity by grazing. Being flagellated, they have the capability of vertical and horizontal movements, which in turn makes them ideal bio-convectors. However, they also pose a problem of an inability to generalize the process with regards to compartmentalizing nutrients and energy to each trophic level. Nevertheless, they are important actors in treatment of sewage and their functional role in a full-scale system is another study objective which will be in focus for future studies.

As mentioned in an earlier publication, the peak wastewater input required to maintain a 10 ha waterbody would be 1 MLD that compensates for the evaporation from the waterbody surface. Schematic of reduction in carbon and other nutrients

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Fig. 3 Sludge upwelling in anaerobic reactor increases mixing with fresh input water, increases active bacterial number over a hundred-fold and reduces holding time to 8–16 h

is shown in Fig. 4. The reduction in nutrients has been extrapolated from various lab and field studies (plant under construction). The dominant phytoflagellates are mostly Euglenoids.

Total residence of water in treatment unit is 3 days, in which approximately 75% carbon, 50% nitrogen and 25% phosphorus is reduced. Partially treated water from this point enters the lake, where total residence is 263 d. Most likely because of light availability and soluble nutrients, Chlorophyceae will follow. Nitrogen and phosphorus content is about 10–17 and 1–1.5% of algal DW (Wang et al. 2010). Thus, considering 50% nutrient transfer, per day primary production is expected to be ~30–150 kg/d, which is well under the grazing limit by primary consumer.

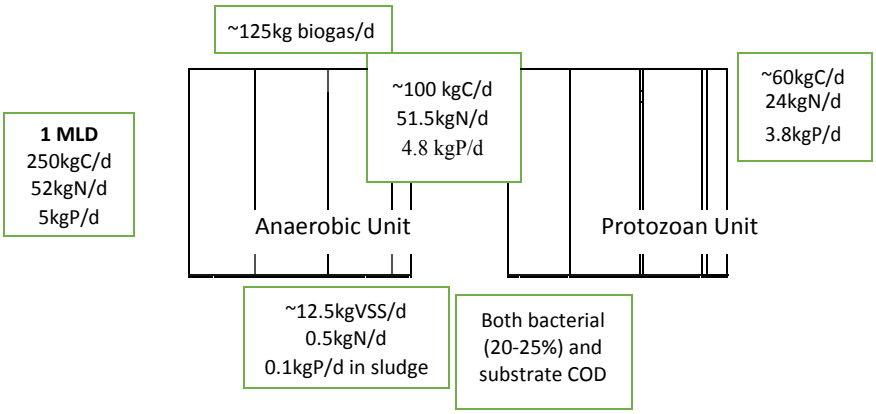

Fig. 4 Overall schematic of PSTP and trophic levels

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2.4 Rotifers, cladocerans, snails and crustaceans are major groups of primary consumer, but cladocera are key players in lakes/waterbodies and dominate the zooplankton community both in species, biomass and abundance (Walseng et al. 2006). With their large body sizes, edibility for planktivorous fishes and faster clearance rates, Daphnia spp. (cladocerans) are major actors in trophic cascade (McQueen et al. 1986). Large Daphnia have been reported to filter efficiently algae with cell diameters between 1 and 30 μm and are a major grazer. For this reason, in this paper, Daphnia are used as representative of all grazers and primary consumers. They have a capability to consume ~0.18 mg algae/day per cell (calculated from Mcmahon and Rigler 1965), and their natural abundance is in range of 106–7 cells/ml. Considering a high value of 50% carbon transfer, biomass of grazer is expected to be 30–70 kg/d. This in turn translates to fish productivity of ~15–30 kg/day. Thus, total revenue which can be generated from a 1 MLD plant is 125 kg biogas (60% methane), 100 kg algae dry weight and ~20 kg fish. As for bacteria, viruses and saprophytes, current knowledge about their diversity is still limited, and hence, they have not been addressed here, although clearly they are key components of food web. Fish production can either be controlled by appropriate harvesting techniques for human use or the waterbody may be allowed for bird preserve with an appropriate stocking density of different feeding types. This latter approach not only avoids human consumption but can increase avian biodiversity in the location. This waterbody when used for education or recreation can provide higher daily revenue than fish harvest and can be made a lot more economically sustainable and has been discussed previously.

3 Conclusion

Understanding of phytoflagellates in slightly intervened environment and their trophic role and interaction with other communities is still an open area of research. This, when combined with an anaerobic reactor to remove organic C and some N, can be effectively used to restore and sustainably maintain waterbodies even in areas where sewage/nutrient ingress into aquatic systems threaten waterbody health and sustainability. Man-made lakes and tanks receiving sewage (treated or raw) possess a status far from freshwater status and can be sustained with this approach wherein, in future some foundational works need to be done. Real-time understanding of all trophic levels under various nutrient conditions and changes with respect to abiotic factors has yet to be gained. There is thus a need to modify our current understanding and approach to use of water quality indicators and traditional trophic levels established for freshwater for these man-made waterbodies.

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Two-Stage Passive High-Throughput Sustainable Sewage Treatment Process: Laboratory Study and Future Scope



Seema Sukhani and Hoysall Chanakya

Abstract Large volumes of sewage need to be handled in the emerging SDG 6 scenario, and low energy/maintenance options are required for distributed and unattended situations. In this direction, a novel two-stage system was developed consisting of a primary anaerobic digestion followed by protozoan/phytoflagellate bacteria/residual OM (organic material) removal stage. Anaerobic purification by sludge upwelling found naturally in idle lagoons was firstly emulated and hastened by encouraging deeper sludge beds that upwell, disperse sludge and maintain high MLVSS without need for mechanical sludge recirculation. In the second stage, a Euglena-driven system that removes mixotrophically, bacteria and residual solids provide reasonably acceptable treated water quality at a HRT < 2d. In this paper, we discuss the preliminary findings. Overall reduction of 70–80% COD, 55% TKN, 25% P and >90% turbidity was achieved. While optimization and in-depth understanding of functionality are being investigated, this system appears to be a good alternative to conventional treatment technologies where space constraints are less and distributed treatment with low interventions is required.

Keywords Wastewater treatment · Passive natural process · Protozoa and phytoflagellates · Anaerobic treatment

1 Introduction

As the world seeks to address sustainable development goals (SDG6) such as sanitation and clean water, providing a household level or decentralized village/town level sewage treatment systems become very important. Sustainability criteria demand the use of less expensive systems as well as low energy options. Towards this, passive decentralized systems are essential where treated water has qualities acceptable at least for surface irrigation or local reuse. The problem is exacerbated when the barely treated sewage flows into nearby natural and man-made water bodies such as lakes and tanks which are generally deprived of natural run-off that was prevalent in the

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past. To these locations, these withering waterbodies have been the most sustainable sources of water and have been the lifeline in arid/semi-arid regions of India. Traditionally in India, these man-made water bodies were fed with only rainwater (run-off) and were interconnected as a cascade. Water collected was used for both irrigation and domestic purposes throughout the year. However, due to the changing land-use pattern, diversion of valley systems and climate triggered weather patterns, loss of interconnectivity, catchment area changes and point discharges of sewage and human wastes, these water bodies have lost their capability for self-purification and water is far from reusable quality.

As indicated above, any new sewage generated from providing total sanitation will need to be treated and reused to meet sustainability goals. National programs in India emphasize this. Thus, while restoring water bodies at locations with a significant change in land-use patterns, including urbanization, we need to treat such decentralized wastewater in a passive and low energy approach. We seek to evolve new ways to treat these two types of wastewater. Firstly, evolve a treatment system that can work starting from a household (HH) level in rural, peri-urban and urban locations (daily discharge 250–400 l) to 1MLD levels for preventing water bodies from eutrophication, function as pre-treatment methods before the wastewater is returned to lakes and man-made water bodies. Firstly, the possibility of using this passive two-stage process is discussed for maintaining a water body for which run-off alone has become insufficient to hold enough water on a yearly basis. To solve this problem, we attempt to top-up the evaporative losses by using treated/partially treated sewage as water source with a passive treatment system constructed within the lake body. A new passive treatment technology is required which can overcome difficulties encountered while installing traditional STPs. Activated sludge process and SBR are most commonly applied treatment technologies in India but their high economic demand (~ Rs. 34–73/kL CPCB 2007) depending on level of treatment achieved, sludge production and disposal problems, technical expertise and no direct economic return make them inviable to adopt. Thus, conventional processes are not ideal for this purpose. Yet, natural water bodies remove pollutants through a combination of physical, chemical and biological processes (Skurlatov 1988; Koronelli 1996). Our main objective is to focus on biological energy and material transfer between different trophic levels and their role in treatments. The general trend is anthropogenic wastewater or agricultural run-off extended anoxic/anaerobic zone-phytoflagellates/ciliates/protists—algae—rotifers/cladocerans/snails/crustaceans—fishes—birds. In earlier publication, we proposed a passive treatment plant which would work on the principle of natural purification of water bodies while treating incoming sewage in 2–3 days to irrigation water quality by facilitating and optimizing each stage of natural purification.

In this proposed novel process, functional roles will be discussed for the first two stages using from experimental data (1L). First unit or stage is an anaerobic system, being most efficient carbon removal systems with approximately 70–80% of removed soluble/particulate carbon being converted to the gas phase. The by-product gas (~0.11–0.3 m^3/kg BOD) is an energy source when if collected can make the treatment economically sustainable. Sludge production is also less (2–10% of BOD removed) due to the lower growth and energy transfer in anabolic activities of

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anaerobic bacteria. Following this in the second stage, phytoflagellates, ciliates and protists which engulf suspended bacterial mass to finally reduce residual BOD and turbidity to levels <20NTU. Phytoflagellates are most abundant eukaryotic plankton in freshwater. Mixotrophic phytoflagellates (e.g. Euglenoids, Dinoflagellates) are known to provide both functions of protozoa and algae and are crucial actors in maintaining balance in biological system. Apart from being photosynthetic and using inorganic carbon to give off oxygen, they eliminate excess bacteria (Bird and Kalf 1987), cyanobacteria (Cole and Wynne 1974) and other algae, promote flocculation (e.g. Ochromonas, Aaronson 1973a, b) and help to decrease turbidity of effluent as well as BOD and suspended matter (Gerardi 1995; Curds 1968). These organisms have also been reported to release exoenzymes for extracellular digestion especially for flocculated and colloidal particles (Sanders and Porter 1988). Clearance rates (through both by ingestion and aid of enzymes) have been noted to range from $10^{3–4}$ bacteria/ml h. During some of laboratory experiments, approximately 7–77 bacteria have been found ingested per flagellate per hour depending on species (Sanders and porter 1988).

These studies suggest that mixotrophy (utilization of particulate food and dissolved organic matter), as well as photosynthetic fixation of organic matter in phytoflagellates, is a balanced process that can be regulated by environmental conditions possibly light or availability of soluble nutrients (nitrogen and phosphorus or vitamins) or both. Many observational and laboratory studies have reported of phagotrophy in phytoflagellates but so far no attempt has been made to use multiple consumption mode of these unique organisms in wastewater treatment. In this study, we have employed only two stages namely anaerobic digestion followed by the protozoan reactor to demonstrate a novel technique for in-line treatment of sewage to restore water bodies or to be applied as passive decentralized small-scale sewage treatment plants.

2 Materials and Methodology

Synthetic wastewater was used to study the treatment capability of anaerobic unit (4L) and protozoa (1L). The composition of media was kept constant throughout the experiment apart from during shock load (near 70d). Composition of media was 0.4 g/L—rice powder, 0.25 g/L—milk powder, 0.05 g/L—urea and 0.025 g/L—KH_2PO_4 with estimated COD of 640 mg/L, emulating typical sewage. The operating mode was fed-batch (fed twice in a day).

Filterable and total COD measurements were made for effluent from anaerobic reactor. MLVSS was estimated periodically. In order to understand the functional role of protozoa (1L), reactors were set up and operated in a similar mode as that of anaerobic system. The input for these reactors was effluent from anaerobic reactor described above. As light is an important factor, illumination with white LED was arranged (2 k lux) and nutrient reductions were monitored in both light and dark conditions. All the testing methods were from APHA. For stage 1, SVI, MLVSS

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through gravimetry, turbidity and COD are reported, whereas for second unit TKN with titrimetry, total phosphorus through persulfate digestion, nitrate, nitrite through cadmium reduction and turbidity along with COD were measured for stage two.

3 Results and Discussion

Stage 1: Anaerobic digestion has been applied for the treatment of various industrial and household wastewaters. The reactor set-up was operated in up-flow mode. The wastewater was introduced at the bottom of the tank, where sludge bed was maintained. The operation was at 27% (v/v) sludge volume with SVI of 27 ml/g VSS. The MLSS at time of operation was 6.4–8.2 g/L. Figure 1 shows total COD reduction for 75 days. While conducting this experiment, the reactor was already in steady-state condition. To establish functionality and kinetics of total reduction, total load was always kept below 1 kg COD/m^3 d. (~0.6 kg COD/m^3 d), which emulates sewage wastewater. To understand disturbances such as overload, from 70th day, load is increased to ~1.4 kg COD/m^3 d. This sudden load caused sludge to come out and a sudden dip in total COD reduction. Although within 5d, reactor had started to stabilize again. This will be monitored further for behaviour under different types of shocks.

Average COD reduction achieved so far has been 55% with 0.79/d of decay rate constant. Nitrogen and phosphorus removal in the reactor is >10%; thus, data is not shown here. The average turbidity of effluent from this stage was 110–180 NTU.

Stage 2: Traditionally, application of anaerobic technology is only as a pre-treatment due to negligible removal of nutrients such as nitrogen and phosphorus and the presence of these cause high algal growth when disposed of directly and restrict its reusability to only agricultural lands. Phytoflagellates and protozoa due to

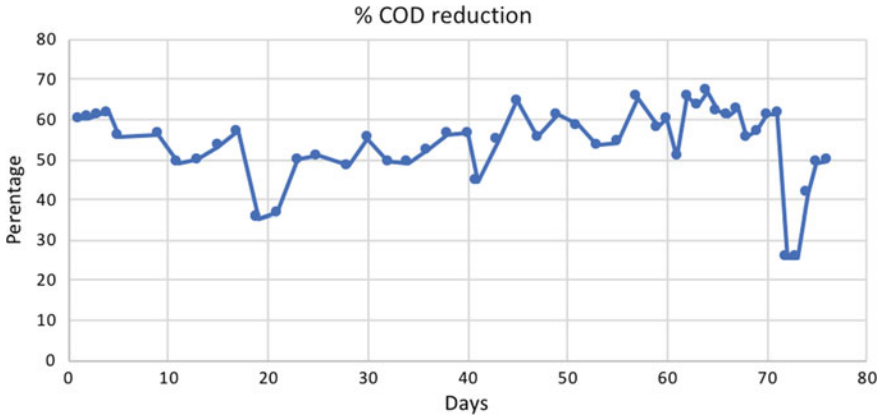

Fig. 1 COD reduction of 75 days in stage 1 anaerobic sludge bed reactor

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capability of exhibiting multiple growth modes (Unpublished data, CST 2018) can remove a significant level of these nutrients.

The effluent from the first reactor was used as input of protozoan/phytoflagellate reactor. Figures 2, 3 and 4 show per cent and average removal of nutrients, COD and turbidity. To understand different modes and partition, the reduction levels between heterotrophic/phagotrophic and autotrophic/phagotrophic, experiments were conducted in light and dark. To the best of our knowledge, this has been not attempted before. The light requirement of phytoflagellates is significantly low, and it was necessary to maintain light limitation so as to maintain stable condition for them. Thus, 2000 lx (~30 $\mu M/m^2$ sec) of white LED illumination was provided. Although other intensity of lights was studied, this seemed to give the best results (Unpublished data, CST 2018).

In dark, due to the lack of photosynthesis, only two modes of nutrition can be functional. Either residual carbon source in particulate or soluble form is taken up or

	Parameter	% reduction
Light	COD	30
	TN	50
	TP	31
	Turbidity	70
Dark	COD	20
	TN	13
	TP	17
	Turbidity (%)	52

Fig. 2 Removal capabilities of phytoflagellates in light and dark in stage 2 reactor

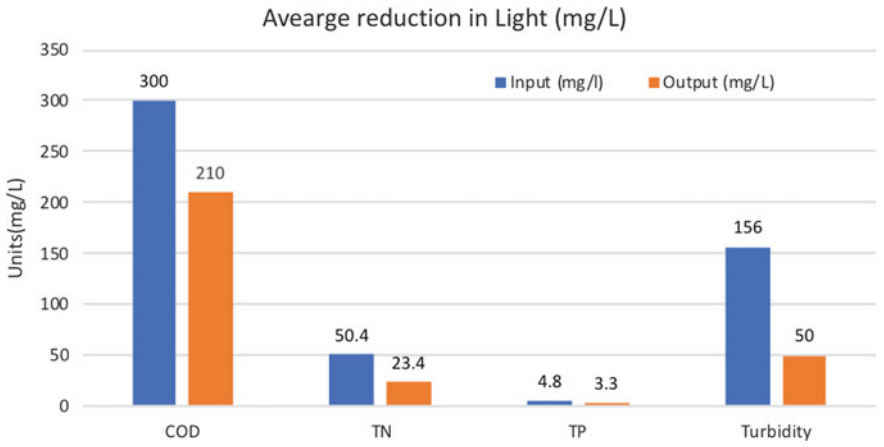

Fig. 3 Average overall performance and nutrient reduction under illumination

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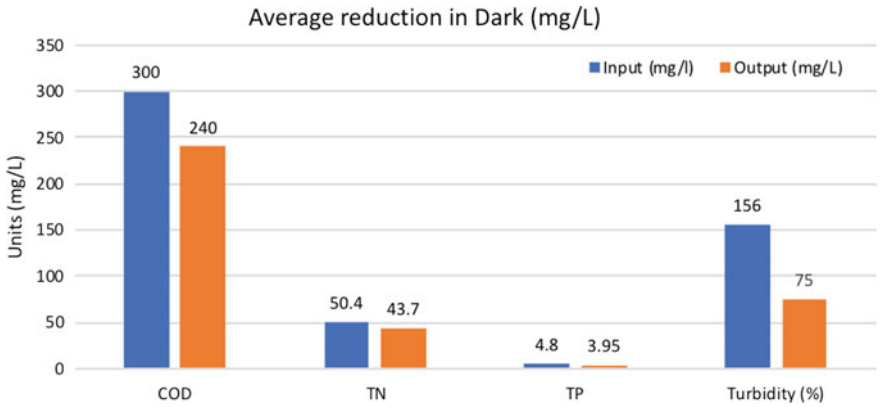

Fig. 4 Average overall reduction in dark

bacteria are being engulfed. In both cases, turbidity and COD from water are removed as shown in Fig. 3. However, the most interesting part is removal of additional COD and turbidity under light, which is counterintuitive as during illumination, inorganic carbon can also be fixed and total COD is expected to increase. This needs further research.

Apart from being an effective disinfectant, there is significant nitrogen and phosphorus removal as well (50 and 30%, respectively). This will ultimately reduce nutrient and C load on the discharge side. Adverse environmental factors such as low light, high bacterial turbidity and particulate forms of nutrients (nitrogen/phosphorus or vitamins) are some of the factors which might act as a switch between protozoa/phytoflagellates and chlorophyceae algae. Phagotrophy and mixotrophy as a source of nutrients have been reported for several algae species of Chrysophytes, Dinophyta and Cryophytes (Provasoli 1958; Aaronson 1980). This ability can be used in post-treatment of anaerobic effluent (Fig. 4).

4 Combined Nutrient Balance in Both the Units

When both units are operated sequentially, the expected reduction 70% COD, 55% total nitrogen, 25% phosphorus and most importantly ~80% turbidity reduction. Using this, technology enables it to be energetically independent with no aeration requirements. Even illumination requirements, which are very high in any algae tertiary treatment, are reduced and post-water is less turbid, bacteria-free and soluble nutrient-rich which can be directly used in flushing, gardening or agricultural fields and in the case of water body restoration (Fig. 5).

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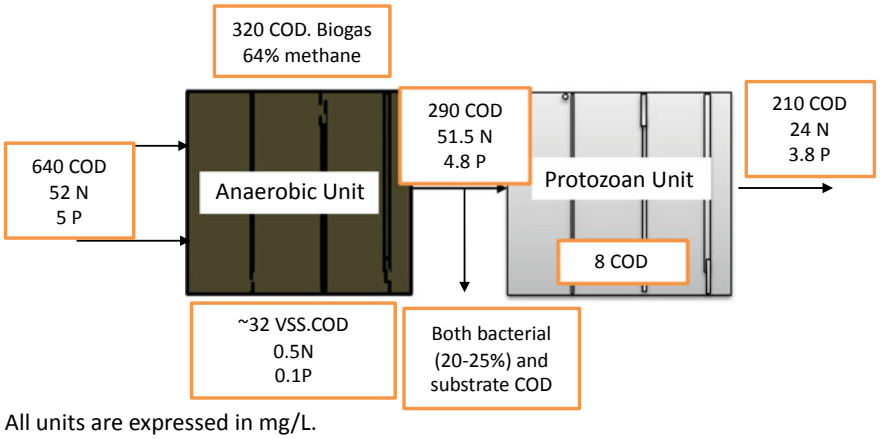

Fig. 5 Flow of nutrients from both reactors and their functionality combined. Although some COD is present in the overall effluent, water is clear (<20NTU) and hardly any biologically useful C

5 Conclusion and Remarks

Difficulty in the operation of anaerobic reactors is to maintain stable conditions and mediating effects of overloads, the presence of inhibitors, changing abiotic factors (temperature). Early detecting indicators of any disturbance are necessary, so that reactors can be operated normally before its efficiency is reduced or methanogenic activity and biomass are washed off. A 27% v/v sludge in the first reactor is expected to overcome these issues. For the second unit, much less is known about the pathways in which organisms are able to function in light. Long-term studies on sludge stability and different photoperiods also need to conduct for this process to be established as stable. Apart from that, what are the other species which have the capability of performing dual roles and how these systems can be optimized is the future scope of this novel treatment process.

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Design and Characterization of Cold Plasma Ozonator for Wastewater Treatment



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Abstract As water scarcity becomes more severe, the need for more sustainable and holistic approaches to deal with the limited freshwater becomes more important. Developing decentralized technological solutions for grey water recovery from households and small communities is a potential way forward to reduce freshwater consumption. Towards this, in this study we report the design and characterization of a small-scale ozonator. The ozonator developed is used to degrade laundry grey water coming from consumer homes, SDBS and methyl orange. Ozonation of grey water from the washing machine resulted in 68.7% chemical oxygen demand (COD) reduction in 1 h of treatment at 1.2 g/h of ozonation. Ozonation of anionic surfactants (SDBS) and methyl orange resulted in 66.4% and 91.9% reduction in their concentration, respectively, over a period of 120 min of treatment. The kinetics studies show that the ozonation of grey water and SDBS follows first-order kinetics.

Keywords Grey water · DBD ozone generator · SDBS · Methyl orange · International society of waste management · Air and water

1 Introduction

Water scarcity is a universal problem. The UN Sustainable Development Goal 6 "Ensure access to water and sanitation for all" recognizes the right of citizens to access safe water and sanitation. Water scarcity, poor water quality and inadequate sanitation have a measurable negative impact on energy, public health and food security. By 2050, it is predicted that one in four people are likely to live in a country affected by chronic or reoccurring shortages of water. Indian domestic water consumption, especial in urban localities, is increasing and is expected to triple from the current demand by 2050. Domestic wastewater treatment and reuse are an attractive option to water conservation and management.

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Grey water is any type of domestic wastewater that comes from kitchen sinks, washing machines, baths and hand basins free from urine and faecal matter (Jefferson et al. 2000). Grey water can be easily treated right at its source of origin and can be recycled for secondary usages such as gardening, floor and car washing purposes. There have been several technologies for the treatment of grey water including simpler natural treatment systems such as vertical wetlands to more advanced and complex treatment options such as membrane bioreactors (MBR) (Merz et al. 2007). Choice of grey water treatment technologies depends on its robustness to handle variations in organic, inorganic and pathogen concentration in grey water influent and consistently produce an effluent of an appropriate and safe quality to meet the required water quality standards for reuse. Advanced oxidation techniques such as ozonation owing its inherent strength to effectively treat a wide range of grey water (Den and Zhao 2015).

Ozone is a three-oxygen containing molecule having an atomicity of three. Ozone is a powerful disinfecting and oxidizing agent. The oxidation potential of ozone is 2.07 V which is 152% more than the next powerful oxidizing agent chlorine which has an oxidation potential of 1.36 V. Ozonation is a water treatment technique which is based on diffusing ozone into a water column. Ozonation is an advanced oxidation process, which involves in situ production of very reactive hydroxyl radical species, which are known to attack a wide range of organic compounds and microorganisms. When ozone is bubbled into water, it reacts with inorganic and organic compounds either directly or indirectly by the formation of hydroxyl radicals and oxidizes electron-rich molecules (Ried et al. 2009). Ozonation finds application for both disinfection and degradation of pollutants, inorganic and organic included (Ried et al. 2009). Ozonation is widely used in drinking water treatment systems because of its ability to disinfect without adding any other chemicals and/or leaving behind any residual chemicals like chlorine. Ozone can be produced by pumping in enough energy to break the firm O_2 bond to form O. Ozone production by electric discharge (DBD) is the most effective, economical and dependable means of controlled ozone production. It involves discharging high voltage, milliamp currents, across a gap through which filtered dry air or pure oxygen is flowing. The reaction is initiated when free, energetic electrons in the plasma zone ionize the oxygen molecules to form ozone.

Historically, ozonation has been used as the sole disinfection step in drinking water systems. Drinking water ozonation systems are large-scale systems which are capable of producing 100's of kg of ozone per hour. Using ozonation in decentralized household grey water treatment systems requires small-scale, reliable, low-cost compact ozone generators which are easy to operate and have minimum maintenance.

In this work, we report on the design and operation of a small-scale ozone generator which can be used for treatment of grey water coming from a typical 4-member household. The ozone throughput has been characterized for ozone production capacity, and its application in treatment of grey water from washing machines, degradation of SDBS and methyl orange has been studied.

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1.1 Design of Dielectric Barrier Discharge (DBD) Plasma Ozone Generator

Dielectric barrier discharge (DBD) is a promising method of producing non-thermal plasma, which is widely used in a variety of industrial applications including ozone generation. Advantages of the DBD are its simplicity of its operation, capability to work at near room temperature and pressure and ability to work with very simple off-the-shelf commercial power supplies. In this work, a cylindrical electrode design ozone generator has been designed as shown in Fig. 1. In this design, an aluminium hollow cylinder, having 6 cm ID, 12 cm length and 3 mm wall thickness acted as one of the electrodes. An aluminium wire of diameter 3 mm and length 2.5 m wound as a coil formed the second electrode. A glass tube of diameter 6.5 cm ID, 14 cm length and 2 mm wall thickness placed in between these two electrodes formed the dielectric. A leak-tight acrylic casing, 10 cm OD and 15 cm length, with one air inlet port and one ozone outlet port, held the electrode assembly together. Compressed air was passed through the ozone generator. Many reactive species are produced during the plasma discharge in the air. In the gas phase, depending on the operating power level, nitrogen and oxygen molecules are dissociated by the energetic electrons in the discharge mostly leading to the formation of radicals (O and OH), ozone (O_3), nitrogen oxides (NO, NO_2), and excited N_2 through several reaction pathways (Sivachandiran and Khacef 2016).

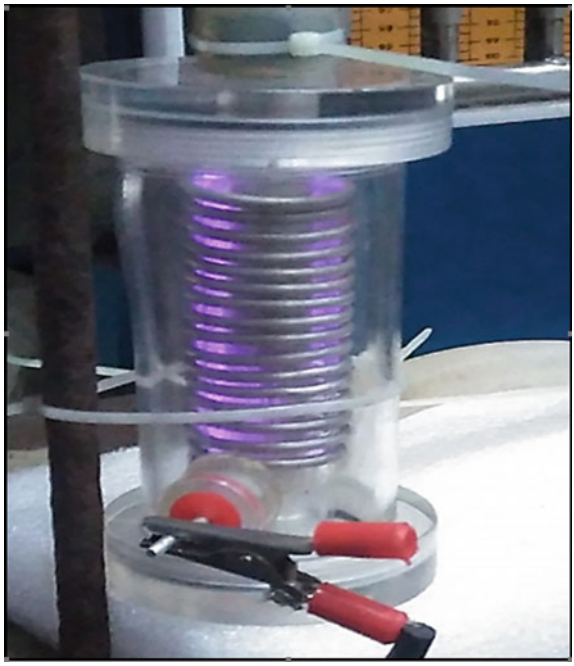

Fig. 1 Co-axial DBD plasma ozone generator

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When compressed air is passed through the plasma zone, various reactions are initiated. When free, energetic electrons interact with the compressed air, they dissociate oxygen molecules as shown in Eq. 1:

$$e^{-1} + O_2 \rightarrow 2O + e^{-1} \tag{1}$$

Following this, ozone is formed by a three-body collision reaction:

$$O + O_2M \rightarrow O_3 + M \tag{2}$$

M is a collision partner. It can be O_2, O_3, O or N_2.

1.2 Wastewater Treatment Using Ozonation

Ozone is known to completely oxidize organics to CO_2 and water either through direct reaction or through the formation of hydroxyl radicals. Oxidation reactions initiated by ozone in water are generally complex in nature, only part of the ozone reacts directly with dissolved solutes. Another part may decompose before reaction. Such decompositions are catalyzed by hydroxide ions and other solutes. Highly reactive secondary oxidants, such as $OH^{\cdot}$ radicals, are thereby formed (Wang 2012).

The reactions of ozone with water include

$$O_3^- \rightarrow O^- + O_2 \tag{3}$$

$$O^- + H_2O \rightarrow OH^{\cdot} + OH^- \tag{4}$$

Ozone oxidizes electron-rich molecules attached to carbon–carbon double bonds such as aromatics and splits the long-chain compounds making them biodegradable.

In this study, anionic surfactants such as sodium dodecylbenzene sulphonate (SDBS) are chosen for the ozone degradation studies because of its widespread use in numerous detergents and other household cleaning products. It belongs to the group of surfactants called linear alkyl benzene sulphonates (LAS). The average SDBS concentration in domestic wastewater ranges between 1 and 10 mg/L (Zhang et al. 1993). Conventional oxidants such as hydrogen peroxide and potassium permanganate have little effect on the removal of LAS, and when chlorine is used, low yields of chloroform; a known carcinogenic compound is formed. Ozonation of SDBS in aqueous solution consists of a free radical mechanism, in addition to direct reactions of molecular ozone. A general mechanism of the ozonation of SDBS can be summed up as shown in Equations 5 and 6.

Direct reaction:

$$\mathrm{NaDBS} + z\,O_3 \rightarrow \text{intermediates} \rightarrow \text{final products}\left(CO_2,\ SO_4^{2-}, H_2O\right) \tag{5}$$

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Free radical reaction:

$$\text{NaDBS} + \text{OH}^{\cdot} \rightarrow \text{intermediates} \rightarrow \text{final products}\left(\text{CO}_2,\ \text{SO}_4^{2-}, \text{H}_2\text{O}\right) \quad (6)$$

The decolourization of methyl orange by ozonation was also studied in this work. Azo dyes are widely used in textile and paper industries. Disposal of dye-rich wastewater from these industries is an environmental concern since the associated colour is quite noticeable and may have carcinogenic effects. When ozonation of an azo dye is conducted, the possible pathways are homolytic fission of the excited dye into radicals, electron transfer of the excited dye to form a radical dye cation, decomposition by superoxide radical anion and decomposition by singlet oxygen, resulting in a reduction in colour (Wang 2012).

2 Materials and Methods

2.1 Materials

A commercially available high voltage AC power supply system (Power: 80 W, Output: 10 kV 30 mA) was used as a power supply for DBD plasma generator. All chemicals (SDBS and methyl orange) were of reagent grade, and they were used as received. Stock solutions were prepared in distilled water.

2.2 Experimental Methods

The experimental set-up consists of a long cylindrical PVC pipe which acted as an ozone contact reactor, a co-axial DBD plasma ozone generator which produced ozone from compressed air, grey water circulating pump and spray nozzle system which increased the contact time between ozone and grey water and an air compressor, as illustrated in Fig. 2. Three types of studies, namely (1) laundry grey water treatment using ozonation, (2) SDBS destruction using ozonation and (3) methyl orange degradation studies, were all conducted in batch mode. The ozone throughput from the designed plasma ozonator was characterized using the wet KI method. The ozone throughput at different airflow rates was measured.

In a typical laundry grey water treatment batch experiments, 4 L of grey water to be treated is filled in the pipe. A mixed water sample obtained by mixing the discharge water from a household laundry washing machine's rinse cycle and wash cycle water in 1:1 ratio was used in this study. Compressed air at a known flow rate from the compressor is fed to the plasma generator, and the outlet from plasma generator is bubbled through the grey water. Ceramic aerators capable of producing fine bubbles were used as submerged aerators. System was provided with a recirculation

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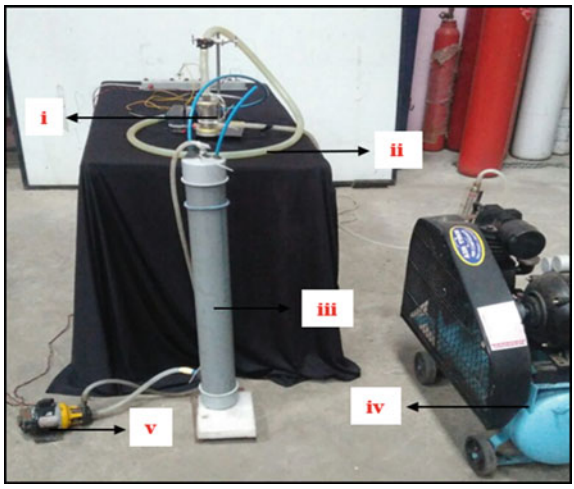

Fig. 2 Experimental set-up for ozonation of grey water. (i) DBD plasma generator, (ii) ozone inlet, (iii) batch reactor, (iv) air compressor, (v) water circulating pump

pump fitted with a nozzle spray to maximize contact time between ozone and grey water. Water samples were collected at regular frequency over the entire duration of ozonation which was up to 60 min. Parameters such as COD, TOC and pH of the grey water were measured using standard procedures. Attempts were also made to determine the kinetics of the COD reduction due to ozonation.

In a typical SDBS destruction batch experiments, 1L of water having an initial concentration of 7 ppm of SDBS was taken in a batch reactor and the ozone was bubbled through. Water samples at regular intervals were taken and analysed for SDBS concentration and pH as a function of ozonation time. The concentration of SDBS was determined using methylene blue active substances (MBAS) method. Attempts were also made to determine the kinetics of the SDBS reduction due to ozonation.

To study the methyl orange degradation, 1 L of water having an initial concentration of 500 ppm of methyl orange was taken in a batch reactor and the ozone was bubbled through the water. Water samples at regular intervals were taken and analysed for methyl orange concentration and pH as a function of ozonation time. The concentration of methyl orange was determined using UV spectrophotometer.

3 Results and Discussion

3.1 Ozone Throughput Studies

Figure 3 shows the ozone throughput as a function of inlet airflow. As can be seen from Fig. 3, increasing airflow rate increased ozone throughput. For 20 lpm of airflow rate, 1210 $\pm$ 10 mg/h of ozone throughput was obtained, and at 100 lpm of airflow

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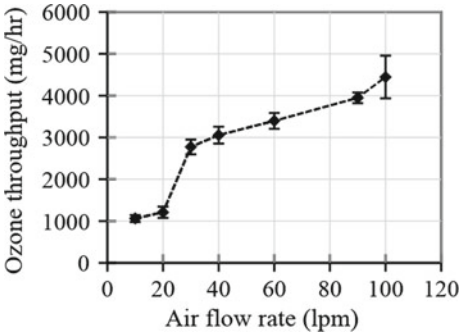

Fig. 3 Ozone throughput (mg/h) as a function of airflow rate (lpm) for co-axial DBD plasma reactor

rate, the ozone throughput measured was 4500 ± 500 mg/h of ozone. We believe that increase in airflow rate leads to higher plasma volume in the reactor leading to higher ozone throughput.

3.2 Treatment of Grey Water Using Ozonation

The feed grey water, which was a mixed sample collected from a household laundry machine, had an initial COD in the range between 500 and 900 mg/L. A 4 L sample was treated using ozonation at 20 LPM of airflow rate. Under these conditions, we noticed that ozonation resulted in 68.7% reduction in COD reduction in the first one hour of treatment at 1.2 g/h of ozone flow rate. During experiments, we noticed that though the grey water coming from the laundry machines created foam during initial 10–15 min, it quickly stopped showing the chemical degradation of surfactants present in the grey water. Figure 4 shows the visual appearance of grey water as a function of ozonation time. As shown in Fig. 4, with ozonation, the turbidity of the water reduced and at the end of 60 min of ozonation, the water looked clear. As illustrated by Fig. 5, in 60 min of treatment the COD reached the effluent discharge limit of 250 ppm in all the treated samples regardless of initial value of COD. The pH remained alkaline, between 8 and 9, during the treatment of laundry grey water.

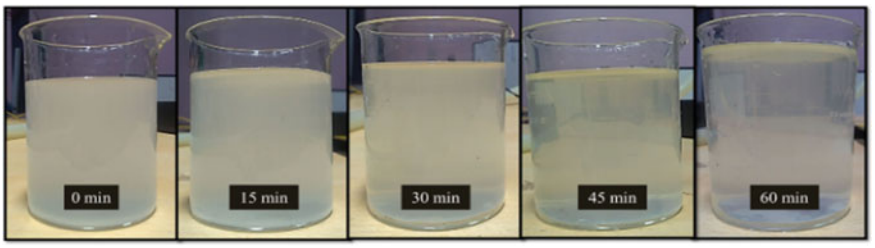

Fig. 4 Reduction in turbidity of laundry grey water over the period of ozonation

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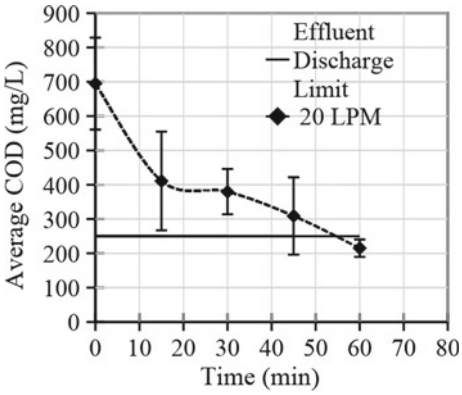

Fig. 5 Reduction in chemical oxygen demand (COD) as a function of time (min) for 4 L of ozonated washing machine discharge at 20 lpm airflow rate

The laundry grey water which typically is rich in SDBS surfactants gets reduced through the hydroxyl mechanism of oxidation as discussed in Sect. 1.2. Due to its electrophilic nature (electron preferring), the $OH^{\cdot}$ can non-selectively oxidize almost all electron rich organic molecules including SDBS.

Total organic Carbon (TOC) was also measured using a Shimadzu TOC-5000A unit by combustion catalytic oxidation method and detection using an infrared gas analyzer. The TOC for ozonated laundry water reduced from 69.1 to 28.2 ppm in 60 min of treatment.

The first step in modelling the process for the study of the kinetics of wastewater ozonation is the determination of the rate constant of the ozone reactions. The kinetic studies of wastewater ozonation are shown in Fig. 6. As can be seen in Fig. 6, we can see that the reduction of COD follows first-order kinetics with respect to ozone and solute concentration at 8.8 pH. Table 1 shows the rate constants of the destruction of various compounds with ozone.

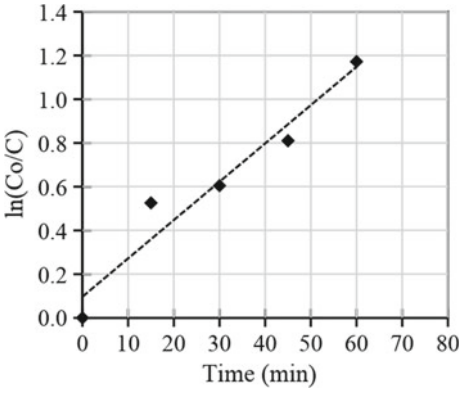

Fig. 6 In (Co/C) versus time (min) for 4 L of ozonated washing machine discharge at 20 lpm airflow rate

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Table 1 Reaction rate constants of ozone

Component	pH	k_{O3} (s^{-1})
COD	8.8	0.0197
SDBS	8.5	0.0213

3.3 Removal of SDBS Using Ozonation

SDBS concentration gradually reduced to 66.4% of the initial amount over a period of 120 min as shown in Fig. 7. We believe that this observed reduction is mainly due to its reaction with $OH^{\cdot}$ radical. The solution remains alkaline over the period of ozonation. Alkaline conditions favour the ozonation rate of the SDBS compound, since hydroxyl radical reactions are the main route of its degradation. It follows first-order rate kinetics as shown in Fig. 8 and Table 1.

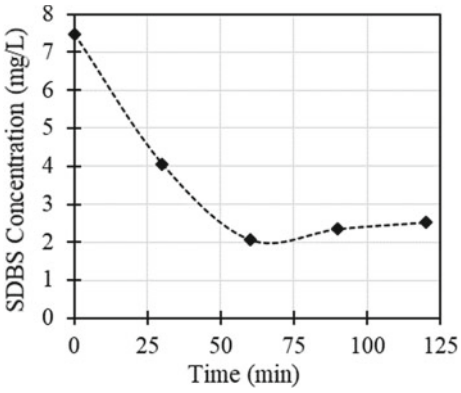

Fig. 7 SDBS degradation by ozonation as a function of time (min) at 20 lpm airflow rate

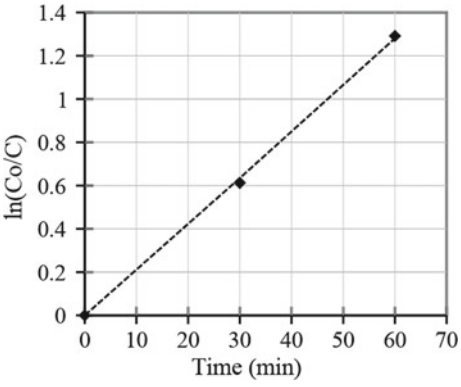

Fig. 8 In (Co/C) versus time (min) for SDBS ozonation at 20 lpm of airflow rate

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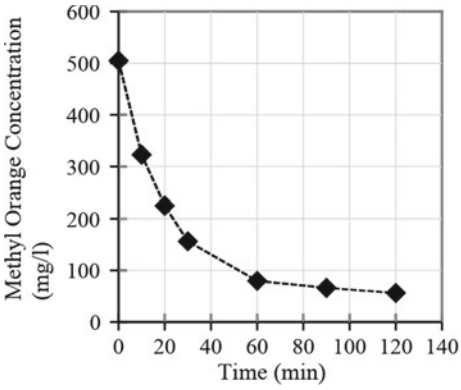

Fig. 9 Methyl orange degradation by ozonation as a function of time (min) at 40 lpm airflow rate

3.4 Methyl Orange Degradation by Ozonation

The decolouring of 1 L methyl orange solution was studied using DBD plasma generator at 40 lpm (3.05 g/h of Ozone) of airflow rate as illustrated in Fig. 9. The dye concentration of 500 ppm with the initial pH of 6.7 was fixed. Experimental results confirm that 91.9% reduction in methyl orange colour concentration was observed over a period of 120 min of ozonation.

4 Conclusions

This study has demonstrated that a small-scale reliable ozone generation system can be developed and can be used to treat domestic grey water. The following can be concluded:

- Ozonation of grey water from washing machine resulted in 68.7% and 59.2% reduction of COD and TOC, respectively, in 1 h of ozonation, regardless of the initial COD value of the sample.
- Turbidity of samples decreased to a significant extent over the course of ozonation. Foaming also reduced after treatment which indicates ozonation causes surfactant degradation in grey water.
- Ozonation of anionic surfactants and methyl orange resulted in 66.4% and 91.9% reduction in concentration, respectively, over a period of 120 min of ozonation. The solution remained alkaline over the period of ozonation.
- Ozonation is highly recommended due to its degradation effectiveness, rate of degradation, relatively simple experimental design and scalability.

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Natural Adsorbents for Removal of Different Iodine Species from Aqueous Environment: A Review



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Abstract Radioactive iodine in the nuclear waste can cause adverse effects on the human and other living organisms. I-129 and I-131 are released into the aqueous environment via the nuclear accident, weapon testing, scientific procedures as well as hospitals. The radioactivity of these substances is fatal to human and other living creatures. This study reviews different types of natural adsorbents that can be utilized for the application of radioactive iodine remediation in the water. To solve the problem, scientifically, the conventional anion-exchange resin is typically employed for the anionic species of iodine, but it is deemed unsustainable due to dependency over petroleum-based chemical. As a result, there is a need for the search of more sustainable adsorbents, which include activated carbon, soil and clay materials, mineral and even polysaccharide. The activated carbon, when impregnated with silver, can adsorb up to 126.9 mg/g of I^-. In its fiber form, the adsorbent has the equilibrium capacity of 305 mg/g. Clay can be modified to contain quaternary amine functional group and has I^- coefficient sorption, K_D, value of 297–9610 mL/g. For the mineral, many kinds had been tested for iodine removal. Non-modified hydrotalcites can reach I^- adsorption equilibrium of 192.5 mg/g in 1 day, while the magnetite–imidazole-coated silica adsorbed 130 mg/g within 40 min. The cyclodextrin–chitosan complex has one of the highest I_2 adsorption capacities of 1200 mg/g. The information shows that natural adsorbents can be considered as a green alternative to the conventional anion-exchange resin, and more studies to optimize these materials are needed in the future.

Keywords Radioactive iodine · Activated carbon · Soils · Clay · Minerals · Polysaccharides · Adsorption efficiency · K_D

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1 Introduction

Radioactive iodine contained in the nuclear waste can create adverse effects on human and other living organisms. Of all the iodine isotopes, I-129 and I-131 should be the most concerned in term of environmental impact and human health. With its 8 days of decay half-life, Iodine-131 (I-131) is described as the most hazardous radionuclide released into the environment (Morita et al. 2010). Similarly, I-129 can also create such adverse health effect to human. It has a lower activity per ton of fuel, but possess a potential to create a long-term risk and is a major problem related to waste disposal (Denham et al. 2009). I-129 exists in a sufficient quantity, and it has a much longer half-life time at 1.6×10^7 years. During the time of the large-scale accident, I-131 might be a more problematic species due to its higher radioactive energy while the accumulation of I-129 in the groundwater and soil has been observed around the nuclear waste disposal sites such as Savannah River and Hanford Site (Denham et al. 2009).

It is known that radioactive element is created by cosmic radiation and the natural disintegration series of other elements (Kohman and Edwards 1966). On the other hand, it is also produced by anthropogenic activities such as weapons testing, science experiment, medical procedures, and the fission process in nuclear power plants. Table 1 shows the major sources and incidents that have caused the released of radioactive iodine. Creating energy from the fission process in nuclear power plants seems to be one of the promising ways of securing electrical power in the future. However, since the first nuclear power plant was constructed, the safety concern relating to its waste products, which are being released into the environment, has been the issue to be dealt with (Ramana 2009). Chernobyl disaster occurred in 1986 with the explosion of reactors in Chernobyl Nuclear Power Plant located in Pripyat, Ukraine. Following the Earthquake near Japan in March 2011, the tsunami destroyed parts of Fukushima Nuclear Power Plants, releasing the substance from the reactors into the environment. Savannah River Site, Hanford Site, Nevada Testing Site, and nuclear reprocessing plants are adding amounts of radioactive iodine into the water resources as well.

When comparing the natural products to those of the quantity released by human actions, it can be seen that human contributed to a much higher amount of radioactive iodine (Kohman and Edwards 1966; Hu et al. 2010). According to Toxicological Profile for Iodine, radioactive iodine can destroy thyroid gland and increase the risk for hypothyroidism, thyroid nodules, and cancer (Agency for Toxic Substances and Disease Registry 2004). Human's thyroid gland, naturally, adsorb iodine for the purpose of hormonal, growth, and metabolic regulation. It can contain up to 30–40 times of iodine concentration than that of in the bloodstream (Braverman and Cooper 2005). Moreover, the pathway of iodine includes the adsorption from the gastrointestinal tract and lungs which the substance eventually ends up in the bloodstream (Agency for Toxic Substances and Disease Registry 2004). Iodine can also be found in other parts of human body including gastric mucosa, salivary glands, mammary glands, choroid plexus, ovaries, placenta, breast tissues, breast milk, and

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Table 1 Amount of radioactive iodine released from different kinds of sources and incidents

Source/incident	Environment affected	Radioactive iodine	Concentration or discharge	Total activity	Reference
Chernobyl, 1986	Soil and atmosphere	I-129	–	0.04 TBq	United Nations Scientific Committee on the Effects of Atomic Radiation (2000)
Chernobyl, 1986	Soil and atmosphere	I-131	–	1.76×10^6 TBq	United Nations Scientific Committee on the Effects of Atomic Radiation (2000)
Fukushima, 2011	Air	I-131	–	153–160 PBq	Kawamura et al. (2011)
Fukushima, 2011	Ocean	I-131	300–4000 Bq/L	3–11 PBq	Kawamura et al. (2011)
Fukushima, 2011	Ocean	I-129	14×10^7 to 62×10^7 atoms/L	–	Hou et al. (2013)
Savannah River Site	Groundwater	I-129	2.1–59.9 Bq/L	–	Kaplan et al. (2014)
Nevada Testing Site	Groundwater	I-129	0.777 Bq/L	–	Smith et al. (2003)
Harford Testing Site	Groundwater	I-129	2.2–42.5 pCi/L	–	Zhang et al. (2013)
Reprocessing Plants	Baltic Sea and rivers nearby	I-129	0.71–13.80 atoms/L	–	Keogh et al. (2007), Aldahan et al. (2006)
Royal Hospital, Muscat, Oman (2006–2009)	liquid waste in the hospital	I-131	–	3777 MBq	Ravichandran et al. (2011)
Medical institutes, Japan	Tap water	I-131	13–15 Bq/kg	–	Kamei et al. (2012)

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skin (Jhiang et al. 1994; National Academy of Science 1999). The exposure pathway of radioactive iodine to human includes the ingestion of cow milk, fruits, vegetable, fish, water, and inhalation (National Academy of Science 1999; Peterson et al. 2007).

A large amount of iodine in the ocean can also create negative feedback to the earth's ozone layer. The iodine in the sea and marine aerosol are important aspects of the earth's temperature and sun radiation regulation (O'Dowd et al. 2002). Above the ocean, 25% of ozone chemical had been lost due to the emission of iodine and 70% increase in ozone depletion due to iodine is estimated from that of in pre-industrial era (Prados-Roman et al. 2015). High accumulation of long-lived I-129 in the ocean can contribute to such adverse effects.

With all the impacts mentioned, the scientific field has been challenged with the search for a suitable technology to remove and immobilize the pollutant, especially in the water environment. The technologies used for radioactive iodine removal in the water are summarized in Table 2. The techniques include membrane separation, electrolysis, chemical precipitation, phytoremediation, and adsorption. The membrane separation and electrolysis are mostly limited to the drinking water application. While these techniques could remove more than 90% of the radioactive iodine in various concentrations, the pre-treatment by adsorption is still needed to prevent the process failure (Hamasaki et al. 2014; Chae and Kin 2014). The drawback of chemical precipitation is that the addition of chemical such as polyaluminum chloride (PAC) and silver-containing agent is not suitable for the open environment (Kosaka et al. 2012; Eden et al. 1952). As a result, treatment plant is usually required, and transportation of contaminated water is thus required. Species of brown algae were proven to accumulate iodine, but the process takes time and further studies are required to control the rate of accumulation (Küpper et al. 1998; Nitschke and Stengel 2014). For the adsorption, the synthesized polystyrene-based adsorbent is commonly used. However, its dependence on petroleum-based chemical is deemed unsustainable.

In this report, the adsorption of radioactive iodine, iodide, and iodate is being considered. It reviews different kinds of natural adsorbents with and without modification that can be employed for adsorption of different iodine species. It also presents the optimum conditions for each adsorbent. The comparison of the adsorption capacities between each group and with ion-exchange resin is also reported. Thus, this review helps in identifying the potential natural adsorbents for the removal of iodine from water environment.

2 Principle of Adsorption

Adsorption is the process of the association or/and adherence of fluid phase on the surface of the solid phase. This can happen in two ways-— through physical and/or chemical interactions. The physical adsorption usually deals with London dispersion forces (as one of Van der Waals forces). London dispersion force is an intermolecular attraction between uneven electrons and protons, creating temporary dipole. The

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Table 2 Typical techniques used for the removal of radioactive iodine in the water

Types of technology	General principle of removal	Maximum iodine removal (%)	Initial concentration	Reference
Membrane separation	1. Pressure-driven—use of pressure to force the water through the membrane where the particulate is separated from the water, depending on the membrane porous size 2. Ion-exchange—use of membrane with a cationic functional group to trap the anionic iodine species	>95	365 kBq/L	Hamasaki et al. (2014), Sancho et al. (2006), Van Der Bruggen et al. (2003)
Coagulation–flocculation–sedimentation	Precipitation of iodine species with polyaluminum chloride (PAC) and silver nitrate in acidified environment	>95	150 μg/L	Kosaka et al. (2012), Eden et al. (1952), Kitada et al. (2015)
Electrolysis	Separating the anionic species of radioactive iodine by applying direct electrical current (DC)	99	4000 μg/L	Hamasaki et al. (2014)
Phytoremediation	Bioaccumulation and/or surface adsorption by species of algae and water plants	>60	1000 kq/L	Morita et al. (2010), Fukuda et al. (2014), Hosseini (2010)
Polystyrene-based anion-exchange resin	Anion-exchange and adsorption between anionic species of iodine and Cl^- or OH^- on the resin beads	>70 (2979.6 mL/g K_D and 5.9 μg/g maximum adsorption)	7.88 μg/L	Parker et al. (2014)

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interaction energy depends on the surface contact area of the molecules, polarizability (based on molecule size) and the number of pi-bonding present. The chemical adsorption deals with ionic and covalent bonding between the target molecules and the functional group of the adsorbent. The physical adsorption is usually weaker than the chemical adsorption.

The binding process of adsorption is related to Eq. (1).

$$\Delta G = \Delta H - T\Delta S \tag{1}$$

where, ΔG is the change of Gibbs free energy expressed in kJ/mol and T is temperature. ΔG is associated with the adsorption process as shown in Eq. (2).

$$\Delta G = -RT \ln K \tag{2}$$

where, K is the thermodynamic constant related to the binding of the sorbate to the adsorbent. R is the gas constant. ΔG is related to the spontaneity of the adsorption process where the higher in negative value of ΔG reflects more energetically favorable adsorption (Plazinski 2012). Substituting Eq. (1) into Eq. (2) would yield Eq. (3).

$$\ln K = -\frac{\Delta H}{RT} + \frac{\Delta S}{R} \tag{3}$$

For an experiment with changing in temperature is observed, ΔH and ΔS can be obtained from the slope and the intercept of the plot ln$K$ against 1/T.

If we are determining the equilibrium relationship between solid and aqueous solution, we can first equilibrate the known adsorptive solution and the sorbent at a fixed temperature and pressure. The equilibrium relationship, described by isotherms, will be obtained when the adsorptive solution and the adsorbent are allowed to make contact for a period of time. The amount of adsorption or amount of mass of solute adsorbed per unit mass of adsorbent, q (expressed in mol/g or mg/g) can be calculated with the mass balance equation (Eq. 4).

$$q = \frac{(C_\mathrm{i} - C_\mathrm{e})V}{m} \tag{4}$$

where, C_i and C_e are the initial and final adsorptive concentration, respectively. V is the volume while m is the mass of the adsorbent. To determine the most suitable adsorption model, it is important to understand that the adsorption isotherms exhibit many different shapes for a different combination of sorbates and sorbents. By plotting q against C_e, if a linear graph is obtained, the relationship between q/C_e can be expressed as a ratio of solid solution distribution coefficient K_D (Eq. 5).

$$K_D = \frac{q}{C_\mathrm{e}} \tag{5}$$

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Linear adsorption usually occurs at low solute concentration and low amount of sorbate (Delle Site 2001). If the plot of q against C_e yields a nonlinear graph, it indicates that after a period of time, the sites of sorbent become saturated and the degree of adsorption does not change anymore. Two kinds of models can be used for this particular case. The first model derived from the equation of the change in final concentration over time which expressed as Eq. (6).

$$\frac{\partial C_e}{\partial t} = -k_1 m \Delta C_e (q_{max} - q) + k_2 q m \tag{6}$$

where q_{max} is the adsorption capacity or adsorbed solutes concentration corresponding to the total number of surface sites. k_1 and k_2 are the rate constant for adsorption and desorption. The rate of adsorption is assumed to be proportional to C_e and to the difference in q_{max} and q. The equation can be reduced to express the relationship between q and C_e Eq. (7).

$$q = \frac{q_{max} K_L C_e}{1 + K_L C_e} \tag{7}$$

where, K_L is the Langmuir constant or coefficient related to the enthalpy of adsorption. To get a linear relation between q and C_e, the Eq. (8) is used.

$$\frac{1}{q} = \frac{1}{q_{max}} + \frac{1}{K_L C_e q_{max}} \tag{8}$$

where, q_{max} can be calculated from the inverse of the intercept. Therefore, K_L can be calculated with the inverse of slope multiply by q_{max} obtained.

In Langmuir model, the relation between q and q_{max} can be described as when the solute concentration is increasing at low surface coverage with the available adsorption sites reaching saturation and q is increasing linearly to approach q_{max}. The model has q_{max} representing monolayer coverage and assumes that adsorption energy is independent of degree of surface coverage (Delle Site 2001). It also assumes the energy to be equal for all sites, where only localized ones are involved in the adsorption process without interaction between adjoining sorbed molecules (Delle Site 2001).

The second model takes into account the degree of surface coverage and sorption energy for the sites. It is called Freundlich model where the relationship of q and C_e is expressed as Eq. (9).

$$q = K_F C_e^n \tag{9}$$

where, K_F is used as the Freundlich coefficient and n is the exponent relates to adsorption intensity and free energy. To get the linear plot for Freundlich isotherms, log transformation is used (Eq. 10).

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$$\mathrm{Log}q = n\mathrm{Log}C_e + \mathrm{Log}K_F \tag{10}$$

Using the linear plot of Freundlich model, n and K_F can be obtained from the slope and intercept, respectively. If n is 0, a constant adsorption-free energy at all sorbate concentration is observed. On the other hand, a value of n more than 1 means the increase in the presence of sorbate enhances the free energies for further adsorption, but when n is less than 1, weaker free energies with increasing sorbate is observed.

It is worthy to note that the linear, Langmuir or Freundlich isotherms equation cannot solely explain the sigmoidal isotherm relation. Instead, sigmoidal behavior signifies the combination of two different adsorption mechanisms, one after another. It occurred due to alternation in the functional groups during the adsorption, numerous components of a heterogeneous sorbates or diversity in free energies related to the adsorption process.

3 Natural Adsorbents for Iodine

3.1 Activated Carbon

Iodine adsorption by activated carbon has been reported for several decades. The activated carbon is derived from the carbonaceous materials such as coconut, nutshell, wood, and lignin. Sometimes, it is made of coal and can be described as activated coal (for this report, the activated coal maybe refers as an activated carbon). The gaseous iodine adsorption capacity is typically used to characterize the commercial activated carbon in the form of "iodine number," which refers to how much amount of iodine (mg^2) is being adsorbed by a gram of activated carbon. The activated carbon is, therefore, regarded as a potential adsorbent for the radioactive iodine in the water. Activated carbon has been utilized and studied extensively for both air and water pollution adsorption because of its large surface area. Many studies have shown a successful iodine adsorption of radioactive venting from the nuclear power plant exhaust pipe and that of polluting the air environment (Adams and Browning 1960; Zhou et al. 2014). However, in this report, the only removal of iodine in the water is considered and summarized in detail.

The activated carbon adsorbs sorbates by London dispersion force. It consists of micro-, meso- and macropores structures, where the major adsorption of iodine occurs mostly at the micropores (Yang et al. 1993). As a result, it is critical how these pores are arranged depending on the form of the activated carbon (Barkauskas and Dervinyte 2004). The comparison of activated carbon in different forms is exhibited in Table 3. One study compared the ability of granular and fiber activated carbon to remove I_2 and I^- (prepared by HI), in the acetic acid (Yang et al. 1993). Under acidic environment, the activated carbon fiber could absorb 305 mg/g I_2 and 350 mg/g I^-, higher than the adsorption capacity of 195 mg/g I_2 and 205 mg/g I^- in the granular form of activated carbon (Yang et al. 1993). The outcome coincided with the BET

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Table 3 Comparison of iodine adsorption with different types of activated carbon

Type of activated carbon	[a]Maximum iodine adsorption (mg/g)	Removal (%)	Equilibrium time	Experimental condition					Reference
				Iodine species	Initial iodine concentration (mg/L)	Adsorbent dosage (g/L)	Medium	pH	
Carbon fiber	305	–	2 h	I_2	800	–	Acetic acid	–	Yang et al. (1993)
Granular	195	–	24 h	I_2	800	–	Acetic acid	–	Yang et al. (1993)
Granular	0.635	87.50	–	I^-	1.015	1	DI water	8	Hoskins and Karafil (2002)
Granular	1.68×10^{-3}	18.50	–	I^-, IO_3^-, I_2	9.19×10^{-3}	1	Groundwater	8.2	Parker et al. (2014)
Granular	–	60	–	I^-	40×10^{-3} to 50×10^{-3}	–	Tap water	7	Sato et al. (2011)
1.05 wt% silver-impregnated carbon	~126.9	–	–	I^-	~1 to 200	1	DI water	5	Hoskins and Karafil (2002)
Silver-activated carbon aerogel	0.638	–	7 day	I^-	0.15	~0.2 (2000 g/L/min)	DI water	7	Sánchez-Polo et al. (2006)
Copper-modified activated carbon	1.91	95.7	2 h	I^-	2	1	DI water	1	Zhang et al. (2017)

[a]The value is obtained from the experimental data and not from the mathematical model

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surface area for activated carbon fiber which is two times higher than that of the granular form. In fiber form, micropores were exposed to the surface of the sorbate, creating a fast iodine binding and diffusion rate (Yang et al. 1993). On the other hand, in granular form of activated carbon, there was a sequence binding and diffusion of iodine from the mesopores at the surface to micropores within the bulk of the sorbate (Yang et al. 1993).

Besides the physical form of activated carbon, its activation processes involved are important aspects in the adsorption mechanism. In the production phase, biomaterials would go through pyrolysis or oxidation for its physical activation to produce an activated carbon. In the pyrolysis process of activated coal where the temperature was increased to about 400 °C, iodine adsorption sites in coal were enhanced with increasing oxygen cross-link, and this results in higher adsorption capacity (Rodriguez and Marsh 1987). On the other hand, the oxidation process decreased the size of micropores and reduced the adsorption capacity in the activated carbon (Rodriguez and Marsh 1987).

In the laboratory experiment, the activated carbon could remove up to 87.50% of 2 mg/L iodide in the solution (Hoskins and Karafil 2002). However, studies have shown that the removal of iodine in other types of water medium may yield lower iodine removal. Compared to the results of the batch experiment using distilled water, the one with 50 μg/L I^- and IO_3^- in tap water showed 60% and almost 0% removal, respectively (Sato et al. 2011). On the other hand, the result of adsorption in groundwater was the lowest with about 20% maximum adsorption at 9.77 μg/L initial total iodine (Parker et al. 2014). The presence of other chemical species in groundwater environment may cause a competition on available sorption site, resulting in less removal percentage (Parker et al. 2014).

The activated carbon possesses several O_2-containing functional groups such as carbonyl, phenol, lactone, and carboxyl group (Barkauskas and Dervinyte 2004; Nwosu et al. 2009). It is still not certain which group, in particular, is responsible for the sorption of iodine. However, there was an attempt to find the relation between the number of these functional groups in the nutshell, quantified by the method of NaOH titratable surface and iodine sorption capacity (Nwosu et al. 2009). The sorption of iodine was found to be dependent moderately on the quantity of functional groups with a linear statistical correlation of 0.6115 (Nwosu et al. 2009). Isolating each functional group for the model would provide an answer to which O_2-containing functional group is responsible for this sorption process.

Many times, the porous carbon can be modified to contain the inorganic material such as silver and aluminum for different sorption specification. Silver-impregnated carbon is often used for iodine sorption, and it is proved to be able to adsorb more iodine. The sorption capacity value of 1.05% silver-impregnated activated carbon was nearly two times higher than that of virgin activated carbon (Hoskins and Karafil 2002). However, with only 0.05% of silver impregnation, there was no significant change in the value compared to that of virgin activated carbon (Hoskins and Karafil 2002). The silver-activated carbon aerogel was also brought to study in the dynamic adsorption test, where the results exhibited about 0.251–0.638 mg/g sorption capacity, depending on pH and porous characteristics of the aerogel (Sánchez-Polo et al.

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2006). The nano-composite of Cu_2O/Cu-activated carbon was synthesized with the ability to remove 95.7% of 2 mg/L I^- and has about 1.91 mg/g adsorption capacity.

The sorption of iodine to activated carbon is affected by pH. At higher pH, activated carbon absorbed iodine less effectively as elevated amount of OH^- competes for the positive adsorption sites (Hoskins and Karafil 2002). The pH effect was demonstrated in the batch experiments of unmodified and copper-impregnated activated carbon. The results showed that all kinds of the activated carbon experience a lower I^- adsorption capacity as pH increases from 3 to 11, although the copper-impregnated activated carbon was shown to be more stable across the pH range (Sánchez-Polo et al. 2006).

The unmodified activated carbon may not be the best selection for the aqueous iodine adsorption because its efficiency decreases drastically when it is used in the natural environment. However, the modification can help to improve its performance. The carbon fiber and silver-impregnated activated carbon are among the best adsorbents in this category. In addition, the activation of biomaterials has brought about the potential in finding alternative and innovative way of making activated carbon. Several waste products such as coffee residue (Boonamnuayvitaya et al. 2004; Boonamnuayvitaya et al. 2005), soybean oil cake (Tay et al. 2009), and even cigarette butts (Sun et al. 2017) became possible raw materials for the activated carbon, and these ideas could be applied for iodine removal in the future.

3.2 Soil and Clay

Iodine is often found as a content of natural soil and clay. Many times the soil itself is contaminated by radioactive iodine (Mimides and Kathariou 2005; Miyake et al. 2012). However, based on the contamination occurrences, it can be a potential natural-derived and low-cost sorbent for the pollution removal in water.

Organic and inorganic matters in soil are both responsible for the sorption of iodine. The iodine content in soil was found to be highly correlated to the amount of oxylate-soluble Al in the near-neutral pH condition and to the amount of oxylate-soluble Fe in the more acidic environment (Whitehead 1978). Generally, I^- and IO_3^- are ionically attracted to the positive charge provided by the free hydroxides of Fe and Al (Whitehead 1984). Table 4 shows iodine adsorption capacity and K_D value of different types of soil and clay. In a batch experiment, the maximum I^- adsorption of 6.59×10^{-3} mg/g occurred in the soil with 4.81% Fe oxide and 5.66% Al oxide, while the maximum IO_3^- adsorbed in the soil with 0.64% Fe oxide and 0.60% Al oxide was 3.41×10^{-3} mg/g (Dai et al. 2009). The experiment was set up with 100 g/L soil dosage at 25 °C for 40 h (Dai et al. 2009).

Nevertheless, in the natural organic constituents of soil, where the positive charge is still scarce, the iodine can still covalently bond and form complexes with functional groups presented in the soil such as phenol, thiol, and amine (Sakuma and Marzukee 1995; Whitehead 1974; Kaplan et al. 2014). The soil samples with higher content of organic matter, organic carbon, calcium carbonate, nitrogen, phosphorus, potassium,

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Table 4 Comparison of iodine adsorption in the collected soil, natural clay, and modified clay

Types of soil or clay	Method of modification	[a]Maximum iodine adsorption (mg/g)	Equilibrium time	K_D (mL/g)	Experimental condition				Reference
					Iodine species	Adsorbent dosage (g/L)	Temperature (°C)	pH	
Orthic aridisols	Not modified, collected from Xinjiang, China	3.41×10^{-2}	–	57.60	IO_3^-	100	25	–	Dai et al. (2009)
Hydragric anthrosols	Not modified, collected from Guangdong, China	6.59×10^{-2}	–	1.97	I^-	100	25	–	Dai et al. (2009)
Sandy loam	Not modified, collected from Zadenhan Iran	–	–	~200	I^-	55.56	9	–	Hosseini et al. (2013)
Entisol	Not modified, collected from Varanasi, India	1.60×10^{-4}	5 h	2.50×10^{-3}	I^-	100	Room	–	Nath et al. (2010)
Argillite	Not modified	–	48 h	0.21	I^-	200	25	–	Tournassat et al. (2007)

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Table 4 (continued)

Types of soil or clay	Method of modification	[a]Maximum iodine adsorption (mg/g)	Equilibrium time	K_D (mL/g)	Experimental condition				Reference
					Iodine species	Adsorbent dosage (g/L)	Temperature (°C)	pH	
Kaolinite	Not modified	–	1 h	47.09	I^-	20	Room	3.5	Sakuma and Marzukee (1995)
HDPy-smectite	Treated with $C_{21}H_{38}N^+$ Cl^-	–	–	297	I^-	55.56	20	–	Riebe et al. (2005)
HDPy-vermiculite	Treated with $C_{21}H_{38}N^+$ Cl^-	–	–	372	I^-	55.56	20	–	Riebe et al. (2005)
HDPy-bentonite	Treated with $C_{21}H_{38}N^+$ Cl^-	–	–	2800	I^-	200	–	–	Riebe et al. (2001)
HDSMB-bentonite	Treated with $C_{19}H_{42}N^+$ Br^-	–	10 min	3600	I^-	20	25	7	Choung et al. (2014)
ClayFloc™ 750	Commercial bentonite containing quaternary amine	–	7 day	9610	I^-	10	22	5.5	Li et al. (2014), Kaplan et al. (2015)

[a]The value is obtained from the experimental data and not from the mathematical model

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and sulfur were found to adsorb iodine (Fukui et al. 1996; Nath et al. 2010). A batch experiment revealed the ability of the collected sandy loam soils to adsorb 1.3×10^{-4} to 1.60×10^{-4} mg/g of I^- adsorption at its capacity (Nath et al. 2010).

Nearly all the sorbate can be desorbed and recovered from the soil (Nath et al. 2010). However, this means that iodine sorption in the soil can be unstable under the condition where pH and temperature fluctuate. The adsorption of iodine may increase and reach its maximum at about 70 °C (Fukui et al. 1996; Hosseini et al. 2013). However, after that point, the adsorption was observed to decrease with the temperature. Higher pH condition decreased the sorption of iodine species in soil due to the OH^- presence, which competes for the adsorption sites (Fukui et al. 1996). The sorption of iodine is affected by the presence of other anions only when the pH value is below neutral (Fukui et al. 1996).

The increasing uptake of I^- and IO_3^- is dependent and independent on the time of contact, respectively (Fukui et al. 1996). Smaller soil grain size promotes a better iodine adsorption due to the increase in surface area (Fukui et al. 1996). However, unlike the activated carbon, IO_3^- is selected for soil instead of iodide. The adsorption of iodate is found to be higher than that of iodide in different temperature and pH condition (Dai et al. 2009; Fukui et al. 1996).

Besides natural soil, clay is another potential adsorbent that has been studied for the removal of iodine. Naturally, clay mineral is limited in its iodine adsorption ability but due to its high retention of cationic species. The non-modified clay, argillite and kaolinite, had K_D value of 0.21 mL/g and 47.09 mL/g, respectively. However, by modifying the materials, iodine removal efficiency could be improved significantly (Kaufhold et al. 2007). By placing inorganic interlayer cations into natural clay, organoclay was produced with available adsorption sites for the iodine (Riebe et al. 2005). For instance, smectite, vermiculite, and bentonite treated with hexadecylpyridinium chloride ($C_{21}H_{38}N^+$ Cl^-) yielded K_D values of 297, 372 and 2800 mL/g, respectively (Riebe et al. 2001, 2005). More efficiency of 3600 mL/g was observed with the K_D value of 3600 mL/g after treating bentonite with hexadecyltrimethylammonium bromide ($C_{19}H_{42}N^+$ Br^-). The commercial clay, ClayFloc™ 750, has the highest K_D value of 9610 mL/g (Li et al. 2014). The adsorbent was designed to contain cage-like structure aluminosilicate minerals, sulfur, iron, nitrogen-containing substitutions as well as quaternary amine functional group (Kaplan et al. 2015).

Although most of the study regarding the iodine adsorption of soil and clay presented the efficiency in the form of coefficient, K_D, overall, the collected soil was found to have very low maximum iodine adsorption capacity. Nevertheless, like the activated carbon, modification of clay was found to have higher efficiency than that of the unmodified adsorbent. In this category, the commercial product, ClayFloc™ 750, exhibited the highest K_D value of 9610 mL/g. HDPy-bentonite and HDSMB-bentonite had over 2000 mL/g K_D value. The unmodified entisol and argillite were presented with the lowest value of K_D.

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3.3 Mineral

Since it could be found in soil and clay, the inorganic matter or minerals adsorb iodine ions in various ways. IO_3^- and I^- are adsorbed to the mineral with the mechanism of specific adsorption (replacement of hydroxyl group) and electrostatic force, respectively (Evans and Hammad 1995). Minerals containing metal ions adsorb iodine and form insoluble metal iodides, while anionic exchange process is also possible for those that contain other anions beside the ions of iodine (Sazarashi et al. 1994). Several researchers have studied the iodine sorption ability of different kinds of inorganic matters. Table 5 shows the summary of iodide sorption capacity on minerals and rocks from various studies.

Zeolite is a group of hydrated aluminosilicate mineral. The examples of natural zeolite include clinoptilolite, mordenite, and chabazite. The commercial zeolite was capable of removing a high amount of positive radioactive ions of strontium, barium, and cesium (Sato et al. 2011; Lonin et al. 2015). However, it could absorb a minimal amount of iodine. With the initial iodine concentration of 40–50 μg/L, the commercial zeolite removed up to about 20% of I^- and less than 10% of IO_3^- (Sato et al. 2011). In a dynamic adsorption test, with a 4-day contact time, 0.1 g natural zeolite yielded the maximum K_D value for 1.65×10^5, which seems to be a huge number of the coefficient (Lonin et al. 2015). However, in the same research, the K_D values of zeolite for Nd(III) and Sm(III) were observed to be more than three times that of iodine at 7.48×10^5 and 5.47×10^6, respectively (Lonin et al. 2015).

A modified form of zeolite might be more promising for the removal of iodine in water. Silver ion-exchange zeolite has been observed to remove iodine at the capacity of approximately 1.5 mol/g or 190.356 g/g in the air stream (Choi et al. 2001). Modifying zeolite to include hydroxyapatite and hydroxyfluorapatite increased the stability of iodine captured by the sorbent from the air stream (Watanabe et al. 2009). Although methodologies in the mentioned literature are for the removal of radioactive in the gas phase, the same techniques and sorbent can be adapted for the removal contaminant from the aqueous phase, in the future.

Cinnabar exhibited high K_D value as well as removal percentage (Sazarashi et al. 1994). The hydrotalcite also had a relatively high iodine adsorption capacity of 192.5 mg/g (Paredes et al. 2006). When the adsorbent was doped with silver, to produce a silver-hydrotalcite, the iodine uptake capacity increased to 495.5 mg/g (Bo et al. 2016). On the other hand, at optimum conditions, allophane, attapulgite, and chalcopyrite exhibited low K_D value and removal percentage (Sazarashi et al. 1994). For bismuth oxide, with 20 mg/L initial concentration, the adsorbent took 10 h to remove 70 and 80% of I^- and IO_3^-, respectively (Liu et al. 2016). The adsorbent may remove more IO_3^- than I^-, but the K_D values suggested that the adsorbent favor the removal of the latter (Liu et al. 2016).

The bismuth oxide was very stable in water at pH 7 as only 2.3% of iodine leaching was reported after a 12-h leaching experiment (Liu et al. 2016). However, as the pH increased, the sorption capacity decreased (Liu et al. 2016). With the anion competition experiment, the bismuth oxide has shown a strong I^- selectivity in the

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Table 5 Comparison of iodine adsorption on various kinds of minerals

Mineral	[a]Maximum capacity (mg/g)	Removal (%)	K_D (mL/g)	Equilibrium time	Experimental condition				Reference
					Iodine species	Initial iodine concentration (mg/L)	Adsorbent dosage (g/L)	pH	
Zeolite	–	~20	–	30 min	I^-	4×10^{-3} to 50×10^{-3}	–	7	Sato et al. (2011)
Chalcocite	0.713	56	1285	30 min	I^-	1	1	5.81	Anderson et al. (1995)
Cuprite	N/A	75	1.5	–	I^-	12.6	50	7.7	Lefevre et al. (2000)
Argillite	N/A	N/A	1.7	14 day	I^-	3.78×10^{-7} - 1260	4	12.6	Devivier et al. (2004)
Cuprous sulfide	60.91	86	370	10 day	I^-	–	20	8.5–9	Lefèvre et al. (2003)
Allophane	–	13.3	3.07	–	I^-	1.26×10^{-4}	50	6.3	Sazarashi et al. (1994)
Attapulgite	–	4.57	0.958	–	I^-	1.26×10^{-4}	50	6.3	Sazarashi et al. (1994)
chalcopyrite	–	43.3	15.1	–	I^-	1.26×10^{-4}	50	6.3	Sazarashi et al. (1994)
Cinnabar	–	99.9	2×10^4	–	I^-	1.26×10^{-4}	50	6.3	Sazarashi et al. (1994)
Hydrotalcites	192.5	95.10	–	1 day	I^-	1.68×10^4	10	–	Paredes et al. (2006)
Silver-hydrotalcites	495.5	>90	–	–	I^-	500	2	–	Bo et al. (2016)

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Table 5 (continued)

Mineral	[a]Maximum capacity (mg/g)	Removal (%)	K_D (mL/g)	Equilibrium time	Experimental condition				Reference
					Iodine species	Initial iodine concentration (mg/L)	Adsorbent dosage (g/L)	pH	
Bismuth oxide	~70	–	1.85×10^4	10 h	I^-	20	0.2	7	Liu et al. (2016)
Bismuth oxide	~80	–	1.34×10^4	10 h	IO_3^-	20	0.2	7	Liu et al. (2016)
Silica coated with magnetite and imidazole	130	98	–	40 min	I^-	254	0.45	7	Madrakian et al. (2012)

[a]The value is obtained from the experimental data and not from the mathematical model

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presence of other anions, but CO_3^{2-} or Cl^- could pose a strong competition for the sorption sites (Liu et al. 2016). Lastly, the researchers studied the removal of iodine in the synthetic seawater, using Fukushima Nuclear Power Plant as a reference. The bismuth oxide could remove 60–100% of the iodine in the seawater, depending on the initial concentration of iodine added (Liu et al. 2016).

The metallic mineral could be modified for iodine adsorption. The silica was coated with magnetite and imidazole. The sorbent was brought for the iodine removal, and the result was satisfactory with 98% iodine removal and about 130 mg/g maximum final sorption capacity (Madrakian et al. 2012). Up to 90% of iodine was recovered from the sorbent (Madrakian et al. 2012). ZIF 8 or (Zn(2-methyl-imidazolate)$_2$) a type of metal–organic framework (MOF) which contained zinc was studied for its ability to remove iodine vapor (Hughes et al. 2013). A gram of ZIF 8 adsorbed up to 0.66 g of iodine (Hughes et al. 2013). The research on this sorbent should be continued in the future with the sorption experiment in the water.

A natural material called gossypol was modified to have zeolite-like morphology. The material is called gossypol P3 polymorph and is described as a phenolic aldehyde pigment, extracted from cotton plants and seeds. It was investigated for its ability to remove iodine in the aqueous solution. The results confirmed for an iodine inclusion, which the molecules enter the extended cavities of the channels within the zeolite-like structure of the gossypol P3 polymorph (Talipov et al. 2007). The sorbent should be subjected to a batch experiment in the future.

Several kinds of minerals have shown promising results. The silver-hydrotalcite had almost 500 mg/g iodide removal capacity and has been able to remove I^- in the seawater, so it becomes one of the best adsorbents in this category. The results of bismuth oxide also exhibited high K_D for both I^- and IO_3^-, and it is one of a few adsorbents that have been reported for the successful removal of IO_3^-. Consequently, the mineral is considered as one of the most essential adsorbents that contribute to the radioactive iodine removal and should be studied further for better results.

3.4 Polysaccharide

Starch and iodine have been known to react to form unique complex formation. The reaction has often been used in the analytical chemistry field for over a century (Szente et al. 1999). It was claimed that iodine form a complex with both amylose and amylopectin in the presence of water (Saibene and Seetharaman 2006). As a result, iodine can be used to determine amylose and amylopectin content in various kinds of starches such as those in corns and potatoes (Rendleman 2003). Knowing that such complex formation exists, there were some attempts to use natural and synthetic polysaccharide in iodine sorption (Table 6).

Chitin is a natural polysaccharide which was found in 1884. It is the most abundant natural polysaccharide, second to cellulose, found in the exoskeleton of arthropods like shrimps and crabs. Chitin and its ability to bind iodine have been studied for drug delivery (Takahashi 1987). Chitin was reacted with iodine, and the results showed that

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Table 6 Iodine adsorption by polysaccharides

Polysaccharide	[a]Maximum capacity (mg/g)	Equilibrium time	Experimental condition					Reference
			Iodine species	Initial iodine concentration (mg/L)	Adsorbent dosage (g/L)	Temperature	pH	
Chitin	116.67	24 h	I_2	~3.8×10^4	100	–	–	Takahashi (1987)
Chitosan	100	24 h	I_2	~5×10^4	2	25	–	Chen and Wang (2001)
Cyclodextrin–chitosan complex	1200	24 h	I_2	~5×10^4	2	25	–	Chen and Wang (2001)
Calcium alginate–silver chloride	152.032	–	I^-	5.5–10	5	25–55	4–10	Zhang et al. (2011)
TiO_2-Fe_2O_3-PVA alginate beads	~20	3 h	I^-	200	50	25	8	Majidnia and Idris (2015)

[a]The value is obtained from the experimental data and not from the mathematical model

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1 and 3 g of chitin were bound to 0.149 and 0.35 g of iodine, respectively (Takahashi 1987). A report presented the synthesis of chitin aerogel with silver impregnation, which the porous adsorbent was capable of adsorbing I_2 from the vapor (Gao et al. 2017).

Chitosan is another kind of polysaccharide, which was made from chitin by the process of alkaline deacetylation. It is considered to be one of a few natural cationic polymers. It is soluble in aqueous solution and can be modified into many forms such as gel, films, and fiber. In a batch experiment using 0.1 g chitosan beads in 50-mL ethanol solution of various iodine concentrations, the maximum sorption capacity was found to be about 0.2 g iodine per a gram of chitosan (Chen and Wang 2001). A K_D value of 88 mL/g was presented in another study (Li et al. 2014).

Cyclodextrin is a sugar molecule that linked to form a ring. It is produced from starch, and like chitin and chitosan, it has been studied extensively for food and drug delivery system (Chen and Wang 2001). A study exhibited a process of cyclodextrin entrapping the gaseous radioactive iodine in a nuclear waste management (Szente et al. 1999). Although the study was done for the air contamination, it shows that cyclodextrin could adsorb iodine in the presence of water vapor. A complex of cyclodextrin–chitosan was found to have a maximum iodine removal capacity of 1200 mg/g (Chen and Wang 2001).

The alginate is another adsorbent that has been researched for the iodine adsorption. It has been proposed that mucilaginous layers, the cells that cover the surface of brown algae, play an important part of iodine sorption ability (Loderio et al. 2005). Within these mucilaginous layers, alginic acid is contained, which is the main ingredient of sodium alginate. Sodium alginate is a compound that is used for pharmaceutical and commercial chelator product to pull I-131 and Sr-90 from bodies of the consumers (Loderio et al. 2005; Sutton et al. 1971). However, the alginate is an anionic polysaccharide. As a result, some studies impregnated it with various kinds of metals, for iodine sorption in the batch experiments. The iodine adsorption on calcium alginate–silver chloride composite yielded the adsorption capacity within the range of 132.742–152.032 mg/g across a set of initial iodine concentration and temperature (Zhang et al. 2011).

The alginate could also be taken to react with Polyvinyl alcohol (PVA), titania (TiO_2), and maghemite (γ-Fe_2O_3) to create a unique sorbent (Majidnia and Idris 2015). The TiO_2-Fe_2O_3-PVA alginate beads were shown to adsorb iodine in an aqueous solution with about 20 mg/g maximum uptake (Majidnia and Idris 2015). pH 8 provided the optimum condition for the sorption mechanism as the highest iodine percentage removal of about 98%, in 200 mg/L iodide initial concentration, was obtained (Majidnia and Idris 2015). Additionally, it was shown that TiO_2-Fe_2O_3-PVA alginate beads can be reused for more than seven times with only 10% reduction of sorption efficiency is observed at the seventh usage (Majidnia and Idris 2015).

Compared to those of the other categories, the research on polysaccharide was found to be limited. Still, the cyclodextrin–chitosan complex exhibited one of the most iodine uptake capacities across all the adsorbent categories. The complex was only studied for the binding of I_2, but, like the calcium alginate–silver chloride, it can possibly be modified for the removal of the anionic species in the natural

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environment. Since polysaccharide is widely available, further research should focus on identifying the potential adsorbents.

4 Comparative Study of Natural Adsorbents to the Conventional Anion-Exchange Resin

The ion-exchange resin is the adsorbent often used in conventional water softening and treatment. It is also a useful material for several other practices including medical procedure, food production, and agriculture. Ion-exchange resins usually contain a cross-linked polymer matrix with ion-active sites throughout the structure. It has an ability to adsorb ions with a minimal effect on the chemical formation of the solutes and the form of targeted ion (DOWEX 2000). Ions can be recovered from the sorbent in the process called regeneration, which returns the resin to its initial state.

The anion-exchange resin is usually produced from polystyrene. It is engineered to have quaternary amine on the surface. Attached to the N^+ is Cl^- or OH^- that can be exchanged with the target anionic contaminant. Several commercial anion-exchange resins were used to remove I-129 from the underground water environment. The commercial resin has a total iodine maximum loading capacity of 8.27 μg/g (Parker et al. 2014). I^- is observed to be a more desirable species for the sorbent with the maximum capacity of 5.90 μg/g (Parker et al. 2014). On the other hand, only about less percentage removal of IO_3^- was reported without the value of maximum capacity (Parker et al. 2014). A recent study on the iodide adsorption by silica-based poly(4-vinyl pyridine) resin yielded the contaminant removal capacity of 148.23 mg/g (Ye et al. 2019).

It would be inaccurate to directly compare the adsorption capacity and equilibrium time of different adsorbent to the anion-exchange resin. This is because the experiments were performed in different condition with different iodine quantification techniques. However, the summary of the sorption mechanism, maximum capacity or $K_{D,}$ and prices of natural adsorbents and anion-exchange resin are shown in Table 7. The sorption mechanism is different for all the natural adsorbent. The price for activated carbon is cheap but the adsorbent itself relies on the modification to improve its iodine adsorption capacity. The commercial bentonite, ClayFloc™ 750, may also have one of the highest K_D values, but it requires the process of synthesis with organic compound containing quaternary amine. The amylose and amylopectin in polysaccharide are also responsible for the binding of I_2 but like the activated carbon, in order to improve the adsorption capacity of anionic iodine species, the adsorbent still depends extensively on the modification with the organic and inorganic with cationic functional groups. The cyclodextrin–chitosan complex seems to have the highest maximum capacity. Nevertheless, only I_2 was used in the experiment, and the adsorbent is expensive compared to the others.

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Table 7 Comparison between the natural adsorbent and conventional anion-exchange resin

Types of natural adsorbent	Adsorption mechanism	Maximum I^- adsorption capacity or K_D from a specific adsorbent	Price/g for specific adsorbent
polystyrene-based Anion-exchange resin	Ion-exchange Cl^- or OH^- with the anionic species of I^-	5.90 μg/g in the underground water environment	~0.84 USD for Dowex-1 chloride form[a]
Activated carbon	1. London dispersion forces 2. Forming bonds with functional group carbonyl, phenol, lactone and carboxyl group 3. Ionic bonding, if modified with metal	305 mg/g from carbon fiber 126.9 mg/g from silver-impregnated carbon	<0.01 USD for untreated, granular, 6 × 12 mesh[b]
Soil and clay	1. Covalently bonded and form complexes with functional groups such as phenol, thiol, and amine 2. Ionically and electrostatically attracted to the positive charge provided by the free hydroxides of Fe and Al	9610 mL/g from the commercial bentonite containing quaternary amine	–
Mineral	1. Specific adsorption (replacement of hydroxyl group) 2. Electrostatic force to cationic components 3. Ion-exchange at the quaternary ammonium, if modified with quaternized agents	192.5 mg/g from hydrotalcites 495.5 mg/g from silver-hydrotalcites 70–80 mg/g from bismuth 130 mg/g silica coated with magnetite and imidazole	<0.01 USD for 4A zeolite[c] ~0.11 USD for hydrotalcite[a] ~0.07 USD for bentonite[a] ~4.58 USD for bismuth (III) oxide[a]
Polysaccharide	1. Form complex with the polysaccharide functional groups; amylose and amylopectin 2. Physical precipitation, ionic bonding, and electrostatic force, if modified with metal	1200 mg/g from cyclodextrin–chitosan complex 152.032 mg/g from calcium alginate–silver chloride	~3.11 USD for β-Cyclodextrin[a]

[a]https://www.sigmaaldrich.com (accessed on 10 January 2019)
[b]https://www.kemcore.com (accessed on 12 January 2019)
[c]https://chemlab.en.alibaba.com/?spm=a2700.details.cordpanyb.1.2f07404cJVc1mg (accessed on 12 January 2019)

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5 Conclusions and Future Work

From the literature compiled in this report, the problem of radioactive iodine in the water is not a new phenomenon. The research on iodine adsorption has been studied extensively to remove the contaminant from the water so that human and other living thing are not at risk. The natural adsorbents are abundant and can be easily obtained. Some of the natural adsorbents seem to outperform the conventional anion-exchange. With 1200 mg/g iodine adsorption capacity, cyclodextrin–chitosan complex seems to be one of the promising adsorbents, but it is still only efficient for removing I_2 and quite expensive compared to the other adsorbents. On the other hand, the adsorbent like activated carbon, clay, mineral, and alginate rely on the modification to yield a high adsorption efficiency. 495.5 mg/g I^- removal was reported for the silver-hydrotalcites. The carbon fiber and calcium alginate–silver chloride adsorb up to 305 mg/g and 152.032 mg/g of I^-, respectively. The bentonite, which was synthesized to contain quaternary amine, has a very high K_D value of 9610 mL/g.

Most of the adsorbent seem to exhibit the selectivity toward I^-. Only the collected clay and bismuth oxide were reported to adsorb more IO_3^- than I^-. The activated carbon was found to adsorb I^- and I_2, while the chitin, chitosan, and cyclodextrin, unless modified with cationic-containing agent, have only been reported for I_2 inclusion. Moving forward, the batch experiment of the potential adsorbent should be performed with both IO_3^- than I^- as these are prominent species that exist in the water.

In addition, it is recommended that the kinetic and batch experiment are conducted on the potential materials like gossypol, chitin aerogel, and ZIF 8. These adsorbents were successfully tested for the adsorption of gaseous iodine, so they might be able to adsorb the iodine as well in the water. In term of modification, there are still more room for impregnation and synthesis so that the natural materials contain the desired functional group. Besides, the research on using plant materials as iodine adsorbent is still limited. The experiments should be conducted on plant parts that contain the cationic components so that we may uncover new kinds of natural adsorbent.

Lastly, if these materials are found to be highly selective for the iodine contaminants, we can benefit from them not only in term of environmental safety, but also economical values and industrial applications. Continuing the research on this topic is crucial in leading us to the more sustainable future and creating us a better well-being of both human and other living creatures.

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An Insight into Characterization, Mechanism and Kinetics of Congo Red Sorption Using Biowaste FRLP



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Abstract Commercial utilization of solid waste is superior to other waste management methods in environment point of view. Dry leaves have potential utility as an adsorbent. The abundantly available biomass *Ficus religiosa* leaf powder (FRLP) was used as an adsorbent for the removal of pollutants like congo red (CR) from aqueous solution. The nature and mechanism for the removal of CR were determined from characterization and kinetic studies. The results reveal the hydrogen bond between various functional groups of adsorbent and the dye. The rate of transport is of pseudo-second-order type.

Keywords *Ficus religiosa* · Congo red · Kinetics · XRD · SEM · FTIR

1 Introduction

Global solid waste generation is around 1.3 billion tonnes per year, with a footprint of 1.2 kg per person per day. By 2025, it is expected to reach 2.2 billion tonnes, with the current phase of population growth, industrialization and urbanization. East Asia and the Pacific region generate approximately 270 million tonnes annually with a per capita of 0.44 kg per person per day. Projected statistics reveals that China and India face serious problems of waste management compared to any other country (http://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management). India is one of the top ten countries producing solid waste with more than 10^5 metric tonnes per day. It is anticipated that population of India would be about 1823 million by 2051 and about 300 million tons per annum of MSW will be generated (http://www.cpcbenvis.nic.in/newsletter/solidwastejun1997/jun1997.htm).

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Around 60% of solid waste from lower and middle income country like India is organic. And leaf litter is one of the major contributors of organic waste. Dry leaf piles are considered unsightly and shelter for disease-causing agents (http://www.earthamag.org/stories/2018/4/9/dont-burn-those-dry-leaves-put-them-to-good-use-instead). Open air burning is a general practice to alleviate this problem, but it contributes to air pollution, and hence, global warming. Commercial utilization is a superior method over other solid waste management strategies. Recent literature review proves the capability of dry leaves as a potential adsorbent in chemical industrial sector and water treatment plants (Mohan Rao and Basava Rao 2016).

In this present study, *Ficus religiosa* leaves are powdered and used as an adsorbent to recover synthetic dye, Congo red dye from water effluents. This paper focuses on the characterization of adsorbent, the binding mechanism and the kinetics.

2 Materials and Methods

2.1 Preparation of Anionic Dye Solutions

Congo red (CI = 22,120) was supplied by Merck (Mumbai, India). Initially, a solution of 1000 mg/L was prepared and then diluted as per the requirement.

2.2 Preparation of the Adsorbent

Ficus religiosa leaves were collected directly from the trees in the local area, rinsed with water to remove the debris and dried in an oven at 80 °C to a constant weight. The dried leaves were made to powder of required size and finally packed in desiccators.

2.3 Biosorption Experiments

Original dye solution of concentration 1000 mg L^{-1} was prepared. And it was diluted to various concentrations up to 25 mg L^{-1}. Pre-calculated amount of adsorbent (0.01–1 g) was measured accurately with an analytical balance (sX200) and added to 50 mL of feed solution; pH of the solution was measured with a digital pH meter (ELICO-L1 612) and varied (2–10) by using 0.1 N HCl and 0.1 N NaOH solutions. The adsorbent solution was agitated with Remi make Temperature Controlled Orbital Shaker (REMI—CIS 24 BL). At the end, the samples were collected and centrifuged to remove the suspended solid particles using REMI C 24 centrifuge. The clear liquid

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was collected and analyzed using UV–VIS Spectrophotometer (SYSTRONICS-117) at a wavelength of 498 nm under different conditions.

2.4 Characterization

A scanning electron microscope SEM model EVO 18, Carl Zeiss, was used for the microstructure analysis of the sample surface. EDS (Oxford Instrument) was attached to it for elemental analysis of the sample. The X-ray diffraction of the sample was obtained with SHIMADZU make XRD 7000. Fourier transmission electroscope was used to identify the functional groups on biomass. The sample was examined using SHIMADZU, FTIR 8400S.

3 Results and Discussion

3.1 Characterization

The SEM image at 10,000× magnification is shown in Fig. 1. It shows irregular surface with some small particles.

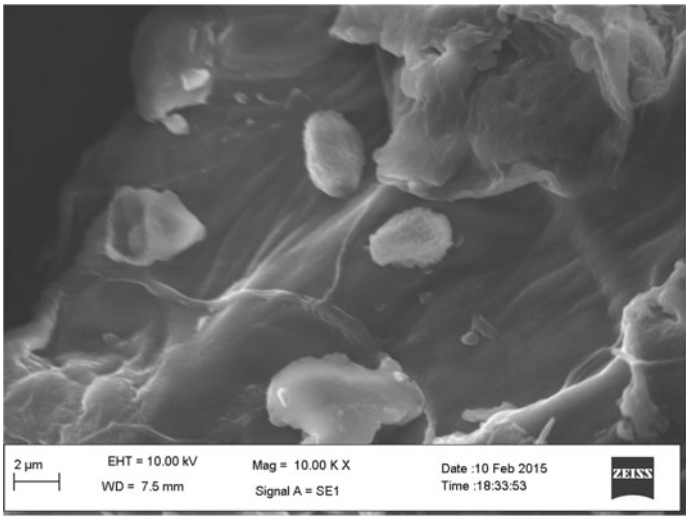

Fig. 1 SEM micrograph of FRLP

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X-ray diffraction spectra of FRLP are shown in Fig. 2. The overall XRD spectrum is indicative of an amorphous nature of the adsorbent. Amorphous materials have greater specific surface area and more active sites which render them good adsorbents.

EDS analysis was carried out to identify the minerals present in FRLP. EDS spectrum has been shown in Fig. 3. It shows the presence of minerals like Ca, K, Cu, Na and Mg with C and O as major compositions.

The FTIR spectral data of FRLP are shown in Fig. 4. It shows the presence of several functional groups that can interact with pollutants like CR in the adsorption process. A broad peak in the range of 3300–3450 cm^{-1} is the characteristic

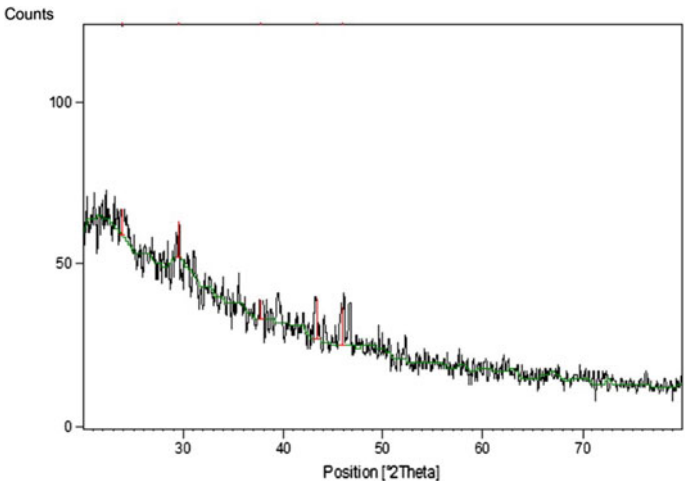

Fig. 2 X-ray diffraction spectra of FRLP

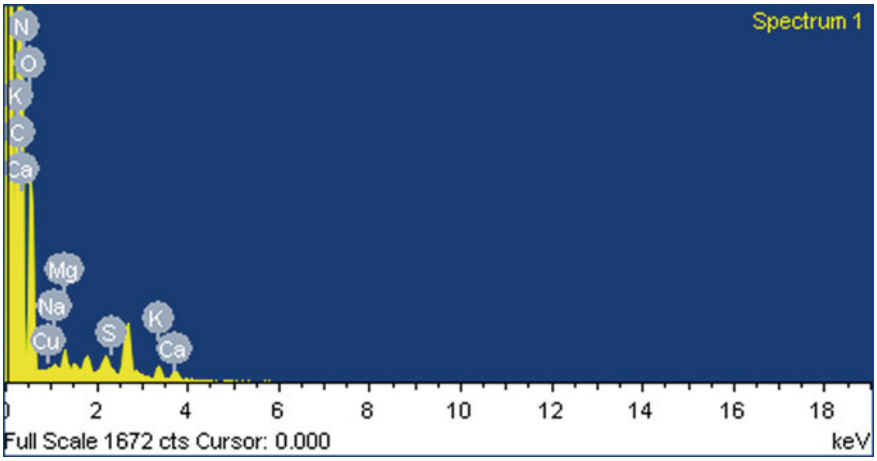

Fig. 3 EDS spectra of FRLP

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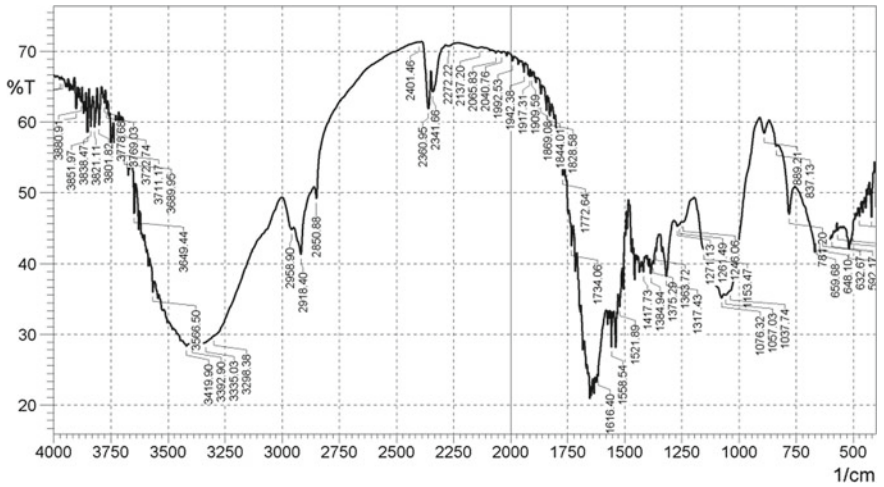

Fig. 4 FTIR spectra of FRLP

of O–H/N–H stretching frequencies and may be attributed to the presence of alcohols, phenols, amines and carboxylic acids in FRLP. The absorbance at 2918 and 2850 cm^{-1} is due to aliphatic C–H stretching in alkanes. While the absorption at 2360 cm^{-1} appears due to C≡C stretching, medium peaks at 2341, 1616 cm^{-1} could be attributed to C–H stretch in cellulose and starch. The weak but sharp peaks at 1558 and 1417 cm^{-1} could be ascribed to C–H deformation in lignin. Similarly, relatively less intense sharp peaks at 1384, 1375 cm^{-1} are characteristics of C–H bending vibrations of alkanes while C–hetero atom stretching frequencies for C–O and C–N bonds at 1076, 1057 cm^{-1} clearly indicates the presence of carboxylic acids/alcohols/amines. The presence of alkyl halides is confirmed by typical C–Cl stretching frequencies at 837 and 781 cm^{-1}, and the absorption for glycosidic linkage in hemi-cellulose appears at 889 cm^{-1}.

Interpretation of analytical data obtained from our studies revealed that FRLP contains various organic components which include alcohols, long-chain hydrocarbons, aliphatic alcohols along with fibers, tannin, different types of proteins and carbohydrates. Besides, it is rich in minerals like calcium, phosphorus, iron, copper, magnesium and sodium. These observations were further supported by the studies conducted by Chitra Gupta (2012).

3.2 Adsorption Kinetics Study

Kinetic studies help to estimate the time of operation and give an idea about the mechanism of the process. In this study, pseudo-first-order and pseudo-second-order kinetic models were applied to determine the suitable rate expression. The linear

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form of pseudo-first-order rate expression of Lagergren based on solid capacity is generally expressed as follows (Purkait et al. 2007):

$$\ln(q_e - q_t) = \ln q_e - K_1 t \tag{5}$$

where q_e and q_t are uptake at equilibrium and at time t, respectively, and K_1 is the rate constant (min^{-1}). A straight line for the plot of log ($q_e - q_t$) versus t would suggest the applicability of the model. The values of K_1 and q_e can be calculated from the slope and intercept of this line.

The linear expression of pseudo-second-order kinetic model of Ho and McKay (1999) (Acemioğlu 2004) is given below:

$$\frac{t}{q_t} = \frac{1}{K_2 q_{2e}^2} + \frac{t}{q_{2e}} \tag{6}$$

where K_2 is the rate constant in unit g min^{-1}. A linear relationship to the plot of t/q_t versus t implies applicability of the pseudo-second-order kinetics.

Various experiments were conducted with different initial concentrations (25, 50, 150 mg/L). Samples were withdrawn at different time intervals, and the data were tested for the kinetic models. Kinetic parameters were calculated from the linear plots of pseudo-first- and second-order models (Fig. 5) and the results of which have been given in Table 1. Adequacy of the model was tested in terms of R^2 values and by comparing uptakes that were actual and estimated by the models. The R^2 values for pseudo-first- and second-order models at 25, 50 and 150 mg/L were 0.73, 0.88 and 0.70 and 1, 1 and 0.998, respectively. Estimated equilibrium uptake values of the pseudo-second-order model are very close to that of actual. However, such is not the case of pseudo-first-order. Hence, the adsorption mechanism is closer to a pseudo-second-order process. It is similar to the observations cited for adsorption of Congo red on activated carbon, calcium-rich fly ash and $CaCl_2$ modified bentonite (Purkait et al. 2007; Liping Guo and Wang 2009; Jing et al. 2011).

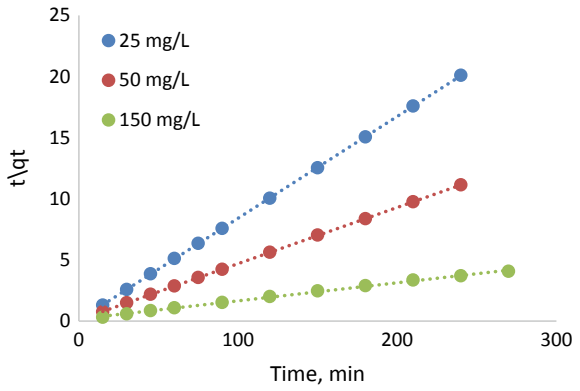

Fig. 5 Pseudo-second-order kinetics for biosorption of CR using FRLP

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Table 1 Kinetic parameter constants for biosorption of CR using FRLP

		Pseudo-first-order reaction			Pseudo-second-order reaction		
C_o (mg/L)	$q_{e,\,exp}$ (mg/g)	K_1 (min^{-1})	q_e (mg/g)	R^2	K_2 (g min^{-1})	q_e (mg/g)	R^2
25	11.94	0.043	2.63	0.73	1748.90	12.05	1
50	21.56	0.026	4.70	0.88	4633.23	21.74	1
150	70.68	0.029	138.24	0.70	26,573.13	71.43	0.998

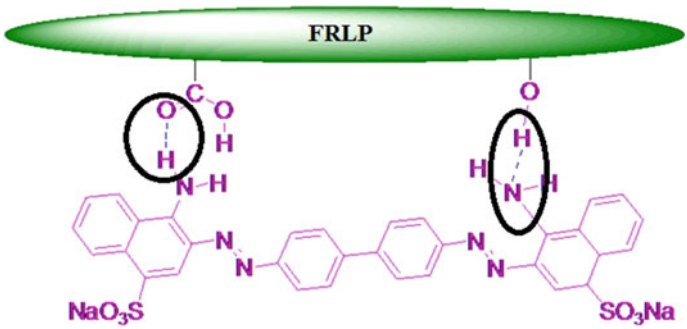

Fig. 6 Proposed mechanistic model for CR adsorption on FRLP

3.3 Mechanistic Studies

Based on the above studies, a type of physical interaction or physisorption model caused by weak hydrogen bond forces of various functional groups present on the surface of FRLP with those of aromatic amine functionalities of Congo red is expected. As could be observed from the proposed mechanistic model depicted in Fig. 6, the basic carbonyl part from the carboxylic acid is H-bonded to the electron-deficient hydrogen atom of the aromatic amine while the simple hydroxyl groups are presumably hydrogen bonded to electron-rich nitrogen atom of the amine. These non-covalent interactions are in agreement with the model proposed earlier (Mao et al. 2008; Kumar et al. 2010) and appear to provide the requisite stabilization for adsorption.

4 Conclusions

FRLP is an amorphous material with greater specific surface area. It contains various organic components like alcohols, hydrocarbons, along with fibers and tannin which are rich in functional groups. Based on the studies, hydrogen bond is expected between carbonyl group of carboxylic acid and the electron-deficient hydrogen atom

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of the aromatic amine. In addition, simple hydroxyl groups are presumably hydrogen bonded to electron-rich nitrogen atom of the amine. In kinetic studies, pseudo-second-order model best described the sorption kinetics compared to other models.

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Novel Utility of Bacteria of Fish Gut Wastes Collected from Local Markets for Detoxification of Textile Dyes and Recycling of Water for Cultivation

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Abstract Preliminary survey shows that an average of 500 kgs of fish waste is being produced per day from each local fish market. Several such markets are in function in whole of Chittoor district alone. These wastes are known to be either underutilized to produce low market value products or dumped in open water systems. Fish waste management has been one of the major problems of concern since it will have the greatest impact on the environment. Fish gut is rich in bacteria; some of which are beneficial or probiotic. Complete utilization of fishery waste for recovering high-end products would be a fruitful strategy to overcome the issue as well to increase the economic gain. Worldwide dyestuff and pigments worth s $10.6 billion (2008) are being produced. India is the second largest exporter of dyestuffs and intermediates among developing countries, after China. The textile industry accounts for the largest consumption of dyestuffs, at nearly 80%. Dye containing waters are known for reducing efficiency of seed germination, plant growth and elongation of shoot and roots (Nirmalarani and Janardhanan in Madras Agric J 75:41, 1988), carcinogenic and mutagenic (Venturini and Tamaro in Mutation Res 68: 307–312, 1979; Mathur et al. in Appl Ecol Environ 4(1):111–118, 2005), causing skin and eye irritation, reducing aquatic life affecting liver, gill, kidney, intestine and gonads as well as liver damage in humans (Badr et al. in Mol Biol Evol 17:499–510, 2008). In spite of the above, the industrial effluents with greater than admissible levels of dyes are noticed to be released into open water systems. Microorganisms are known to reduce the dyes by secreting enzymes such as laccase, azoreductase, peroxidase and hydrogenase. Reduced forms of dyes are further mineralized into simpler compounds and are utilized as their energy source. Hence in the present study, *Bacillus subtilis* and *Terribacillus saccharophillus,* isolated from the gut of *Labeo rohita* (*Gendi*), the most local delicacy collected from the market, were examined for their ability to decolourize the textile dye, malachite green (MG). UV-Vis studies showed that both *B. subtilis* and *T. saccharophillus* have an ability to degrade methyl red, the azo dye.

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Further, Fourier transform infrared spectroscopy (FTIR) studies of *B. subtilis*- and *T. saccharophillus*-treated dye solutions after 0, 24 and 48 h showed remarkable change and reduction in the number of functional groups with progress in treatment time, clearly illustrating the impact of both these bacteria in degrading the dye molecules. Phytotoxicity studies further clearly demonstrated that addition of *B. subtilis* and *T. saccharophillus* to the growth medium used for seed germination significantly degrades the dye integrity resulting in reduced toxicity and significant rise in the rate of germination. This study demonstrated the beneficial use of bacteria of fish gut waste as good biological agents for water treatments, specifically for degradation of textile dye effluents making it suitable to recycle for irrigation purposes.

1 Introduction

Ever since the beginning of humankind, colour has become an important property of expression. Colourants are being used for painting and dyeing of their surroundings, clothes and even skins. Till the middle of the nineteenth century, all colourants were derived from natural sources. With the invention of aniline purple and Tyrian purple with excellent dyeing properties by Perkin in 1896 followed by benzene structure by Kekule strongly stimulated the production of various synthetic dyes leading to replacement of natural dyestuffs with synthetic ones from the beginning of the twentieth century, they were replaced by synthetic dyestuffs (Welham 2000). Worldwide demand for natural dyes is about 10,000 tones. Production of dyestuff and pigments in India is close to 80,000 tons and stands as second largest exporter of dyestuffs and intermediates among developing countries, after China. Textile industry accounts for the largest consumption of dyestuffs, at nearly 80% and the major source of ecotoxic hazard ranging 10–200 mg l^{-1}. The principal route by which dyes enter in the environment is via wastewater. As dyes are designed to be chemically and photolytically stable, they are highly persistent in natural environments.

The International Agency for Research on Cancer (IARC) has classified various dyes like benzidine being associated with cancer (Venturini and Tamaro 1979; Anonym 1982; Mathur et al. 2005). Further, benzidine is known to be carcinogenic to the variety of mammalian species, including humans and reported to induce hepatocellular carcinomas and neoplastic liver nodules in rats after 13 weeks of exposure (Robens et al. 1980). Apart from being phytotoxic (Parshetti et al. 2006), textile dyestuff and wastewaters are detected to be causative for significant reduction in erythrocyte count in the freshwater fish *Gambusia affinis* (Sharma et al. 2009).

Among the commonly used dyes, malachite green (MG) is a multi-organ toxin causing decreased food intake, growth and fertility rates along with damaging liver, spleen, kidney and heart in aquatic species (Werth and Boiteaux 1967; Culp et al. 1999) and irritation to the gastrointestinal tract in humans and permanent injury in eyes (Kumar et al. 2006). Methyl Red (MR) is a commonly used monoazo dye in paper printing and textile dyeing and in the preparation of commercial products (Lachheb et al. 2002). MR is well known to cause eye, skin, respiratory tract and

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mucous membrane irritation (Mahmoud et al. 2010) and also liver damage upon repeated exposure (Badr et al. 2008). Crystal violet (CV), a triphenylmethane dye, is extensively used in human and veterinary medicine as a biological stain and as a textile dye. It is also used in the preparation of paints and printing. CV is reported to persist in the environment for a long period posing toxic threat to the environment. Therefore, there is an urgent need to develop such eco-friendly and cost-effective biological treatment methods, which can effectively remove the dye from industrial wastewaters for the safety of environment, as well as human and animal health.

1.1 Dye Removal Methods

Textile dyestuff and wastewater are recalcitrant to the degradation. Several physical techniques based on adsorption, osmosis, ultrafiltration, microfiltration and chemical techniques such as coagulation or flocculation combined with flotation and filtration, precipitation/flocculation, electroflotation, electrokinetic coagulation, conventional oxidation irradiation or electrochemical processes were employed to remove colour from the dye containing wastewaters. Several factors, including dye type, wastewater composition, dose or costs of required chemicals, operation costs, environmental fate and handling costs of generated waste products imposed the technical and economic feasibility of each method employed. In general, each technique has its own limitations (Cooper 1993; Maier et al. 2004).

Alternatively, biological treatments are opted to completely degrade dyes (Verma and Madamwar 2003; Moosvi et al. 2005; Pandey et al. 2007; Khalid et al. 2008), ever since microorganisms were found to reduce the dyes by secreting enzymes. Biodegradation methods such as (a) decolourisation using fungi such as *Phanerochaete chrysosporium*, *Trametes* sp. and *Aspergillus* sp, (b) adsorption using live or dead microbial biomass, (c) anaerobic methods to decolourise azo dye using bacteria such as *Bacteroides* sp., *Eubacterium* sp. and *Clostridium* sp. and (d) aerobic oxidatively decolourisation methods. But due to xenobiotic nature, azo dyes are not totally degraded (Laing 1991; Panswald et al. 2001). Moreover, azoreductase and laccase are the two extracellular enzymes that are primarily involved in the bioremediation of textile dyes for which all the microorganisms may not serve as a source.

Fish is highly proteinaceous and easily digestible and a good delicacy. Several fish markets are in operation in each city of Andhra Pradesh. Recent survey revealed that an average minimum 500 kgs of fish waste is generated from each of the fish markets that contain fish scales, fins, gut and other parts of the viscera which is partially used or discarded becoming the main source of pollution and environmental contamination.

Hence in the present study, *Bacillus subtilis* and *Terribacillus saccharophillus* isolated in our laboratory from the gut wastes of freshwater fish, *Labeo rohita*, were examined for their ability to decolourize malachite green. Degraded products were also characterized through, UV-Vis spectroscopy and FTIR and phytotoxic studies.

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2 Materials and Methods

2.1 Materials

1a. *Labeo rohita*



1b. Fish-selling shops, Tirupati, Chittoor Dt., A.P





2. Bacterial Strains
Bacterial strains, *B. subtilis* and *Teribacillus saccharophillus* isolated from the gut of *Labeo rohita.*

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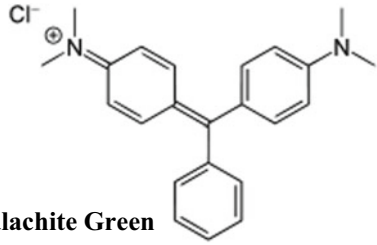
B. subtilis ***T. saccharophillus***





3. The textile dyes such as malachite green (MG) and nutrient broth were obtained from Himedia, India.



Malachite Green

3 Methodology

1. Assessment of Dye Decolourization
   B. subtilis and *T. saccharophillus* were inoculated separately in 250 ml of nutrient broth and incubated at 37 °C for 24 h. After incubation, 25 ml (100 mg/l) of MG was taken, and 5 ml of each bacterial suspension of 10^7 CFU/ml was added separately. The flasks were kept in orbital shaker and incubated at 37 °C. Samples were drawn at 0-, 24- and 48-h intervals centrifuged at 10,000 rpm for 10 min, and the level of decolourization was assessed by measuring absorbance of the supernatant at wavelength maxima (lambda m) of the dye using UV-Vis spectrophotometer.
2. Extraction and Analysis of Dye Degradation Products—UV-Vis spectral analysis
   After complete decolourization of the dye suspended solutions, culture broth was centrifuged at 7000 rpm for 15 min. Equal volume of n-butanol was added to extract metabolites from the supernatant. The extracts were evaporated after removal of aqueous content with anhydrous Na_2SO_4 in a rotary evaporator, dried at 40 °C and used for further analysis.
   The supernatant samples (2 ml; 250 μg/ml) obtained before and after treatment with *B. subtilis* and *T. saccharophillus* were subjected to spectral analysis between

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250 and 700 nm. The UV-Vis spectral analysis was carried out using Hitachi UV-Vis spectrophotometer (UV 2900).
Percentage decolourization was calculated from the following formula and tabulated.

$$\%\,\text{Decolorization} = \frac{\text{Initial OD} - \text{Final OD}}{\text{Initial OD}} \times 100$$

3. Fourier Transform Infrared Spectroscopy (FTIR) analysis
Fourier transform infrared spectroscopy (Bruker ALPHA—T) **of** samples MG (0 h), 24 and 48 h decolorization products was carried out. The FTIR analysis was done in the mid-IR region of 400–4000 cm^{-1} with 16 scan speed. The samples were mixed with spectroscopically pure KBr in the ratio of 5:95, the pellets were fixed in sample holder, and the analysis was carried out. The transformation of the interferogram into FTIR is carried out mathematically using the software OPUS.
4. Phytotoxicity Studies (Durve et al. 2012)
Effect of MG on the pattern of seed germination of *Vigna radiate* (Moong) was evaluated. The seeds were germinated in sterile Petri dishes, layered with sterile circular filter paper (diameter 10 cm). Ten seeds were irrigated at room temperature (28 ± 2 °C) for three days with 2 ml of water (control); MG and one of the two bacterial suspensions. Every day 2 ml of respective sample solution was applied to the surface of the filter paper. Each treatment was replicated for three times. Observations were made on daily basis, and rate of germination (%) and root length (cm) were measured.

3.1 Statistical Analysis

Significant differences in the parameters such as shoot and root length were assessed through students' t-test ($p > 0.05$ level).

4 Results and Discussion

1. Dye decolourization

Gradual change in MG colour from bright green to light green up to 48 h after the inoculation of B. *subtilis* and *T. saccharophillus* isolated from the fish gut wastes was observed (Fig. 1).

44/34% decolourization of MG, by *B. subtilis* and *T. saccharophillus* suspended media, respectively, following 24 h of incubation, indicated the ability of these two selected bacteria to rapidly decolourize azo dyes (Fig. 2). Continued exposure up to

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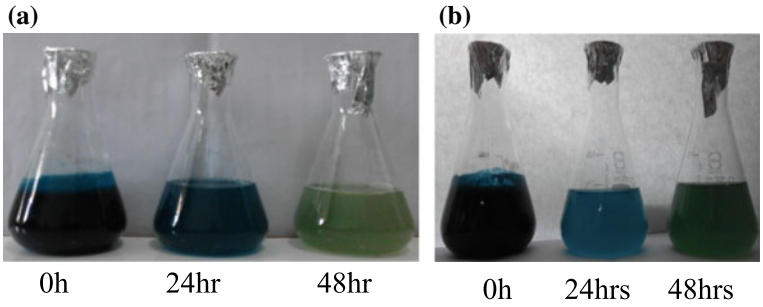

Fig. 1 Malachite green (MG) dye decolourization at 0, 24 and 48 h by **a** *B. subtilis* and **b** *T. saccharophillus*

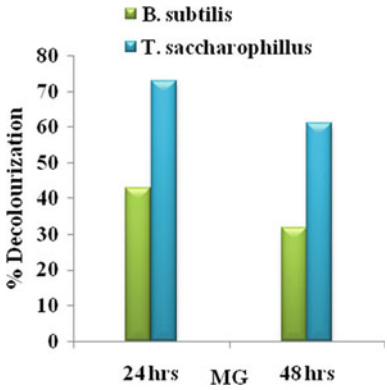

Fig. 2 Percentage decolourization of MG with *B. subtilis* and *T. saccharophillus* after 24 and 48 h compared to 0 h

48 h was found to further increase the above-mentioned levels to 73/63%, respectively. In each case compared to *T. saccharophillus* (Fig. 2), *B. subtilis* showed the higher decolourization ability.

Rodriguez et al. as early as in 1999, reported that several industrial dyes were decolourized biocatalytically by extracellular enzymes secreted by microbes. The decolourization effect of different bacterial species may vary. It was reported earlier that the adsorption of chromatophores on the cell surface of the microorganisms results in the decolourization of the dye. The possible mechanism is biosorption which is dependent on functional groups in the dye molecule (Fu and Viraraghavan 2002). Effective decolourization of azo dyes by *Pseudomonas luteola* was reported by Chang and Lin (2000), while Olukanni et al. (2006) reported decolourization by the strain of *Micrococcus.* While Yatome et al. (1991) reported *B. subtilis* to degrade crystal violet, Mabrouk and Yusef (2008) observed its capability in degrading fast red dyes. Malachite green was enzymatically reduced to leucomalachite green and also

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converted to N-demethylated and N-oxidized metabolites (Cha et al. 2001). Similarly, Pandey and Upadhyay (2010) demonstrated the ability of *Pseudomonas fluorescens* to degrade orange dyes, first by broking it down to 3, 7-diamino-4 hydroxynaphthalene-2 sulphonic acid sodium salt, which is nontoxic in nature. *Psuedomonas aeruginosa* was observed to cause 78, 76 and 24% decolourization of MR, MG and CV after 24-h incubation by Durve et al. (2012). Recently, Abubacker and Mehala (2014) reported 65, 55 and 50% of decolourization of MG incubated for 96 h with *P. fluorescens*.

2. UV-Visible Spectral Analysis of Dye Degradation

Results of UV-Vis spectroscopic analysis are presented in Fig. 3a, b. Single prominent peak at 615 nm is obtained in UV-Vis spectrum of MG. During absorption or adsorption, it was observed that the intensity of the peak of spectrum decreases with course of time followed by its disappearance with concomitant appearance of some new peaks which were correlated to metabolites produced during degradation. Recording of UV-Vis spectra (200–900 nm) of ethyl acetate extract of MG (250 mg/L) treated with *B. subtilis* showed new peaks at 230 and 330 nm in the present study indicating the degradation of MG resulting in the production of new metabolites in 24 and 48 h (Fig. 3a, b). Further, the appearance of new peaks at 215 and 300 nm in case of treatment with *T. Saccharophillus is* also evincing similar effect. This absorbance was probably a result of impact of similar type of metabolites or/and fragments obtained after degradation of dye molecules by the respective bacteria. These results clearly

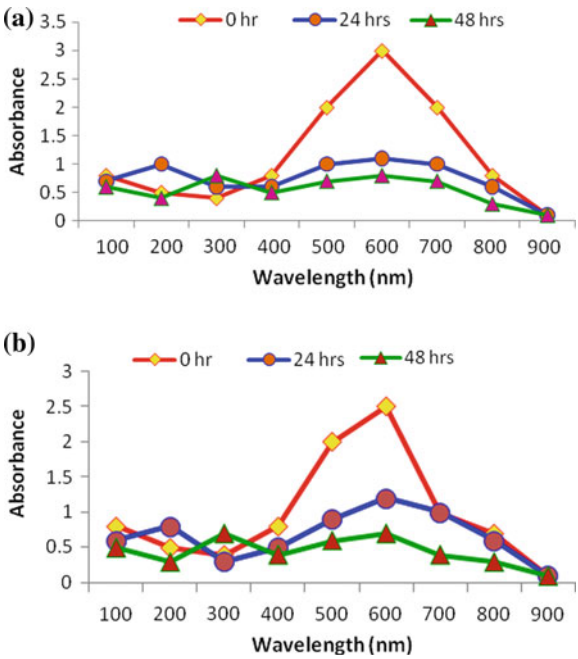

Fig. 3 **a** UV-visible spectra of MG at 0 h (control) and after MG degradation by *B. subtilis* (0, 24; 48 h), *T. saccharophillus* (0, 24 h; 48 h)

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indicate the colour-removing ability of *B. subtilis* and *T. saccharophillus* and hence their potential as biodegrading agents.

In the UV spectra, the decrease in absorbance of the peaks at 220 nm corresponds to benzene ring as demonstrated by Yang and Reilly (1987), and the formation of new peak at 260 nm suggested the reductive destruction of azo-conjugated structure as explained by Feng et al. (2000). The appearance of two new peaks after degradation of MG by *Pseudomonas sps* was shown by Du et al. (2011).

3. Fourier Transform Infrared Spectroscopy (FTIR) analysis

MG (control) and its degraded metabolites are confirmed by FTIR analysis. Remarkable variations were observed in the region 3500–500 cm^{-1} of the FTIR spectroscopy of MG (control), 0-, 24- and 48-h-degraded metabolites of MG by *B. subtilis* and *T. saccharophillus* (Figs. 4a and 5c). FTIR spectra of control MG (control), 0, 24 and 48 h of MG showed the specific peaks in region 2000–500 cm^{-1} representing mono- and para-benzene rings (Tables 1 and 2).

Spectral analysis (FTIR) of MG (0 h) and degraded products (24/48 h) showed functional groups such as alkyl halides, alkenes, carboxylic acids, nitro compounds similar to MG (control). Functional groups such as alcohols and phenols were observed in MG (control), and MG (0 h) was found to be absent after treatment. Extra functional groups such as alpha- and beta-unsaturated aldehydes and ketones were observed in 24-h-treated samples. The variations in the FTIR spectra of MG and those following 24 and 48 h of treatment with *B. subtilis* and *T. saccharophilus* were considered as an indication of biodegradation.

4. Phytotoxicity Studies

Seed germination and plant growth bioassay are the most common techniques used to evaluate the phytotoxicity (Kapanen and Itavara 2001).Water bodies used for irrigation purposes contain untreated effluents from dyeing industry. This practice is of great environmental concern as it is associated with biotic and ecosystem health. Soil fertility is directly and indirectly dependent on irrigation water. Biodegradation of effluent leads to generation of various degradation products. Therefore, it is virtually important to study the toxicity impact of these degradation products on plants (Kalyani et al. 2008).

Phytotoxicity studies using malachite green and its degraded products on *Vigna radiata* are shown in Table 3. The relative sensitivity of *Vigna radiata* towards the MG dyes and its degradation products was studied. 100% germination was observed in the seeds irrigated with tap water (control) (Fig. 6a). Germination of *Vigna radiata* was observed to decrease to 93% with water containing MG dye (Fig. 6b). But germination of *Vigna radiata* seeds soaked in water containing MG treated with *B. subtilis* or with *T. saccharophillus* was 100% (Fig. 6c, d).

The root length in water (control)-treated seeds was 1.5, 4.03 and 9.1 cm on Day 1, 2 and 3, respectively (Table 3), while the same was 0.63, 1.03 and 1.8 cm, respectively, for MG-treated seeds. But following treatment with *B. subtilis* in spite of MG treatment, the seeds showed the root lengths of 1.03, 2.35 and 3.4 cm, respectively. But similar groups treated with *T. saccharophillus* showed root length of 0.85, 2.13

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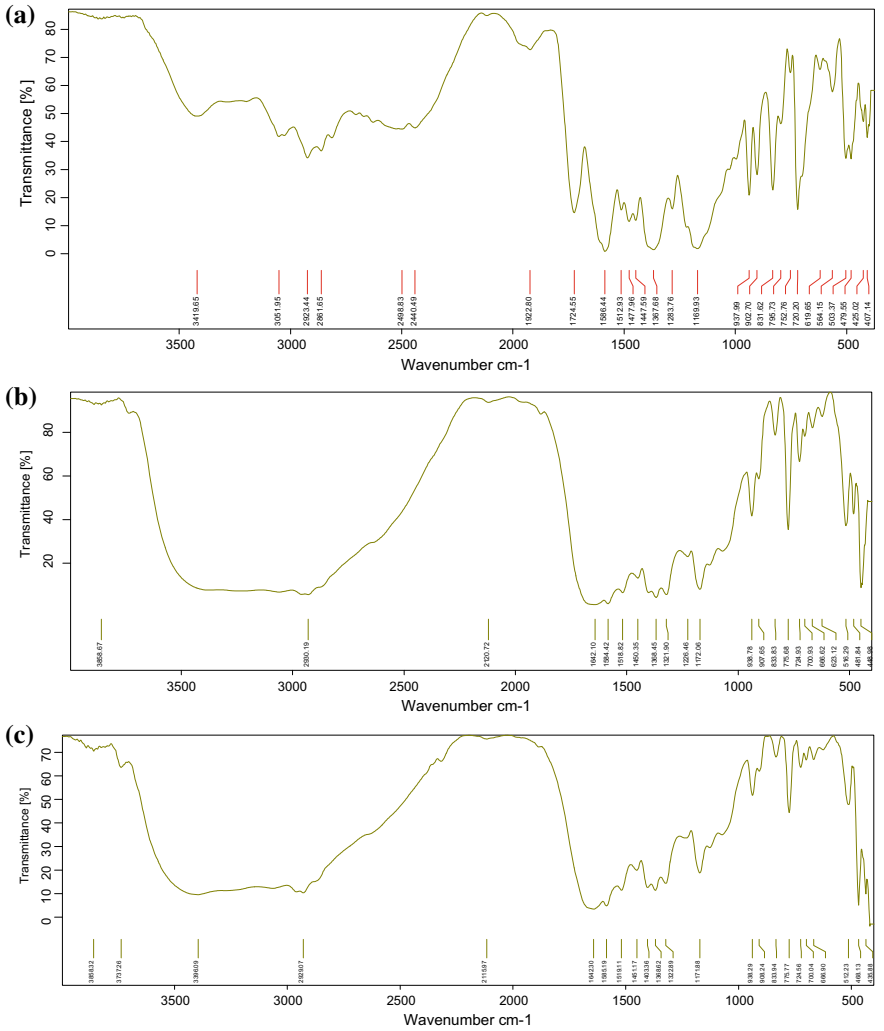

Fig. 4 **a** FTIR spectra of MG (control), **b** FTIR spectra of MG were obtained 0 h by *B. subtilis*, *and* **c** FTIR spectra of MG were obtained 0 h by *T. saccharophillus*

and 2.83 cm respectively (Table 3). Higher root length was observed in seeds grown with treated water compared to the rest of the groups. The results of phytotoxicity studies revealed that the biodegraded products of MG were not toxic to seeds, and hence, the germination process was not affected.

Ren et al. (1996) demonstrated the toxicity of polycyclic aromatic hydrocarbons (PAHs), anthracene (ANT), benzo[a]pyrene (BAP) and fluoranthene to the duckweed, *Lemna gibba L.* and *Brassica napus L.* seeds. These authors used the germination efficiency, root and shoot growth, and chlorophyll content, as a measurement

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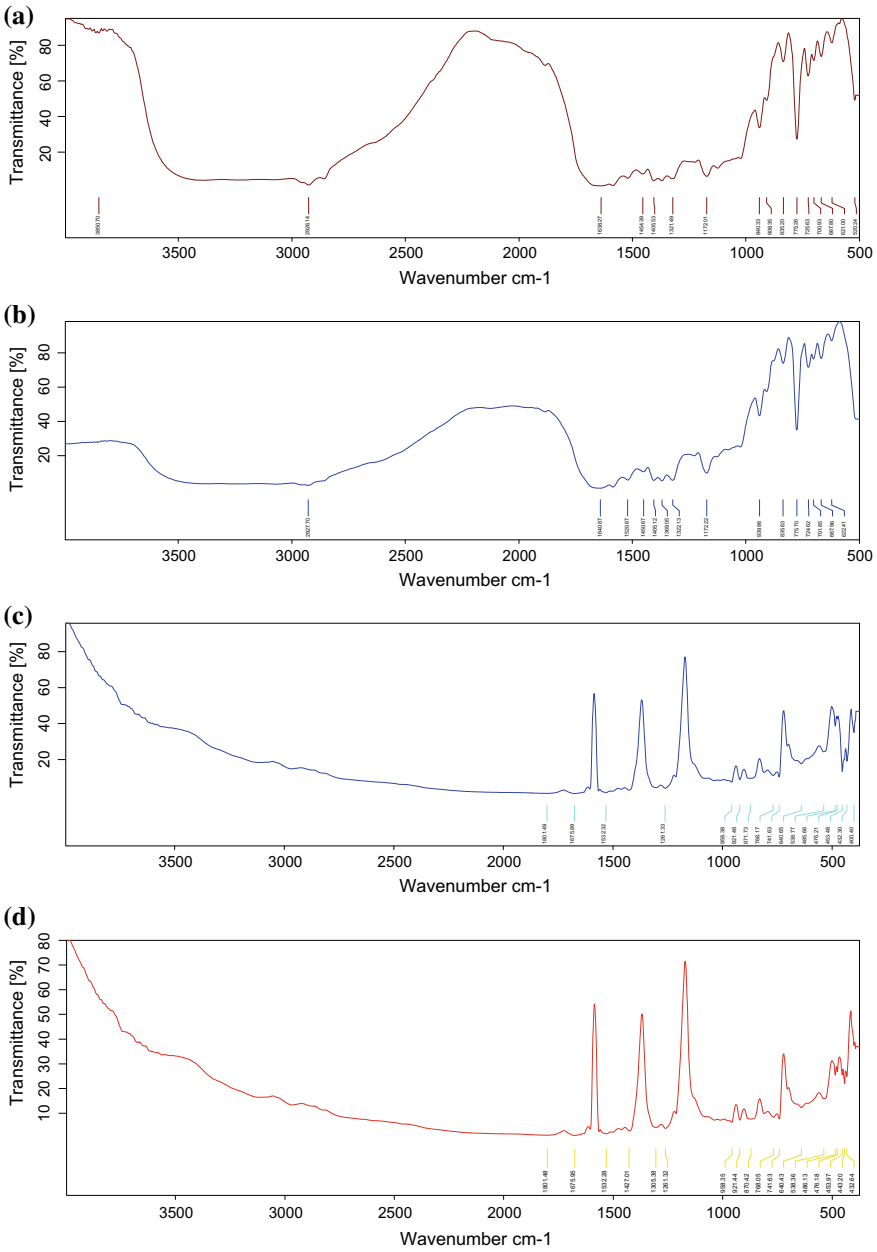

Fig. 5 **a** FTIR spectra of MG were obtained after 24 h by *B. subtilis*, **b** FTIR spectra of MG were obtained after 24 h by *T. saccharophillus*, **c** FTIR spectra of MG were obtained after 48 h by *B. subtilis*, *and* **d** FTIR spectra of MG were obtained after 48 h by *T. saccharophillus*

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Table 1 FTIR spectral peaks of malachite green (control) and degraded MG for 0, 24 and 48 h

Samples	Wavelength (cm^{-1})		Vibration	Functional groups
MG (control)	3419.65		O–H stretch, H–bonded	Alcohols, phenols
	3051.95, 2923.44		C–H stretch	Alkanes
	2861.65			
	2498.83			
	2440.49			
	1922.8			
	1724.55		C=O stretch	Alpha-, beta-unsaturated esters
	1586.44		N–H bend	Primary amines
	1521.93, 1477.96		N–O asymmetric stretch	Nitro compounds
	1447.59		C–C stretch (in-ring)	Aromatics
	1367.68		C–H rock	Alkanes
	1283.76		C–H wag	Alkyl halides
	1169.93			
	937.99, 902.70		O–H bend	Carboxylic acids
	832.62, 795.73		C–H “oop”	aromatics
	752.76, 720.20			
	619.65		C–Br stretch	Alkyl halides
	564.15			
	503.37			
MG at 0 h	**B. S**	**T.S**		
	2930.19	2929.07	C–H stretch	Alkanes
		3396.09	O–H stretch, H—bonded	Alcohol, phenols
	2120.72	2115.97	CN stretch	Nitriles
	1642.1	1642.3	– C=C—stretch	Alkenes
	1584.42	1585.19	N–H bend	Primary amines
	1518.82	1519.11	C–C stretch (in-ring)	Aromatics
	1450.35	1451.17 1403.36		
	1368.45	1368.62	C–H rock	Alkanes
	1321.9	1322.89	C–N stretch	Aromatic amines
	1172.06	1171.88	C–C wag	Alkyl halides
	938.78	938.29	O–H bend	Carboxylic acid
	907.65	908.24		

(continued)

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Table 1 (continued)

Samples	Wavelength (cm^{-1})		Vibration	Functional groups
	833.83	833.94		
	775.68	775.77	C–H "oop"	Aromatics
	724.93	724.56		
	700.93	700.04		
	666.62	666.9		
	623.12	512.23	C–Cl stretch	Alkyl halides
	516.29			
MG at 24 h	**B.S**	**T.S**		
	2926.14	2927.7	C–H stretch	Alkanes
	1638.27	1640.87	N–H bend	Primary amines
	1454.39	1520.67	N–O asymmetric stretch	Nitro compounds
	1405.53	1450.67	C–C stretch (ring)	Aromatics
		1405.12		
	1321.43	1322.13	C–N stretch	Aromatic amines
	1172.01	1172.22	C–H wag	Alkyl halides
	940.33	939.86	O–H bend	Carboxylic acids
	908.35	835.63		
	835.2	775.7		
	775.26	724.62	N–H wag	Primary, secondary amines
	725.63	701.85		
	700.93	667.96		
	667.8			
	621.06	622.41	C–Cl stretch	Alkyl halides
	520.24			
MG at 48 h	**B. S**	**T.S**		
	1675.89	1675.65	C=O stretch	Alpha-, beta-unsaturated aldehydes, ketones
	1532.32	1532.28	N–O asymmetric stretch	Nitro compounds
	1261.33	1305.38	C–H wag	Alkyl halides
		1261.32		
	958.38	958.35		
	921.48	921.44		
	871.73	870.42	=C–H bend	Alkenes

(continued)

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Table 1 (continued)

Samples	Wavelength (cm^{-1})		Vibration	Functional groups
	768.17	768.05		
	741.63	741.63		
	640.65	640.43	C–Br stretch	Alkylhalides
	538.77	538.36		

Table 2 Functional groups MG before (control) and after degradation treatment with *B. subtilis* and *T. saccharophilus* at 0, 24 and 48 h

MG (control)	MG BS + TS (0 h)	MG BS + TS (24 h)	MG BS + TS (48 h)
Alkyl halides	Alkyl halides	Alkyl halides	Alkyl halides
Alkanes	Alkanes	Alkanes	Alkanes
Carboxylic acid	Carboxylic acid	Carboxylic acid	Carboxylic acid
Aromatic	Aromatic	Aromatic	
Primary amines	Primary amines	Primary amines	
Nitro compounds	Nitro compounds	Nitro compounds	Nitro compounds
	Aromatic amines	Aromatic amines	
Alcohol	Alcohol		
Phenols	Phenols		
Nitriles			
Alpha-, beta-unsaturated esters		Alpha-, beta-unsaturated aldehydes, ketones	

Table 3 Comparison in % germination and root length among the seeds in **a** normal water, **b** water containing malachite green, **c** water containing malachite green treated with *B. subtilis* and **d** water containing malachite green treated with *T. saccharophillus*

Dyes	Germination (%)	Root length (cm)			Average root length (cm)/day
		1st day	2nd day	3rd day	
Water (control)	100	1.5 ± 0.50	4.03 ± 1.4	9.1 ± 2.6	4.96 ± 1.7
MG	93	0.63 ± 0.2	1.03 ± 0.5	1.8 ± 0.7	1.18 ± 0.6
MG + BS	100	1.03 ± 0.61	2.35 ± 0.8	3.4 ± 0.9	2.39 ± 0.9
MG + TS	100	0.85 ± 0.3	2.13 ± 0.8	2.83 ± 1.0	2.19 ± 1.0

Values are mean ± SD of 5 individual observations

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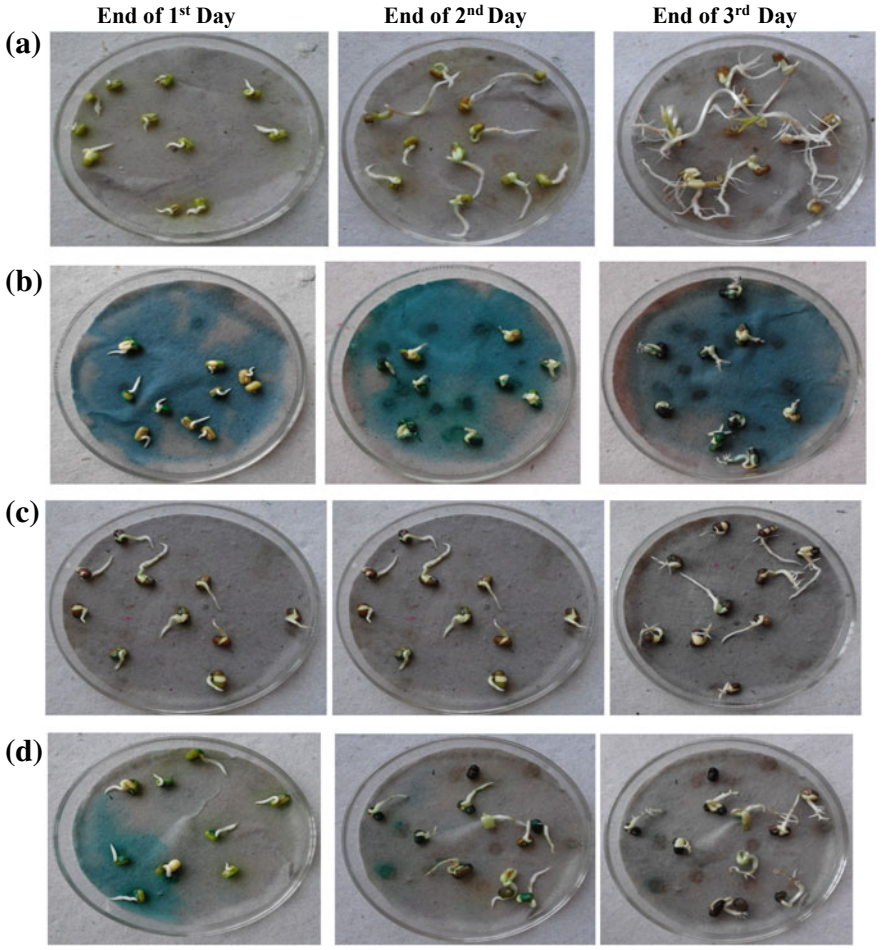

Fig. 6 *Vigna radiata* (Moong) seed germination for 3 days with **a** normal water, **b** water containing malachite green, **c** water containing malachite green treated with *B. subtilis* and **d** water containing malachite green treated with *T. saccharophilus*

for toxicity. Moawad et al. (2003) showed that the textile dyes were toxic to the seed germination process of four plants such as clover, Triticum spp wheat, tomato and lettuce. Though MG is toxic to microbes and plants, its degradation by microorganisms results in significant reduction in its toxicity (Parshetti et al. 2006; Ayed et al. 2009; Chaturvedi et al. 2013). Parshetti et al. (2006) also reported that biodegradation product of MG formed by action of *Kocuria rosea* was nontoxic. Du et al. (2011) also reported that degraded product formed by biodegradation of MG by *Pseudomonas aeruginosa* is nontoxic.

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5 Summary and Conclusions

In the present study, *B. subtilis* and *T. saccharophillus* isolated from the gut wastes of freshwater fish; *L. rohita* were found to degrade azo dye.

UV-Vis studies showed that *B. subtilis* and *T. saccharophillus* have a significant ability to degrade azo dye such as malachite green.

Fourier transform infrared spectroscopy (FTIR) studies demonstrated that remarkable change and reduction in the number of functional groups occur with progress in treatment time clearly illustrating the impact of both the bacteria on the degradation of malachite green.

Phytotoxicity studies further clearly showed that addition of *B. subtilis* and *T. saccharophillus* to the growth medium of seeds can successfully increase the rate of germination through degrading integrity of the dye.

Thus, this study clearly demonstrated that the fish gut bacterial isolates such as *B. subtilis* and *T. saccharophillus* can serve as good tools to treat wastewaters, especially the textile dye effluents. Further, these wastes which otherwise are thrown into water bodies or dumped in open lands leading to additional pollution can well be avoided and explored for their reutilization using probiotic microbes.

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Utilization of Rice Husk Ash for Defluoridation of Water



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Abstract Effective utilization and safe disposal of solid wastes is one of the major challenges placed before the modern-day scientist, in the wake of exploding population. Rice husk is a major agricultural waste being generated by an agricultural nation such as India, and therefore warrants proper utilization before disposal. On the other hand, fluorosis is a burning problem caused due to consumption of groundwater consisting of excessive fluoride, prevalent in several parts of the world. Therefore, in this study, Rice Husk Ash was impregnated with Lanthanum and investigated for defluoridation of water by adsorption. Batch adsorption experiments were conducted for fluoride removal using Lanthanum-Impregnated Rice Husk Ash (LIRHA) and tested for various parameters such as pH, time of agitation, influence of ions, and optimum dosage of sorbent. It was observed that LIRHA removed fluoride to less than the permissible limit in the naturally encountered pH of water. The optimum time and dosage of LIRHA were found to be 240 min and 6 g/L, respectively. The anions phosphates and chlorides were found to be detrimental for fluoride sorption probably due to competitive of those ions with fluoride on the active sorption sites on LIRHA. Thus, this study revealed that the agricultural waste, Rice husk can be effectively utilized for removal of fluoride from water and subsequently disposed off safely.

Keywords Adsorption · Defluoridation · Water · Low-cost · Lanthanum

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1 Introduction

India being an agricultural nation generates huge quantities of Rice husk as agricultural waste. About 24 million tons of Rice husk is being generated by the nation annually (Pandey et al. 2012). A minor portion of this waste is used as cattle feed and in manufacture of cement and refractory bricks. The remaining major portion is dumped, which results in its decomposition and subsequent emission of methane gas. Therefore, an effective way for utilizing rice husk has to be found and subsequently disposed safely. Concomitant to this challenge, contamination of groundwater with fluoride and the resulting fluorosis is a major threat faced by mankind. Fluoride has dual impacts on living organisms. In lower concentrations, fluoride is very beneficial as it assists in formation of bones and prevents dental decay, whereas in higher concentrations, it causes serious health issues such as skeletal fluorosis, dental fluorosis, mental derangements, dwarfishness, etc. Therefore, it is imperative that fluoride has to be removed from water before consumption. The World Health Organization (WHO) has stipulated a maximum permissible limit of 1.5 mg/L of fluoride in drinking water. Various technologies are available for defluoridation of water and are partially successful to various extents. But, as fluorosis is not yet completely eradicated, the focus has recently shifted to use of rare earth materials as adsorbents for defluoridation with a fairly reasonable degree of success (Vardhan and Srimurali 2018; Vivek Vardhan and Srimurali 2015, 2016). However, research is still deficient on achieving a dual advantage of simultaneously utilizing waste and removing fluoride from water. Therefore, in this study, an attempt was made to employ Rice Husk Ash impregnated with Lanthanum for removal of fluoride from water. The main objectives of this study are to: (1) Impregnate Lanthanum onto Rice Husk Ash, (2) Find the optimum time of agitation and the dosage of sorbent required, (3) Investigate the influence of pH on fluoride removal, and (4) Study the impact of anions on defluoridation.

2 Materials and Methods

2.1 Chemicals

All reagents used in the present investigation were procured from E. Merck Ltd., India and were of analytical reagent grade. Sodium fluoride of 221 mg was dissolved in distilled water and made up to 1 L in a volumetric flask to prepare a stock fluoride solution of 100 mg/L. Stock solution was diluted appropriately to obtain fluoride solutions of required working concentrations.

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2.2 Adsorbent

Rice Husk Ash (RHA) was procured from a local rice mill and was sieved to a mean size of 475 μm.

2.3 Adsorbent Preparation

Lanthanum carbonate of varying weights was mixed with 0.05 L of distilled water and 0.1 N HCl was added to it drop wise until Lanthanum carbonate got dissolved completely. To this solution, 0.1 N NaOH was added under constant stirring until precipitates were visually observed. RHA of mean size 475 μm and 20 ± 0.2 g weight was added to this mixture. This mixture was mixed for 6 h in a magnetic stirrer. Subsequently, it was decanted, dried, and heated at 300 °C for 4 h in a muffle furnace. It was thoroughly washed with distilled water and dried. The obtained material is Lanthanum-Impregnated Rice Husk Ash (LIRHA).

2.4 Batch Adsorption Experiments

Teflon flasks of 250 mL capacity and a working volume of 100 mL were used throughout the experiments. Laboratory spiked fluoride solutions of 10 ± 0.2 mg/L were prepared and adsorbent of required dosage was added to each flask. These flasks were agitated in a rotary shaker of make Kaizen imperial. The optimum rate of agitation for highest removal of fluoride was determined by varying the speed of agitations at 40, 80, 120, 160, and 200 rpm, at 25 ± 1 °C. Highest fluoride removal was observed at 160 rpm and so all experiments were conducted at this speed of agitation. After agitating for stipulated time periods, the contents were withdrawn, filtered in a Whatman filter paper of size 42, and analyzed for fluoride removal using SPADNS method (APHA 2005). Fluoride was analyzed using a spectrophotometer, Evolution 201, of Thermo Scientifics. pH adjustments were carried out using 0.1 N NaOH and 0.1 N H_2SO_4. Individual ions of Cl^-, SO_4^{2-}, PO_4^{3-}, HCO^{3-}, and NO^{3-} were added in concentration of 250 ± 5 mg/L in addition to fluoride ions to evaluate its impact. Concentration of Lanthanum was measured using an atomic adsorption spectrophotometer AAS, GBS 932 plus.

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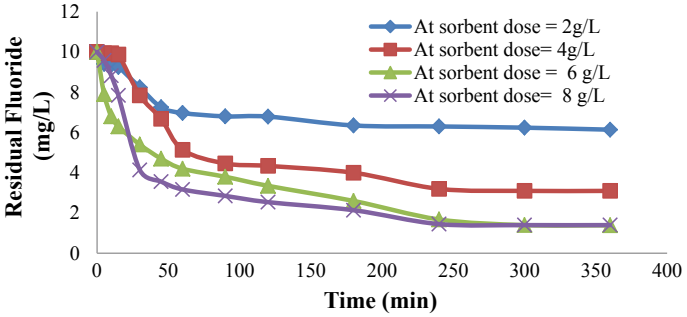

Fig. 1 Influence of time of agitation and dose of LIRHA on defluoridation

3 Results and Discussion

3.1 Time and Dose Studies of RHA and LIRHA

Experiments were carried out to arrive at the optimum time and dose required for adsorption to take place using LIRHA and the results are presented in Fig. 1. It can be observed that the time and dose of sorbent required for defluoridation using LIRHA are 240 min and 6 g/L, respectively, which left a residual fluoride of 1.39 mg/L.

3.2 Influence of pH

Role of pH on defluoridation using LIRHA was examined and the results are presented in Fig. 2. It can be observed that LIRHA performed better in removing fluoride from water in a pH range of 7–9. Formation of HF ions at lower pH values and OH

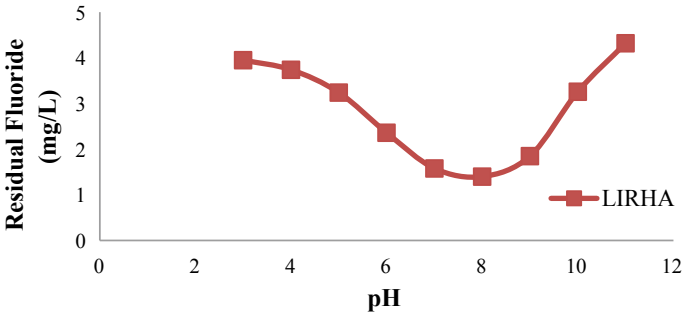

Fig. 2 Influence of pH of solution on fluoride removal by LIRHA

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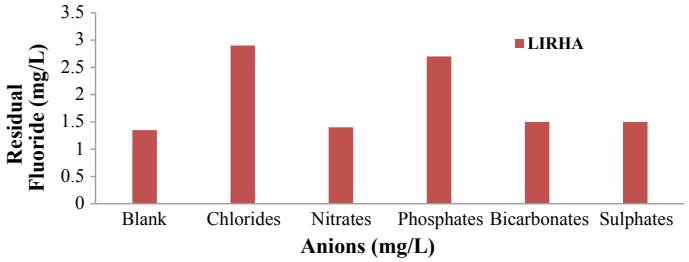

Fig. 3 Influence of anions on sorption of fluoride by LIRHA

ions at higher pH values could be the reason for lesser defluoridation below and above the optimum pH ranges observed.

3.3 Influence of Anions

Efficiency of fluoride removal by LIRHA was tested in the presence of the anions Cl^{-}, SO_4^{2-}, PO_4^{3-}, HCO^{3-}, and NO^{3-}, each individually and the results are presented in Fig. 3. It can be observed that chlorides and phosphates impeded sorption of fluoride by LIRHA, whereas the ions nitrates, bicarbonates, and sulfates exhibited a lesser influence. Similar trend of competition of phosphates with fluorides for active sorption sites was reported by Bia et al. (2012) on ion modified montmirillonite. Chlorides were also reported to be highly competitive against fluoride for sorption on expanded clay aggregate, according to Sepehr et al. (2014).

4 Concluding Remarks

The aim of this work is to simultaneously utilize the agricultural waste Rice Husk Ash and to remove fluoride from water.

Agitated non-flow batch studies demonstrated that LIRHA is capable of removing fluoride from water to less than the permissible limits.

Normally encountered pH range was found to be favorable for fluoride removal by LIRHA.

It was observed that the time and dose of LIRHA required for defluoridation were 240 min and 6 g/L, respectively.

Presence of anions such as phosphates and chlorides exerted a detrimental effect on removal of fluoride from water using LIRHA, possibly due to competition of ions.

These investigations revealed that the agricultural waste Rice Husk can be utilized toward removal of fluoride from water and should be disposed off safely.

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Comparison of the Suitability of Activated Carbon Derived from *Mangifera indica* by Four Physicochemical Methods for the Removal of Methylene Blue Dye

Moumita Biswas, Anirban Ghosh and Saswata Bose

Abstract Activated carbon (AC) from mango (*Mangifera indica*) peels was developed through four environmentally benign methodologies. Activated carbons were prepared by both thermal and chemical activation and termed mango peel activated carbon (P-MPAC). One involving a single physical activation was termed P-MPAC. Two methods, involving the two-step activation process where chemical activation (using H_2SO_4) was followed by physical activation. One of the two variants activated at 300 °C was termed as C-300-MPAC and the other activated at 700 °C was termed C-700-MPAC. One has an additional physical activation before the two-step activation process was named PCP-MPAC (physical 300 °C—chemical–physical 700 °C three activation steps). Thermal activation was done at two temperatures 300 and 700 °C to explore the effect of high- and low-temperature thermal activation in generating pores on the surface of the AC. The four variants (namely P-MPAC, C-300-MPAC, C-700-MPAC, and PCP-MPAC) were explored to determine the ideal method of AC preparation. Their ability as an adsorbent for the removal of a basic dye methylene blue was examined. The pH and adsorbate concentration was optimized to get ideal conditions for the removal of the two respective dyes from their respective aqueous solutions. ACs activated at 700 °C performed significantly better at removing dyes from their aqueous solution. Three-step activation showed an enhanced effect in removing the impurity.

Keywords International society of waste management · Air and water

1 Introduction

Mango (*Mangifera indica* L., family Anacardiaceae) is a fruit native to South Asia. It is most popular for its consumption for its juicy pulp which regards it the name "King of fruits" in India. India is also the largest producer of the juicy fruit producing an

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outstanding 40% of the total produce worldwide which stands at an estimated amount of 46 million metric tons as of 2016. India thus produces a high amount of organic waste rich in functional group in the form of mango peels and seeds which have little use as a delicacy but can be tapped into as a very good source of producing resource from waste (FAOSTAT 2005).

The edible part (the pulp), which makes up to 33–85% of the fresh fruit depending on the various breeds of the fruit finds use both in households and commercially. Household use is mostly seasonal in nature, i.e. during the fresh fruit comes into the market, but commercial uses run throughout the year. Household uses mainly include consuming the fruit raw due to its one of a kind flavour and also making pickles from the dried fruit. The major commercial products made from the fruit are milkshakes, drinks, and juices. Brand names such as Maaza and Slice which specializes in mango-related beverages are hardly unknown to any in India. Processed products such as nectars, concentrates, jam, jelly powders, fruit bars, and dried mango products also require a huge amount of the fruit produce (Wu et al. 1993).

Processing of the fruit entails that 7–24% of the entire weight of the fruit which constitutes the mango peels turns into waste. Mango peels mostly end up turning into a stockpile of waste that remains unused that serves no end. Although possessing chemical characteristics, which indicate a rich source of bioactive compounds such and enzymes such as protease, peroxidase, polyphenol oxidase, and carotenoids use of these essential organic structures have not yet been found. There is also an abundant content of vitamins C and E, dietary fibres, enzymes, and carbohydrate content of 20.80–28.20% in dry weight samples of mango peel (Ajila et al. 2007). Despite these beneficial traits not only has there been any suitable application of them but also these rich organic produce end up being incinerated or being left to putrefy. Land usage is hampered and the over hygiene of the environment in which such commercial usage of mango is being carried out is jeopardized. Presence of functional groups such as carboxylic (pectin) and hydroxyl groups (cellulose) is reported in the polymers contained in abundance in the mango peel matrix. The presence of these functional groups increases the chance of mango peels being favoured as suitable material for the production of AC (Pehlivan et al. 2008; Shukla and Pai 2005; Xuan et al. 2006).

In the current condition of the planet, where all the resources including the land, water bodies, and air are getting polluted beyond imagining, saving the environment is the need of the hour. Many water purifying technologies are available to mankind for use such as electro-coagulation, membrane filtration, electrochemical destruction, ion exchange, irradiation, advanced oxidation, ozonation, precipitation but none prove to be as cheap and effective as the method of adsorption (López-Grimau and Gutiérrez 2006). Carbonaceous materials such as AC prove to be some of the most effective adsorbents having relatively lower production costs too. An application of the as-obtained industrial by-product(waste)-mango peels would be saving a lot of resources. Currently, activated carbon is mostly derived from charcoal, wood derivatives bones, and nutshells. The option and scope of producing ACs from organic sources are wide and endless. Attempts are being made worldwide to produce AC from organic wastes to reduce the load on the environment (Lakshmi et al. 2009; Lillo-Rodenas et al. 2003). An application like producing AC would

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serve the dual purpose of not only help reducing the load on the land used by commercial users of mango pulp but also contribute to the cleaning up of water by being used as an adsorbent to remove the pollutants to produce safe water for drinking and recreational processes.

The main aim of work is to design a suitable adsorbents derived from mango peels, to test their effectiveness in the removal of dyes, and to explore treatment methods during production which give rise to desired traits in an AC towards removal of dyes. Many organic sources have been tried as sources for the production of AC but mango peels irrespective of its chemical properties are not a much explored precursor for AC production. Methylene blue dyes were removed using the ACs prepared by the four respective routes of mango peel activated carbon (MPAC) production.

2 Materials and Methods

2.1 Preparation of AC

Local markets of Kolkata were selected as the source of the MPs. The as-obtained MPs contained juice of mangoes and were not purified. Thus, a two-step washing procedure was adopted. This consisted of thorough and repeated washing by tap water after which washing by double distilled water ensued. This step was followed by two drying steps; first of all, the sun drying for one day followed by oven drying at 100 °C for 24 h. Drying was stopped at the stage when the mango peels obtained a nice crunchy texture ideal for hand grinding. This is followed by thorough grinding of the mango peels which resulted in fine particles of powdery material named as mango peel grinded powder (MPGP).

2.1.1 Thermal Activation

MPCP the powder was taken in several silica crucibles in measured amounts and carbonized ensued at 700 °C for 2 h in a muffle furnace. The product obtained from the muffle furnace after thermal activation was sieved through a 250 μm mesh to obtain the AC. The AC so produced was called as temperature activated-mango peel activated carbon (P-MPAC).

2.1.2 Chemical Activation

First Process

MPCP was taken in glass petri dish and mixed thoroughly till with concentrated H_2SO_4 in 1:1 weight ratio till uniformity was obtained. This mixture was kept

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overnight (24 h) under stirring at room temperature. The product thus obtained was then washed with double distilled water repeatedly till neutral pH was reached. The powder after neutralization was then transferred into silica crucibles and carbonized at 700 °C for 2 h in a muffle furnace. The product obtained from the muffle furnace after thermal activation was sieved through a 250 μm mesh to obtain the AC. C-700-MPAC was the name given to the as-produced AC.

Second Process

MPCP was taken in petri dish and mixed thoroughly with concentrated H_2SO_4 in 1:1 weight ratio till uniformity was obtained. This mixture was kept overnight (24 h) under stirring at room temperature. The product thus obtained was then washed with double distilled water repeatedly till neutral pH was reached. The powder after neutralization was then transferred into silica crucibles and carbonized at 300 °C for 3 h (as we maintain temperature well below 700 °C, we have raised the time of carbonization to 3 h) in a muffle furnace. The product obtained from the muffle furnace after thermal activation was sieved through a 250 μm mesh to obtain the AC. C-300-MPAC was the name given to the as-produced AC.

Third Process

MPCP was taken in a silica crucible and carbonized at 300 °C for 2 h. The obtained product was crushed thoroughly and mixed with equal proportion of concentrated H_2SO_4 in 1:1 weight ratio. This mixture was kept overnight (24 h) under stirring at room temperature. The product thus obtained was then washed with double distilled water repeatedly till neutral pH was reached. The powder after neutralization was then transferred into silica crucibles and carbonized at 700 °C for 1 h in a muffle furnace. The product obtained from the muffle furnace after thermal activation was sieved through a 250 μm mesh to obtain the AC. PCP-MPAC was the name given to the as-produced AC.

2.2 Preparation of Adsorbate

The 10 μM solution of methylene blue dye solution was prepared to be used as the adsorbate in the adsorption studies. 1.6 mg of methylene blue of analytical grade was added to 500 ml of double distilled water to prepare the 10 μM solution of methylene blue.

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2.3 Reagents and Analytical Measurements

The reagents used were of analytical grade, they were supplied from EMPARTA. The adsorbate used was methylene blue was supplied by SRL (Shanghai Richem International). H_2SO_4 used was of 98% purity. Mango peels were obtained from local markets in Kolkata. Double distilled water was used in all solutions.

3 Effect of pH

One of the most fundamental parameters that effect how efficiently an adsorption process will perform is the pH of the solution. The charges present on the surface of the adsorbent and the electrical interactions between the adsorbent and adsorbate is greatly affected by the pH of the solution. Speciation and degree of ionization are also affected by the pH of a solution. The effect of pH of solution on adsorption of dyes (concentration = 10 μM) using MPAC (m = 1 g/l) was evaluated at different pH varying from 1 to 11 at 303 K for six hour and the results are plotted in Fig. 1. It could easily be understood from the figure that low pH of 3 is the most favourable pH for carrying out the further adsorption studies as the highest percentage of removal was obtained at it.

Point of zero charge (PZC) is defined as the pH for which the adsorbent surface bears no charge. Any increase of pH from the PZC will render the surface negatively charge and any decrease from the PZC will make the surface positively charged. Thus, PZC is the optimum for the purpose of adsorption studies. It is clear from the figure MPAC must have a PZC of 3 for methylene blue dye and act neutral at this pH.

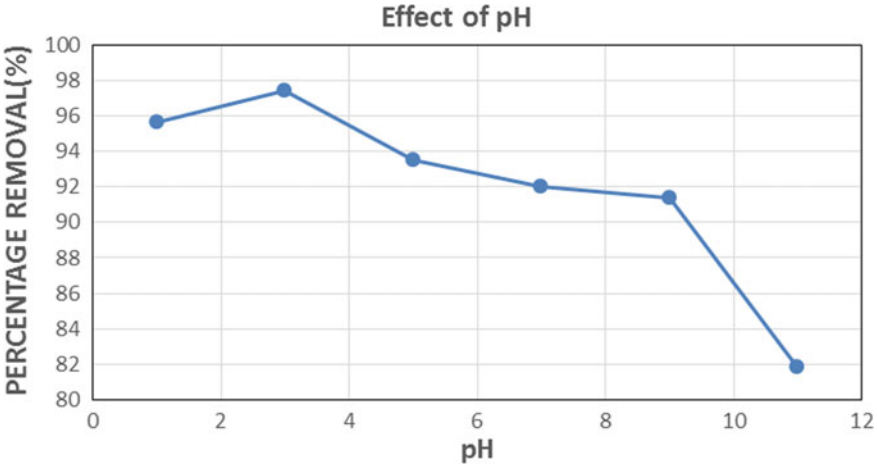

Fig. 1 Effect of initial pH as a function of percentage removal for methylene blue dye

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3.1 Batch Kinetic Study

Experimental study was conducted in batch mode for exploring the ability of the MPACs for the adsorption of methylene blue dye from its aqueous solution. The experiments were performed in Erlenmeyer flasks containing 50 nl of dye solution. 50 mg of the prepared adsorbents were added to the prepared 10 micromolar solution of methylene blue dye. Stirring was conducted at 500 RPM. Initial pH of the solution was changed using 0.1 N NaOH/0.1 N HCl. Filtrate analysis was carried out using UV-VIS spectrophotometer at $\lambda_{max} = 554$ nm for methylene blue. The dye adsorbed per unit weight of MPACs and percentage removal of Rhodamine B was calculated using following equations (Fig. 2):

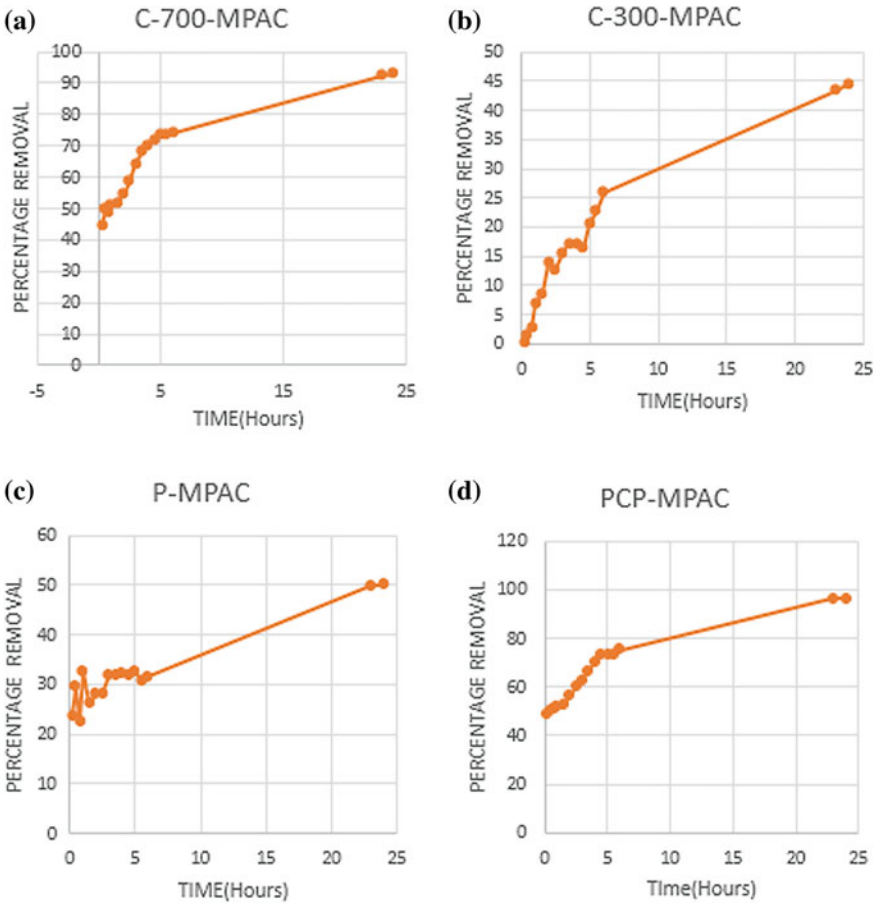

Fig. 2 % removal versus time plot for **a** C-700-MPAC; **b** C-300-MPAC; **c** P-MPAC; **d** PCP-MPAC

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$$\text{Adsoption Capacity}\,(q_e) = \frac{(C_0 - C_e)V}{m}$$

$$\%\,\text{Removal} = \frac{(C_0 - C_e) * 100}{C_0}$$

where

C_e Residual or equilibrium concentration of dye solution (mg/l)
C_o Initial concentration of dye solution (mg/l)
m Amount of MPAC (g)
q_e Amount of dye adsorbed on BPAC/adsorption capacity (mg/g)
V Volume of dye solution (l).

4 Adsorption Kinetics Results

The results of the kinetic study along with the predicted model (shown in bold text in Table 1) are listed in Figs. 3 and 4.

5 Discussion

The inference that can be drawn from the batch study is that PCP-MPAC (3.221 mg/g) and C-700-MPAC (3.0931 mg/g) having the mentioned adsorption capacities are much more superior as adsorbents than C-300-MPAC and P-MPAC having adsorption capacities 1.4291 mg/g and 1.6815 mg/g, respectively.

The enhanced ability of C-700-MPAC as adsorbent compared to the P-MPAC despite having a similar thermal treatment might be attributed to the fact that chemical activation was performed on the C-700-MPAC which can lead to the generation of oxygenated groups on the surface of the ACs. The oxygenated groups may play a crucial role in the adsorption process through chemisorption. The dual effect of high-temperature physical activation and chemisorption could lead to an enhancement of the adsorption capacity of C-700-MPAC.

P-MPAC although received a similar treatment as C-700-MPAC thermally the lack of the chemical treatment could be held responsible for the low adsorption capacity. Chemical treatment by a strongly oxidizing chemical such as concentrated sulphuric acid can generate additional oxidizing functional groups which aid in the adsorption of the dye from its aqueous solution. It can also be seen in the case of C-300-MPAC that although it received both chemical and physical treatment it is the temperature of activation which made a huge difference in adsorption capacities. It may be inferred that the low temperature of 300 °C is not sufficient to complete the thermal cracking of the precursor mango peels.

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Table 1 Batch data of the adsorbents

Name of sample	Type of kinetics	R^2	Error (%)	K	Model predicted Q_e (mg/g)
PCP-MPAC	Pseudo-first-order kinetics	0.9785	54.38	0.2616 h^{-1}	1.4063
	Pseudo-second-order kinetics	**0.9943**	**4.48**	**0.2241 g/mg h**	**3.221**
P-MPAC	Pseudo-first-order kinetics	0.9245	34.31	0.2024 h^{-1}	1.0531
	Pseudo-second-order kinetics	**0.976**	**4.8**	**0.3108 g/mg h**	**1.6815**
C-300-MPAC	Pseudo-first-order kinetics	0.9917	15.53	0.1593 h^{-1}	1.2071
	Pseudo-second-order kinetics	**1**	**0**		**1.4291**
C-700-MPAC	Pseudo-first-order kinetics	0.9956	57.62	0.2010 h^{-1}	1.2606
	Pseudo-second-order kinetics	**0.996**	**3.98**	**0.2588 g/mg h**	**3.0931**

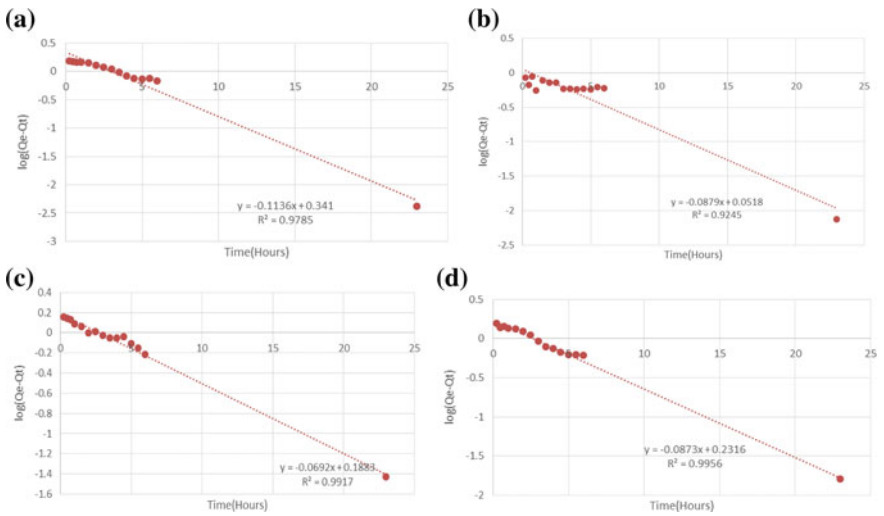

Fig. 3 First-order kinetic data for **a** PCP-MPAC; **b** P-MPAC; **c** C-300-MPAC; **d** C-700-MPAC

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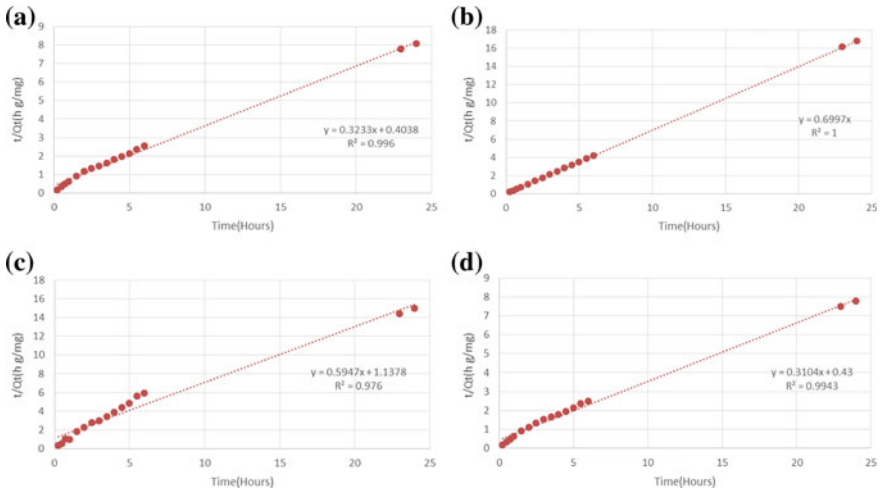

Fig. 4 Second-order kinetic data for **a** C-700-MPAC; **b** C-300-MPAC; **c** P-MPAC; **d** PCP-MPAC

PCP-MPAC shows the most superior removal and this could be attributed to quite a few factors. Mild carbonization plays an important role in proper chemical activation. Thus, sulphuric acid has a more enhanced effect of chemical activation since partly generated pores are already available. This also reduces the energy consumption in producing the activated carbon. Although it may seem that there are three steps in producing the activated carbon but certainly the amount of time spent activating at the higher temperature is essentially reduced making the process energy efficient in totality.

6 Conclusions

It can be safely concluded that MPs can act as suitable precursors for producing high-quality ACs. These ACs can be used to remove one of the most abundant pollutants of the textile industry namely methylene blue dye. Using MPs as a source for AC achieves the dual purpose of not only producing a substance capable of cleaning the waters of our planet but also helps reduce solid waste in the form of MPs that are either incinerated to produce gaseous pollutants or end up as landfill. Since MPs are a waste product of different beverage industries and mango beverages are available all through the year, this ensures that not only the raw material will be cheap but also available year round for continuous production of ACs. The batch adsorption studies proved that chemical activation along with thermal activation at suitable temperatures is necessary for proper performance of the adsorbent. High-temperature activation combined with low-temperature pre-carbonization proving essential to get the desired qualities in the AC.

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Passive High-Rate Wastewater Treatment Using Upwelling Anaerobic Lagoons as an Alternative to Conventional Systems



Seema Sukhani and Hoysall Chanakya

Abstract Wastewater treatment processes employed today are many decades old and often do not follow emerging criteria of sustainable development promoting resource recovery as well as smaller environmental footprint while ensuring nutrient reuse and stakeholder involvement. Based on various performances reported and field observations of various poorly operating STPs in South India, it is proposed that an intermediate concept of anaerobic upwelling sludge bed reactor (USB) is proposed to operate with no O&M interventions like a septic tank but providing potential for methane and nutrient recovery at rates and HRTs as practised today, namely HRT < 24 h, loading rates 1–2 kg BOD/m^3/d, 70–80% BOD removal, 1–3 years of attention-free operation and moderate effluent turbidity. Some field scale evidence of such function at various locations is provided, and its proposed operation is discussed.

Keywords Sewage treatment · SDG-6 · Upwelling sludge bed reactor · Resource recovery · International society of waste management, air and water

1 Introduction

Developing countries face severe shortage of wastewater treatment infrastructure comprising of sewerage and collection systems, wastewater treatment and sludge disposal facilities. Lack of financial assistance and technical expertise has been some of the biggest factors for incapability to construct and operate conventional centralized STP. Absence of a reliable power supply and high costs of backup diesel power and frequent maintenance needs have been a major concern in rural and peri-urban areas in developing countries and hindered widespread deployment of STPs. Such factors also need to be considered before any technological development efforts are taken up (Verawaty et al. 2013).

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Further, as various countries strive to provide compliance and capabilities for various sustainable development goals, SDG-6, especially in urbanizing locations, the absence of reliable power supply hinders the use of high-rate aerobic systems as well as power-based control systems for the STPs to be set up. Thus, there is a need to develop energy neutral or energy-independent STP systems that are also ecologically safe, socially acceptable, economically viable and self-sustaining in the immediate future while also being simple to operate (Luo et al. 2014). It is believed that when small village settlements those have rapidly grown and become urbanized, the high costs of land as well as the absence of large spaces for local treatment will drive them towards decentralized STPs, and these recently urbanized locations will be the first to face such problems of the absence of appropriate technology for such locations. In this paper, a review is attempted from the capabilities of various systems focussing on low-energy systems that are likely to be suitable to the emerging sustainability, people-led and multiple by-product-driven scenario of the future.

2 Conventional Passive and Low-Energy STPs

Constructed wetlands are one of the best-known passive systems and well established with regard to their performance. Their potential is highly dependent on microbial activity, retention times, variation in load, particulate content and climatic factors such as precipitation and evapotranspiration (El-Khateeb et al. 2009; Katsenovich et al. 2009). However, major limitations of system are poor nutrient (nitrogen and phosphorus removal), large areal footprint, propensity to clog during overloads and oxygen transfer limitations.

In urban and peri-urban areas, large footprint, which is essential for good effluent in constructed wetlands (Kivaisi 2001; Foladori et al. 2013), is difficult to acquire. Footprints can vary around 0.06kg BOD/m^2d (Zhang et al. 2009; Vymazal 2011). Nutrient recovery is also very low. In a study conducted by Vymazal in 2007, out of 40–55% of N removed (initial load 250 and 630 g Nm^{-2} $year^{-1}$) and ~40–60% of TP (initial load 45 and 75 g Pm^{-2} $year^{-1}$) removed, only 100–200 g Nm^{-2} $year^{-1}$ and 10–20 g Pm^{-2} $year^{-1}$ could be harvested through vegetation biomass. Important recoverable are being lost to environment to cause pollution on the one side and unsustainability on the other. In the emergent sustainability scenario, it is imperative that a significant fraction of the sewage nutrients are harvested and made amenable for recycling and reuse.

Aerobic systems such as activated sludge process are most commonly adopted treatment technology. As mentioned earlier, for a sustainable system, high treatment efficiency and low energy consumption are the key. In aerobic systems, energy demands are high due to operation of pumps, air blowers, mixers and separators. In general, 1–25 kWh/kg COD removed is required to operate various types of aerobic system depending on technology as compared to 0.25–13 kWh/kg COD removed for

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anaerobic systems (Amanatidou et al. 2016; Pitas et al. 2010; Yin 2010). In a conventional system, observed biomass production rate (Y_{obs}) usually ranges between 0.12 and 0.45 kg MLVSS kg COD removed-1 (Amanatidou et al. 2016).

Such excessive sludge will hinder sedimentation and create problems while mixing and aeration. Ultimately, a large part of sludge needs to be wasted, which again has significant economic and ecological footprint in terms of drying the sludge and disposing it in landfills. It must be noted that most of the aerobic systems of today are between 50 and 150 year old and now need alternatives in the light of emerging sustainability criteria of energy, C and environmental footprint as well as resource recovery criteria.

2.1 Anaerobic System

Anaerobic treatment systems generally have low operating costs and lower environmental footprint, and they also produce biogas, compost and many value-added products. However, for reasons of a slightly lower treatment efficiency and slower reaction rates and susceptibility to near-freezing temperatures, they have often been overlooked. Effluent from an anaerobic needs a small but definite aerobic treatment. Despite these 'stated' problems associated with anaerobic systems, they still are our best option for BOD removal. Though, as mentioned above the energy requirements are lower than all systems, potentially higher loading rates than aerobic systems, most planners are not generally in favour of the anaerobic systems for various reasons of skills and monitoring needs. The future capabilities or potential would be set by high-end processes such as UASB while seeking the O&M simplicity of a septic tank. Some of the studies conducted on UASB and septic tank in various parts of world are mentioned in Table 1.

2.2 Sludge Production

Biomass production rate (Y_{obs}) during anaerobic metabolism is usually between 0.03 and 0.15 kg MLVSS/kg COD removed. Moussavi et al. (2010) after operating septic tank for 355 days concluded that depth of total sludge produced and inert accumulated was still less than half volume of reactor. This illustrates that even in simple system like septic tank, there is no need to frequently remove sludge. It was observed by Lin and Yang (1991) that sludge with a concentration of 30–40 kg TS/m^3 exhibits the highest methanogenic-specific activity. Yet under anaerobic conditions and depending upon the organisms responsible, the Yobs of sludge can range between 0.3 and 0.5 kg MLVSS/kg COD removed. There are instances of 3–5 year uninterrupted operation of anaerobic systems without need for sludge removal. Older anaerobic sludges tend to become heavier and gradually decompose to be become a lot more

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Table 1 Performance of anaerobic reactors across various processes and locations

				Influent conc. (mg/L)			Removal efficiency (%)			
Location	Type of wastewater	Volume (m^3)	Temp °C	COD	BOD	HRT (h)	COD	BOD	Type	References
Columbia	Sewage	64	25	267	95	6–8 h	75–82	75–93	UASB	Kooijmans and Van velsen (1986), Lettinga et al. (1987)
Brazil	Sewage	120	19–28	627	357	4	74	78	UASB	Barbosa and Sant' Anna (1989)
India	Sewage	1200	20–30	563	214	6	74	75	UASB	Draaijer et al. (1992)
India	Sewage	6000	18–32	404	205	8	62–72	65–71	UASB	Haskoning (1996), Tare et al. (1997)
Finland	Synthetic blackwater	np	10–20	400–1900	NA	4.4d	90	np	UASB-septic tank	Luostarinen and Rintala (2005)
Netherlands	Domestic wastewater		12–20	2000–3000		6	51.5–60		UASB	Zhang et al. (2018)
Iran	Sewage (mix black and grey)	0.25	18–36	154–395	119–261	24	77%	85%	Septic tank	Moussavi et al. (2010)
Iran	Sewage (mix black and grey)	0.5	Dec-26	154–395	119–245	12	67	71	Septic tank	Moussavi et al. (2010)
Egypt	Concentrated sewage	0.575	13	3600		120	94		Upflow hybrid septic tank	Adhikari & Lohani (2019)

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dense, and aerobic sludge is a lot more bulky and thus typical aerobic treatment systems require weekly and monthly management of sludge. Needless to say, aerobic sludges need a lot more careful treatment since they are quite odoriferous and bulky, thus more difficult to dewater and require monthly management of sludge.

2.3 Retention Time

The reaction rates are longer in typical septic tanks due to the absence of sludge recycling (maintaining a higher level of MLVSS), a gradual accumulation of inert solids and non-specific selection of sludge. Also, the time required to reach at a steady state is somewhat long taking 1–3 months. However, in a UASB system, these factors are overcome by maintaining a specific upflow velocity, which firstly helps retaining a high level of MLVSS that is constantly recycled, and this in turn tends to select a good settleable sludge with high microbial mass (lower EPS content). The retention period for same level of treatments is approximately three times lower achieving loading rates in the range of 3–8 kg COD/m^3/d. This is a lot higher than typical aerobic system that can handle only about 1–2 kg COD/m^3/d. From this, it is obvious that we need to engineer a system which can give us treatment efficiency and throughput of a UASB and energy independence/simplicity of a septic tank. This appears feasible if it is possible to hold on to a lot of heavy anaerobic sludge in the reactor and make it to be recirculated in a passive manner without external energy application. This invokes the concept of natural phenomenon of sludge upwelling if particles are allowed to mix with the sludge at a specific rate.

2.4 Sludge Properties and Activity

Under a typical mesophilic condition of 15–28 °C, the typical density of anaerobic sludge would be 1.05–1.10 g/m^3, and this imparts a propensity to settle rapidly. Being anaerobic, there is very little tendency to accumulate a large fraction of extracellular polysaccharides (EPS) very characteristic of aerobic sludges. When fed at a near maintenance rates, the settling sludge maintained would be primarily of viable bacteria. It is thus possible to create a process that selects predominantly well-flocculated sludge, thereby gradually enhancing its settling properties. This is typical in anaerobic sewage treatment systems giving a flocculated sludge in range of 20–30 ml/g of sludge. Although granular sludge has higher methanogenic activities with SVI 10–20 ml/g/d, they are useful for soluble COD and much less for sewage. The role granular sludge (e.g. UASB) in particulate COD removal before hydrolysis has been reported to be very limited. In terms of activity, 1.2 and 1.9 kg/kg VSS/d of methanogenic activity is appropriate to achieve a F/M ratio of 0.5 or even lower. It has been observed that in lower loading rates, diversity of micro-organisms is much more and they have capability to degrading diverse compounds. In anaerobic sludge,

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VSS/SS ratio observed is 0.70–0.85 and wet cakes after centrifugation have 10% solids. This sludge can be used as a fertilizer by directly applying it to field.

3 Conclusion

Most wastewater systems being adopted and run today are very old and do not meet many sustainability criteria of Carbon, nutrient, energy and environmental footprint as well as societal inclusion. Meeting SDG obligations, especially to emerging urbanization, will require newer concepts of decentralized treatment with resource recovery. From various performance criteria found in literature, it is suggested that there is a need for modifying anaerobic reactors to provide the O&M and design simplicity of septic tanks while creating performance yardsticks closer to UASB processes.

The upwelling sludge bed reactor concept has been advanced to meet immediate application goals and performance criteria. Anaerobic system with one-third volumetric sludge, F/M ratio <0.5, 1.2–1.9 kg/kg VSS/d of methanogenic activity with functional MLVSS to be ~8–9 g/L, natural mixing through sludge upwelling is proposed. Based on field observations at HRT ~24 h, approximately 70–80% COD and 90% BOD removal occurs in such system. The proposed design and upwelling phenomenon are shown in Figs. 1 and 2, respectively. This system can be applied from a scale of 1MLD to a community level. This unit is a part of a sequential system and is discussed elsewhere.

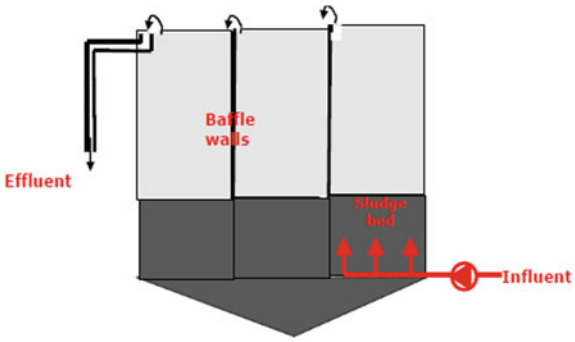

Fig. 1 Conceptual reactor design for passive sewage treatment

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Fig. 2 Anaerobic waste-water treatment by sludge upwelling followed by *Rhodopseudomonas* stage (In Karnataka, India. Unpublished data)

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3.4.4 Number of books and chapters in edited volumes/books published per teacher during the last f

3.4.4.1: Total number of books and chapters in edited volumes / books published, and papers in natio

Sl. No.	Name of the teacher	Title of the book/chap	Title of the paper	Title of the proceed
1	VivekVardhan C.M.	Utilization of Rice Husk Ash for Defluorid		NA
2	VivekVardhan C.M.	Development of a Low-Cost Column Typ		NA
3	Dr.J.Selwyn Babu, Dr	Structural Lightweight Concrete		NA
4	B.Vamsi Krishna, Dr.M	NA	Dimensional Seism	National E-Confer
5	B.Vamsi Krishna, Dr.M	NA	Seismic Analysis o	National E-Confer
6	Mr. A. Naga Sai Baba	NA	Pedestrian Mid Blo	International Confe
7	Mr. E. Rakesh Reddy	NA	Design and Model	International Confe
8	Mr. Seelam Srikanth	NA	An Empirical base	International Confe
9	V.Lakshmi Shrieen Ba	NA	EFFECT OF aspe	International Confe
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38	Dr M. Kameswara Ra	**NA**	SEISMIC ANALYS	3rd National Confe
39	K.Naga Sujatha	**NA**	A STUDY ON JAT	3rd National Confe
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Utilization of Rice Husk Ash for Defluoridation of Water



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Abstract Effective utilization and safe disposal of solid wastes is one of the major challenges placed before the modern-day scientist, in the wake of exploding population. Rice husk is a major agricultural waste being generated by an agricultural nation such as India, and therefore warrants proper utilization before disposal. On the other hand, fluorosis is a burning problem caused due to consumption of groundwater consisting of excessive fluoride, prevalent in several parts of the world. Therefore, in this study, Rice Husk Ash was impregnated with Lanthanum and investigated for defluoridation of water by adsorption. Batch adsorption experiments were conducted for fluoride removal using Lanthanum-Impregnated Rice Husk Ash (LIRHA) and tested for various parameters such as pH, time of agitation, influence of ions, and optimum dosage of sorbent. It was observed that LIRHA removed fluoride to less than the permissible limit in the naturally encountered pH of water. The optimum time and dosage of LIRHA were found to be 240 min and 6 g/L, respectively. The anions phosphates and chlorides were found to be detrimental for fluoride sorption probably due to competitive of those ions with fluoride on the active sorption sites on LIRHA. Thus, this study revealed that the agricultural waste, Rice husk can be effectively utilized for removal of fluoride from water and subsequently disposed off safely.

Keywords Adsorption · Defluoridation · Water · Low-cost · Lanthanum

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1 Introduction

India being an agricultural nation generates huge quantities of Rice husk as agricultural waste. About 24 million tons of Rice husk is being generated by the nation annually (Pandey et al. 2012). A minor portion of this waste is used as cattle feed and in manufacture of cement and refractory bricks. The remaining major portion is dumped, which results in its decomposition and subsequent emission of methane gas. Therefore, an effective way for utilizing rice husk has to be found and subsequently disposed safely. Concomitant to this challenge, contamination of groundwater with fluoride and the resulting fluorosis is a major threat faced by mankind. Fluoride has dual impacts on living organisms. In lower concentrations, fluoride is very beneficial as it assists in formation of bones and prevents dental decay, whereas in higher concentrations, it causes serious health issues such as skeletal fluorosis, dental fluorosis, mental derangements, dwarfishness, etc. Therefore, it is imperative that fluoride has to be removed from water before consumption. The World Health Organization (WHO) has stipulated a maximum permissible limit of 1.5 mg/L of fluoride in drinking water. Various technologies are available for defluoridation of water and are partially successful to various extents. But, as fluorosis is not yet completely eradicated, the focus has recently shifted to use of rare earth materials as adsorbents for defluoridation with a fairly reasonable degree of success (Vardhan and Srimurali 2018; Vivek Vardhan and Srimurali 2015, 2016). However, research is still deficient on achieving a dual advantage of simultaneously utilizing waste and removing fluoride from water. Therefore, in this study, an attempt was made to employ Rice Husk Ash impregnated with Lanthanum for removal of fluoride from water. The main objectives of this study are to: (1) Impregnate Lanthanum onto Rice Husk Ash, (2) Find the optimum time of agitation and the dosage of sorbent required, (3) Investigate the influence of pH on fluoride removal, and (4) Study the impact of anions on defluoridation.

2 Materials and Methods

2.1 Chemicals

All reagents used in the present investigation were procured from E. Merck Ltd., India and were of analytical reagent grade. Sodium fluoride of 221 mg was dissolved in distilled water and made up to 1 L in a volumetric flask to prepare a stock fluoride solution of 100 mg/L. Stock solution was diluted appropriately to obtain fluoride solutions of required working concentrations.

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2.2 Adsorbent

Rice Husk Ash (RHA) was procured from a local rice mill and was sieved to a mean size of 475 μm.

2.3 Adsorbent Preparation

Lanthanum carbonate of varying weights was mixed with 0.05 L of distilled water and 0.1 N HCl was added to it drop wise until Lanthanum carbonate got dissolved completely. To this solution, 0.1 N NaOH was added under constant stirring until precipitates were visually observed. RHA of mean size 475 μm and 20 ± 0.2 g weight was added to this mixture. This mixture was mixed for 6 h in a magnetic stirrer. Subsequently, it was decanted, dried, and heated at 300 °C for 4 h in a muffle furnace. It was thoroughly washed with distilled water and dried. The obtained material is Lanthanum-Impregnated Rice Husk Ash (LIRHA).

2.4 Batch Adsorption Experiments

Teflon flasks of 250 mL capacity and a working volume of 100 mL were used throughout the experiments. Laboratory spiked fluoride solutions of 10 ± 0.2 mg/L were prepared and adsorbent of required dosage was added to each flask. These flasks were agitated in a rotary shaker of make Kaizen imperial. The optimum rate of agitation for highest removal of fluoride was determined by varying the speed of agitations at 40, 80, 120, 160, and 200 rpm, at 25 ± 1 °C. Highest fluoride removal was observed at 160 rpm and so all experiments were conducted at this speed of agitation. After agitating for stipulated time periods, the contents were withdrawn, filtered in a Whatman filter paper of size 42, and analyzed for fluoride removal using SPADNS method (APHA 2005). Fluoride was analyzed using a spectrophotometer, Evolution 201, of Thermo Scientifics. pH adjustments were carried out using 0.1 N NaOH and 0.1 N H_2SO_4. Individual ions of Cl^-, SO_4^{2-}, PO_4^{3-}, HCO^{3-}, and NO^{3-} were added in concentration of 250 ± 5 mg/L in addition to fluoride ions to evaluate its impact. Concentration of Lanthanum was measured using an atomic adsorption spectrophotometer AAS, GBS 932 plus.

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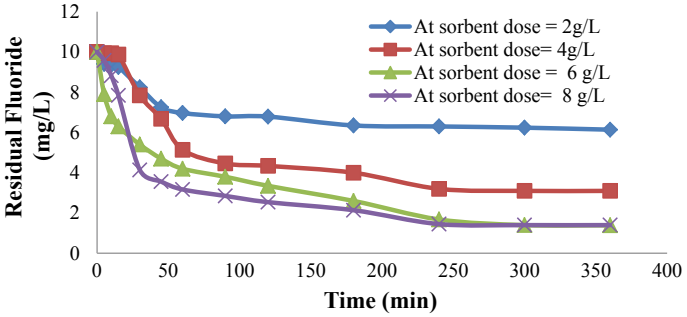

Fig. 1 Influence of time of agitation and dose of LIRHA on defluoridation

3 Results and Discussion

3.1 Time and Dose Studies of RHA and LIRHA

Experiments were carried out to arrive at the optimum time and dose required for adsorption to take place using LIRHA and the results are presented in Fig. 1. It can be observed that the time and dose of sorbent required for defluoridation using LIRHA are 240 min and 6 g/L, respectively, which left a residual fluoride of 1.39 mg/L.

3.2 Influence of pH

Role of pH on defluoridation using LIRHA was examined and the results are presented in Fig. 2. It can be observed that LIRHA performed better in removing fluoride from water in a pH range of 7–9. Formation of HF ions at lower pH values and OH

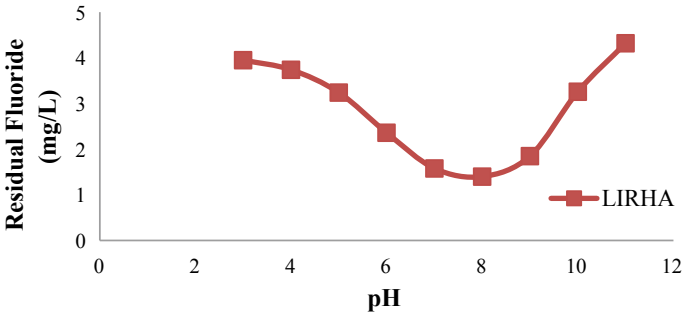

Fig. 2 Influence of pH of solution on fluoride removal by LIRHA

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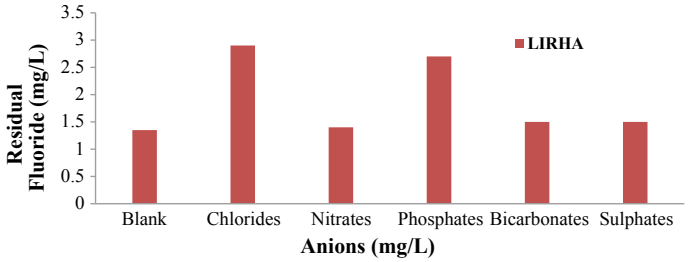

Fig. 3 Influence of anions on sorption of fluoride by LIRHA

ions at higher pH values could be the reason for lesser defluoridation below and above the optimum pH ranges observed.

3.3 Influence of Anions

Efficiency of fluoride removal by LIRHA was tested in the presence of the anions Cl^{-}, SO_4^{2-}, PO_4^{3-}, HCO^{3-}, and NO^{3-}, each individually and the results are presented in Fig. 3. It can be observed that chlorides and phosphates impeded sorption of fluoride by LIRHA, whereas the ions nitrates, bicarbonates, and sulfates exhibited a lesser influence. Similar trend of competition of phosphates with fluorides for active sorption sites was reported by Bia et al. (2012) on ion modified montmirillonite. Chlorides were also reported to be highly competitive against fluoride for sorption on expanded clay aggregate, according to Sepehr et al. (2014).

4 Concluding Remarks

The aim of this work is to simultaneously utilize the agricultural waste Rice Husk Ash and to remove fluoride from water.

Agitated non-flow batch studies demonstrated that LIRHA is capable of removing fluoride from water to less than the permissible limits.

Normally encountered pH range was found to be favorable for fluoride removal by LIRHA.

It was observed that the time and dose of LIRHA required for defluoridation were 240 min and 6 g/L, respectively.

Presence of anions such as phosphates and chlorides exerted a detrimental effect on removal of fluoride from water using LIRHA, possibly due to competition of ions.

These investigations revealed that the agricultural waste Rice Husk can be utilized toward removal of fluoride from water and should be disposed off safely.

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Development of a Low-Cost Column Type Filter Based on Agricultural Waste for Removal of Fluoride from Water



C. M. Vivek Vardhan and M. Srimurali

Abstract Population explosion and subsequent increase in demand for food have resulted in adoption of modern methods of agriculture, thereby generating huge quantities of agricultural wastes. India being an agricultural nation generates large amount of Rice Husk warranting proper utilization before disposal. Concomitantly, fluorosis caused due to consumption of excessive fluoride is posing a serious threat to mankind. Therefore, in this study, an attempt has been made to develop a low-cost column type filter based on Rice Husk for removal of fluoride from water. Lanthanum was used to enhance the fluoride removal capabilities of Rice Husk Ash. Continuous-flow column studies were conducted and investigated for its potential in removing fluoride from water. It was observed that 37.8 L of water of initial fluoride concentration 10 mg/L could be brought down to permissible limits in 1890 min and can be safely consumed. The developed low-cost filter utilizes an agricultural waste and protects people from fluorosis especially of rural and isolated communities.

Keywords Adsorption · Defluoridation · Water · Low-cost · Lanthanum

1 Introduction

Agricultural wastes are generated in huge quantities in agriculture-based nations such as India. It is estimated that the annual generation of Rice Husk in India is about 24 million tons (Pandey et al. 2012). Though a minor portion of it finds application in production of silica, cement and refractory bricks, majority of it is dumped and remains non-utilized. Therefore, an effective way of utilizing the same is required. On the other hand, contamination of groundwater with fluoride and the resulting fluorosis is a major threat faced by mankind. Fluoride has dual impacts on living organisms. In lower concentrations, fluoride is very beneficial as it assists in formation of bones

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and prevents dental decay, whereas, in higher concentrations, it causes serious health issues such as skeletal fluorosis, dental fluorosis, mental derangements, dwarfishness, etc. Therefore, it is imperative that fluoride has to be removed from water before consumption. The World Health Organization (WHO) has stipulated a maximum permissible limit of 1.5 mg/L of fluoride in drinking water. Various technologies are available for defluoridation of water and are partially successful to various extents. But, as fluorosis is not yet completely eradicated, the focus has recently shifted to use of rare earth materials as adsorbents for defluoridation with a fairly reasonable degree of success (Vivek Vardhan and Srimurali 2015, 2016, 2018). However, research is still deficient on achieving a dual advantage of simultaneously utilizing waste and removing fluoride from water. Therefore, in this study, an attempt was made to employ Rice Husk Ash impregnated with Lanthanum for removal of fluoride from water in continuous-flow mode and thereby develop a filter using endemically available wastes. Thus, the main objectives of this work are to impregnate Lanthanum on to Rice Husk Ash and to test it for fluoride removal at varying rates of flow rates, initial fluoride concentrations and bed depths.

2 Materials and Methods

2.1 Chemicals

All reagents used in the present investigation were procured from E. Merck Ltd, India and were of analytical reagent grade. Sodium fluoride of 221 mg was dissolved in distilled water and made up to 1 L in a volumetric flask to prepare a stock fluoride solution of 100 mg/L. Stock solution was diluted appropriately to obtain fluoride solutions of required working concentrations.

2.2 Adsorbent

Rice Husk Ash (RHA) was procured from a local rice mill and was sieved to a mean size of 475 μm.

2.3 Adsorbent Preparation

Lanthanum carbonate of varying weights was mixed with 0.05L of distilled water, and 0.1 N HCl was added to it dropwise until Lanthanum Carbonate got dissolved completely. To this solution, 0.1 N NaOH was added under constant stirring until precipitates were visually observed. RHA of mean size 475 μm and 20 ± 0.2 g weight

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was added to this mixture. This mixture was mixed for 6 h in a magnetic stirrer. Subsequently, it was decanted, dried and heated at 300 °C for 4 h in a muffle furnace. It was thoroughly washed with distilled water and dried. The obtained material is Lanthanum-Impregnated Rice Husk Ash (LIRHA).

2.4 Continuous-Flow Experiments

Fixed bed down-flow column studies were performed using a Pyrex glass column of inner diameter 2.54 cm and depth 1 m. Cotton was placed at the base to support aggregates. The column was filled with aggregate of mean size 600 μm to a depth of 30 ± 1 cm at the base. On its top, LIRHA of varying depths of 20 cm, 30 cm and 40 cm was filled. Aggregate of mean size 600 μm and of varying depths of 30 ± 1 cm, 40 ± 1 cm and 50 ± 1 cm was filled on the adsorbent to ensure an equally distributed flow of tap water spiked fluoride solution onto the sorbent bed. The set-up of the column is depicted in Fig. 1. Aqueous fluoride solutions of various concentrations of 5 ± 0.1 mg/L, 10 ± 0.1 mg/L and 15 ± 0.1 mg/L were passed

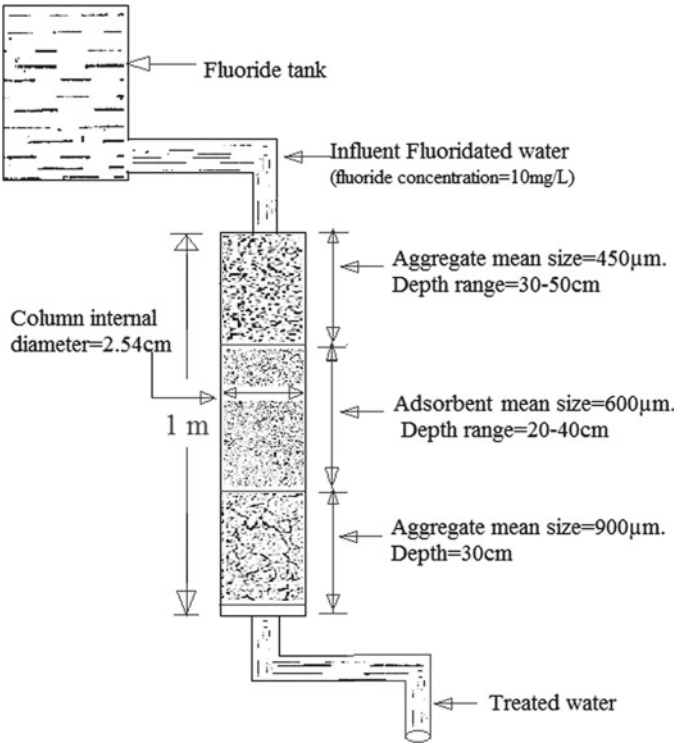

Fig. 1 Column set-up block diagram

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through it. Flow rates of the solution were varied at 10 ± 0.2 ml/min, 15 ± 0.2 ml/min and 20 ± 0.2 ml/min. At regular intervals of time, effluent samples were collected and analysed for residual fluoride concentration, until the effluent concentration of fluoride equalled the influent concentration.

2.5 Analysis of Continuous Sorption Experiments

Analysis of breakthrough curves gives an insight into the performance of fixed-bed column. The time taken for breakthrough and time taken for complete exhaustion of column gives characteristic information for determining the performance and dynamics of adsorption of a column (Chen et al. 2013). Breakthrough of the column is considered to have occurred when the effluent concentration (C_t) has reached about 0.1% of influent concentration (C_o), and exhaustion of column is considered to have occurred when effluent concentration has reached about 95% of influent concentration (Kundu and Gupta 2007). However, from fluoride removal point of view, 15% fluoride removal (i.e. up to effluent concentration of 1.5 mgF^-/L) is considered for analysis. A breakthrough curve is obtained by plotting values of (C_t/C_o) versus (t) (Han et al. 2009). Effective effluent volume (V_{eff}) can be calculated from Eq. (1) (Ramavandi et al. 2014).

$$V_{\text{eff}} = Q \cdot t_{\text{total}} \tag{1}$$

where Q is volumetric flow rate (ml/min), and t_{total} is flow time (min). The value of total mass of fluoride adsorbed (q_{total}) (mg) can be obtained from the area under the breakthrough curve, found by integrating the adsorbed concentration (C_{ad}, mg/L), within the functioning time limits (Ramavandi et al. 2014) (Eq. 2).

$$q_{\text{total}} = \frac{Q}{1000} \int_{t=0}^{t=\text{total}} C_{\text{ad}} \mathrm{d}t \tag{2}$$

where $C_{\text{ad}} = C_o - C_t$.

The maximum fluoride adsorption capacity (q_{eq}) can be calculated as follows, as given in Eq. (3)

$$q_{\text{eq}} = \frac{q_{\text{total}}}{m} \tag{3}$$

where m is dry weight of adsorbent used in column (g).

Fluoride was analysed using SPADNS method (APHA 2005), using a spectrophotometer, Evolution 201.

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3 Results and Discussion

3.1 Continuous-Flow Column Studies

To evaluate the practical applicability of LIRHA for defluoridation, in continuous-flow mode, fluoride-rich water was passed through columns consisting of varying depths, at different flow rates and different influent fluoride concentrations.

3.1.1 Effect of Bed Depth

LIRHA bed depths were varied, and the corresponding variations in related parameters such as time for exhaustion of column and effective volume of water treated were evaluated and presented in Table 1. Increase in bed depth resulted in increase in the effective volume of water treated and took more time for the column to get exhausted. Breakthrough curves were drawn between t versus (C_t/C_o) for various bed depths, and the plots are presented in Fig. 2. It is clear from this figure that with

Table 1 Values of column parameters obtained at different bed depths, flow rates and initial fluoride concentrations for defluoridation using LIRHA

Q (ml/min)	(C_o) (mg/L)	Z (cm)	t_{total} (=Total flow time in min)	V_{eff} (ml)	q_{total} (mg)	q_o (mg/g)
15	10	20	2790	41,850	273.1	4.149
15	10	30	5130	76,950	468	4.739
15	10	40	6930	103,950	770.3	5.85
10	10	30	12,780	127,800	783	7.928
20	10	30	1890	37,800	270.1	2.735
15	5	30	11,700	175,500	484.3	4.904
15	15	30	2790	41,850	343.1	3.475

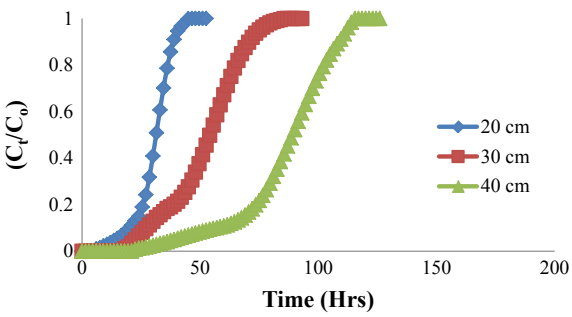

Fig. 2 Breakthrough curves for the effect of bed depth on defluoridation of water using LIRHA

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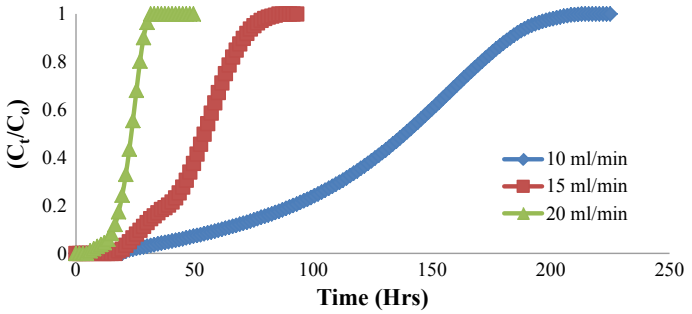

Fig. 3 Breakthrough curves for the effect of flow rate on defluoridation of water using LIRHA

increasing bed depth, the slope of column gradually decreases, marking a broadening of the mass transfer zone, resulting in increased fluoride sorption.

3.1.2 Effect of Flow Rate

Rate of flow of influent fluoride solution into the column was varied, and the corresponding variation of dependent parameters is presented in Table 1. It can be observed from this table that with increase in flow rate, the column gets exhausted rapidly because it gets saturated rapidly. Figure 3 shows the breakthrough curve drawn between t versus (C_t/C_o) for varying flow rates. From this figure, it can be seen that, with increasing flow rate, the breakthrough curves become steeper, and the uptake of fluoride too decreases. This could be due to adsorption taking place, only through film diffusion, because of lesser residence time (Ye et al. 2018).

3.1.3 Effect of Initial Fluoride Concentration

Concentration of fluoride in the influent aqueous solution was varied, and its impact on defluoridation in continuous mode was studied. The influence of variation of initial fluoride concentration on the effective volume treated, and uptake of fluoride and sorption capacities are presented in Table 1. From the table, it can be observed that, with increase in influent fluoride concentration, the adsorption capacity of column too increased gradually. Higher fluoride concentration effectively overcomes mass transfer resistance and therefore transfers fluoride effectively on to the surface of LIRHA. Breakthrough curves were plotted between t versus (C_t/C_o) for different influent fluoride concentrations and are presented in Fig. 4. From this figure, it can be seen that with increase in initial fluoride concentration, the gradient of the breakthrough curve increases, resulting in decreased mass transfer zone. This indicates that intraparticle diffusion controls the adsorption process (Manna et al. 2018).

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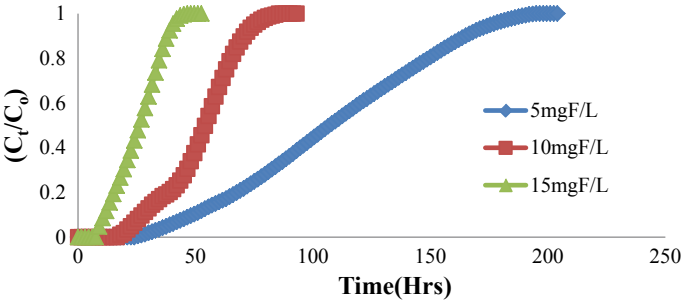

Fig. 4 Breakthrough curves for the effect of initial fluoride concentration on defluoridation of water using LIRHA

4 Concluding Remarks

The aim of this work is to simultaneously utilize the agricultural waste Rice Husk Ash and to remove fluoride from water.

Continuous-flow column studies demonstrated that LIRHA is capable of removing fluoride from water to less than the permissible limits.

Thus, the agricultural waste, Rice Husk can be effectively utilized for removal of fluoride from water, especially in rural and isolated communities.

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Structural Lightweight Concrete

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Abstract

Lightweight concrete is a composition composed of lightweight coarse aggregates like shale, clay or slate, giving its low density characteristic. The lightweight concrete is suitable for the construction of modern buildings requiring minimal cross sections. It is increasingly used for the building of stylish foundations and has become a viable alternative to standard concrete. Lightweight concrete provides flexibility of design and significant cost savings, with lower dead load, stronger seismic structural response, longer lengths, increased fire ratings, reduced height of the story, lower size structural elements, less steel reinforcement and lower foundation costs. Due to the ceramic quality of the combine and the outstanding bonding and elastic compatibility it ensures the excellent longevity performance of structural lightweight concrete made of expanded shale, expanded clay or slate structural lightweight aggregate. The structural lightweight cellular structure of the aggregate enables inner healing through the water exertion, which is particularly useful for high-performance concrete.

Keywords: Concrete, Lightweight, Structural, Oil Palm Shell, Coconut Shell, Peach Shell.

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Dimensional Seismic Analysis of Irregular Reinforced Cement Concrete Framed Structure by using Staad Pro

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Abstract

The project's aim is to evaluate response spectrum (RS) and time history (THA) of vertically irregular RC building frames using IS13920 corresponding to Equivalent static analysis and time historical analysis. Their purpose is to carry on ductility based design. The findings were contrasted with the standard structure for study and design of irregular structures. The research also concerns the evaluation of responses from strong, weak, and medium-frequency earthquakes to structures subjected to time histories. There were three types of irregularities: mass irregularity, rigidity irregularity, and irregularities in vertical geometry. Our observation shows that the shop shear force is maximal in the first floor, and decreases in all cases to a minimum in the top floor. Mass irregular structures were found to be larger than equivalent regular structures.

The irregular rigidity system has a smaller base shear and has larger interstory drifts. The absolute shifts obtained from historical study of the irregular geometry structure at the respective nodes were higher in the case of normal structures for the higher stories, but slowly as we shifted to lower stories, changes in both structures appeared to converge. Higher rigidity contributes to higher upper-story displacement. In the case of an unusual mass structure, an examination of time history provides slightly higher range for top stories than in normal structures, whereas in the case of lower stories, there are higher increase than in normal stories. When the historical study of normal and rigid irregular structure was made, it was found that the displacements in the upper stories were not very different but that the absolute displacements were greater in case of softening than in the standard structure when we moved to the lower stories. High natural frequency structures have been found to have highest response during an earthquake of low frequency. It is because the low natural frequency of high-frequency earthquake systems results in vibration that contributes to greater displacements.

If a high-rise (low natural frequency) structure is subject to high-frequency earth shifting, it contributes to minor changes. Likewise, when the high-frequency earth motion underlies a low elevation structure (high natural frequency), it results in bigger movements and when a high-elevation structure is subject to low-frequency earth motion, slight displacements happen.

Keywords: Staad Pro, Seismic Loads, Framed Structure.

1. INTRODUCTION

The structural collapse begins at points of weakness during an earthquake. This vulnerability exists because of mass discontinuity, rigidity, and structural geometry. Such discontinuous structures are referred to as abnormal. Most of our urban infrastructure is supported by dysfunctional structures. One of the main reasons for structural failures in earthquakes is vertical irregularity. For example, soft-story structures were the most remarkable collapsing structures. The effect of vertical irregularities is therefore very important in the seismic performance of structures. High variations in rigidity and mass differentiate these buildings from their normal buildings for their dynamic properties.

IS 1893 definition of Vertically Irregular structures?

Regardless of the irregularity of the building structures, their density, strength and rigidity can be

irregular in their weights. The study and construction of these buildings become more difficult when they are built in high-seismic areas.

There are two types of irregularities-

1. Plan Irregularities
2. Vertical Irregularities.

Vertical Irregularities are on the whole of five types-

i) **a) Stiffness Irregularity** - Soft Storey-A soft storey has less than 70% of the lateral rigidity above or under 80% of the total lateral rigidity over the top of the three racks.

b) Stiffness Irregularity - Extreme Soft Storey- The exceptionally soft surface is one in which lateral rigidity is not more than 60% or less than 70% of the average rigidity of the top three floors.

ii) **Mass Irregularity**- There would be considered mass anomalies when the seismic weight of any storey reaches 200% of the adjacent surface. Irregularity must not be taken into consideration in the case of roofs.

iii) **Vertical Geometric Irregularity**- A structure is considered to be Vertical geometric irregular the seismic weight of any storey exceeds 200% of the neighboring surface will be known as mass anomalies. In the case of roofs, anomalies should not be taken into account.

iv) **In-Plane Discontinuity in Vertical Elements Resisting Lateral Force**- An in-plan offset of the lateral force which resists elements larger than their length.

v) **Discontinuity in Capacity** - Weak Storey- A low floor has less than 80 percent of the lateral power in the storey above.

In accordance with IS 1893, a linear static structural analysis of a standard, restricted height structures can be employed since lateral forces are measured in this phase according to the specific structural time period based on codes. This research enhanced the effects on the higher vibrational modes and the actual distribution of forces across the range, thereby enhancing the linear dynamic analysis over the linear static analysis. Built induced earthquakes are optimized for structures, however, the forces actually operating on the structure are much greater than DBE. Thus, in higher seismic areas, a definition of ductility based architecture is favored because structural ductility decreases the distance. The primary purpose of the development of an earthquake-resistant device is for the building to be ductile enough to cope with the earthquake forces it is exposed to during an earthquake.

2. OBJECTIVES

- The structural side forces of normal and irregular buildings can be measured using the response spectrum analysis and the effects of various structures comparable.
- For research three structural irregularities, namely mass, rigidity and irregularities in vertical geometry.
- For the study of time history and comparing results the reactions of buildings subject to different types of land movements, namely low, medium and high frequency ground movement, are measured.
- Conduct an earthquake-resistant ductility-based design as per IS 13920, consistent with comparable static analysis and study of time history and comparing design variations.

3. SCOPE OF THE STUDY

- Only RC buildings are considered.
- Also vertical anomalies have been investigated.
- The structures were the subject of linear elastic analysis.
- As fixed to the base, the column was constructed.
- The contribution of the infill wall to rigidity was not taken into account. Infill wall loading was considered.
- The relation between the soil structure is overlooked.

4. RESEARCH METHODOLOGY

- A study by different scholars of current literature.
- Selection of structure forms.
- Modeling the structures selected.
- Complex analysis and evaluation of test findings on selected building models.
- Buildings are constructed according to the results of the study.

5. ANALYSIS METHODS

Seismic analyzes are a crucial method to understand buildings' response to seismic excitations more easily in earthquake engineering. In the past the structures have only been built for gravity and recent research is seismic engineering. This is part of the structural study of the earthquake and is part of the structural architecture.

Earthquake analysis approaches are special. Many of the programs included are:

I. Equivalent Static Analysis

II. Response Spectrum Analysis

III. Time History Analysis

Equivalent Static Analysis

The corresponding static analysis is primarily an elastic technique of architecture. However, it is simple to implement than the multi-model response approach, because the absolute simplification assumptions are maybe more compatible with other absolute assumptions elsewhere in the design process.

The following steps are used in the analogous static analysis procedure:

- Estimate the building's first mode response time from the spectrum design response.
- Using the basic design response range to assess the conformity with the presumed poste lastic (ductility) response level of the lateral basis shear of the entire structure.
- Distribute the base shear among the different lumped mass rates normally centered on a triangular inverted shear distribution of 90% of the base shear with 10% of the base shear being applied at the highest level to permit higher mode effects

Response Spectrum Analysis

This approach helps a building to take into account multiple modes of response. For all but extremely simple or very complex structures, this is necessary in many building codes. The structural response can be described as a combination of many different modes. To evaluate these modes for a system, computer analysis can be used. In each mode, the design spectrum corresponds to the modal frequency and the modal mass and is then combined to approximate the total structure response. The scale of forces is measured in all directions and then results are observed on the structure. The mixture methods are as follows:

- Absolute - peak values are added together
- Square root of the sum of the squares (SRSS)
- Complete quadratic combination (CQC) - a method that is an improvement on SRSS for closely spaced modes.

Time History Analysis

Techniques of time historical analysis include the step-by - step solutions in the time domain of the movement multi degree equations, which constitute the actual buildings answer. This is a structural engineer's most sophisticated method of analysis. The solution is to explicitly work with the earthquake motion chosen for a specific building as an input parameter. This research approach is generally restricted rather than to testing the suitability of hypotheses taken during the design of important structures.

The following steps in the study of time history are:

- Modal matrix estimation
- Active vector intensity estimation
- Obtaining of a standard coordinate displacement response
- Receiving the physical coordinate displacement response
- Efficient earthquake response forces measurement at each level.
- Maximum reaction estimate

Three different kinds of ground motions, namely low (Imperial), intermediate (IS code) and high frequency (India), were compare to the results. In this sense the results of an irregular structure were compared. The last thing is the nature and evaluation of irregular structures in accordance with IS 13920 relating to the related static analysis and time history analysis

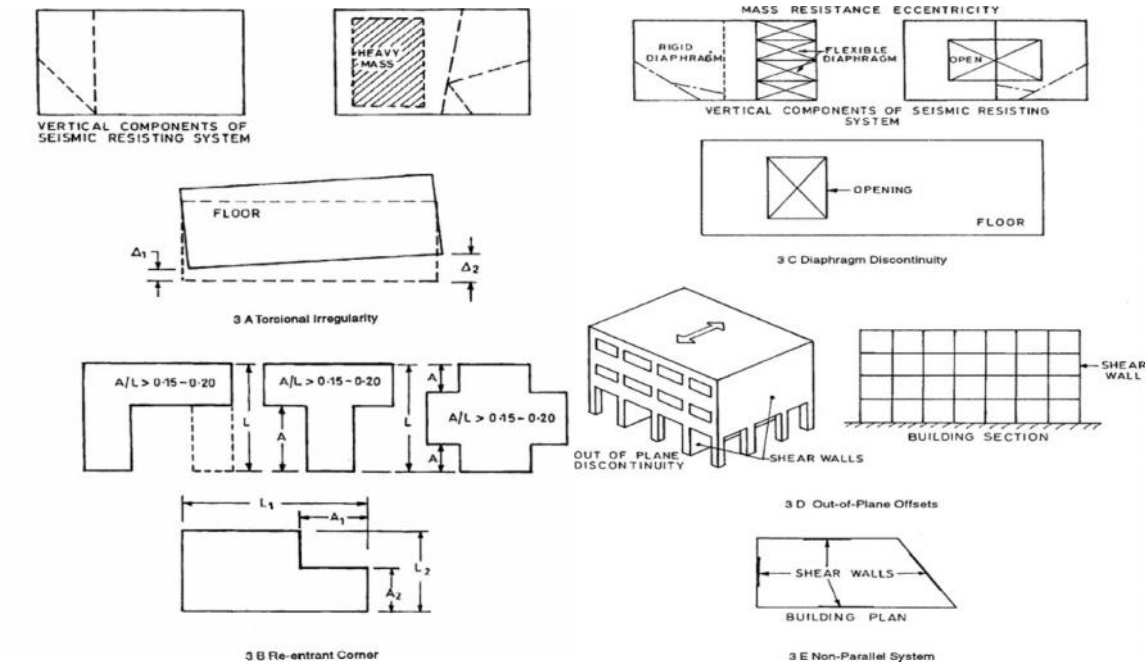

Fig. 1 Irregular Structures

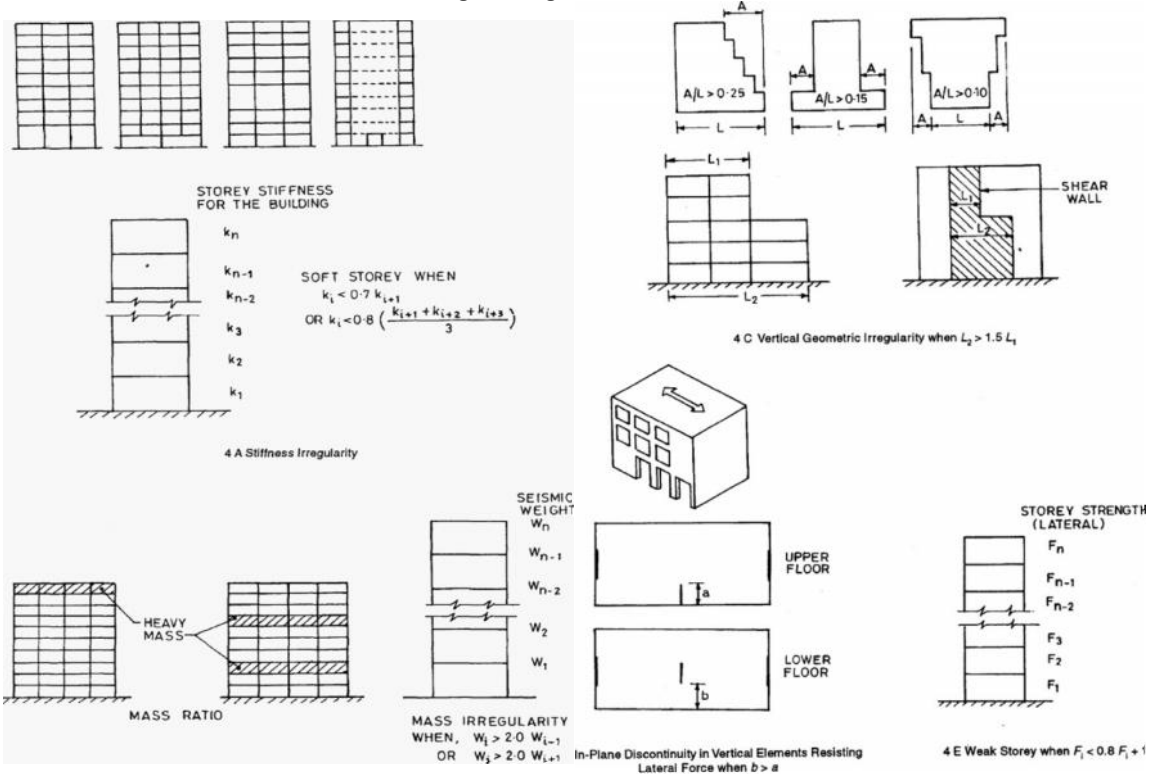

Fig. 2 Vertical Irregularity

5. METHODOLOGY

Response analysis of the structure was carried out using Staad-Pro in regular and separate irregular buildings. The shear forces for each floor were determined and each structure was drawn on a diagram.

Live Load	3kN/m^2
Density of RCC considered:	25kN/m^3
Thickness of slab	150mm
Depth of beam	400mm
Width of beam	350mm
Dimension of column	400x400mm
Density of infill	20kN/m^3
Thickness of outside wall	20mm
Thickness of inner partition wall	15mm
Height of each floor	3.5m
Earthquake Zone	IV
Importance factor	1
Type of Soil	Rocky
Type of structure	Special Moment Resisting Frame
Response reduction Factor	5

Four styles of Irregular structures, Regular building structure, irregular mass structure, ground floor structure and irregular vertically rectangular building were considered. There were 10 of the first three systems.

1. Regular structure (10 storeys):

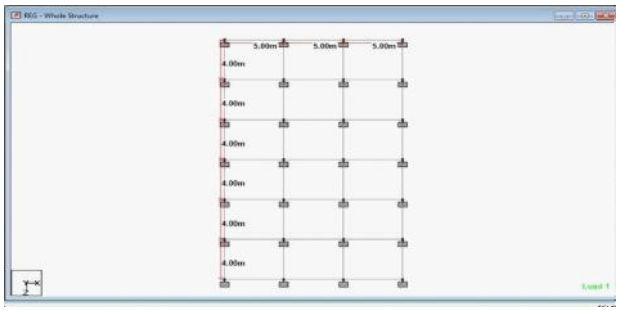

Figure 3: Standard construction plan (10 floors)

2. Mass Irregular Structure (10 storeys):

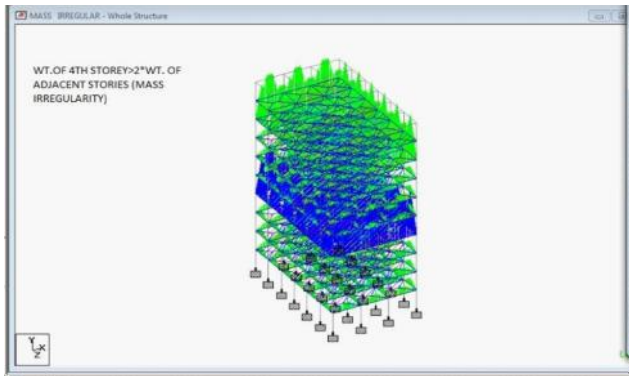

Figure 4: Mass standard building 3D view (10 floors) with 4th and 8th floor swimming pools

3. Stiffness Irregular Structure (Soft Storey):

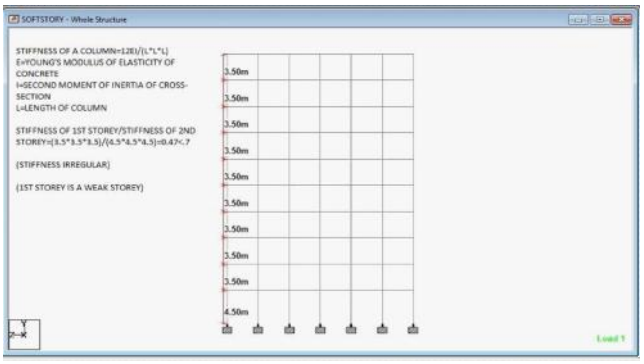

Figure 5: Irregular rigidity (10 stories) Structure

4. Vertically Geometric Irregular

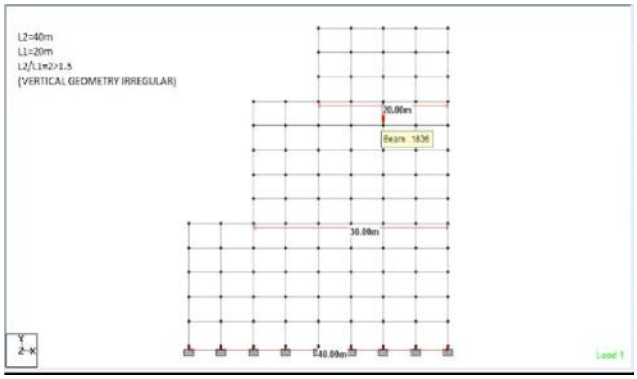

Figure 6: Vertical Geometric irregular structure (14 storeys)

CONCLUSIONS

Three different types of irregularities, namely mass irregularities and irregularities of stiffness and vertical geometry, were considered. For any type of irregularity, Response spectrum analysis (RSA) was performed and the shear strength obtained was compared with that of a normal structure. Three types of ground movement were considered with different frequency contents, i.e. low frequency (imperial), intermediate frequency (IS code), high rate (India). For each irregularity form that corresponds to the above ground movements, time history analyzes (THA) were carried out and nodal displacements were compared. The abovementioned irregular frames were finally constructed using the IS 13920, which corresponds to Static Analysis Equivalent (ESA) and the Analyzes of Time History (THA), and the results compared. We may summarize our findings as follows.

- The shelving force for the first floor was found to be maximal and decreased in all cases to a minimum in the top floor, based on RSA tests.
- The mass irregular building frames were found to have a higher base shears than equivalent normal structural frames, as per the results of the RSA.
- The abnormal stiffness of the building has less baseline shear and greater inter-store drifts, according to results of the RSM.
- The absolute displacements obtained from a study of time history of irregular geometry of construction in the respective nodes were higher than the normal building for upper stories, but slowly the lower story displacements appeared to converge in both constructions. Such a geometry, the upper stories are irregularly formed because of their lower stiffness (due to L form). Higher rigidity contributes to higher upper-story displacement.
- Time history analyzes created marginally higher displacement for the upper stories than for regular buildings in the case of mass irregular structures, while when we step down, the lower stories demonstrated higher displacement than in normal structures.
- The time history research was carried out on the normal and stiffness of irregular buildings (soft floors), but when we went down to lower stories it was found that the absolute movement in soft floors was higher than the stories of standard buildings.
- The long history research for both normal and irregular stiffness buildings (soft-story), it was discovered that displacements of upper stories did not vary significantly from one another. In the case of soft stories we moved down into lower stories but, compared to respective stories in standard buildings, absolute displacement was higher.

Tall structures have low natural frequency and have a maximum response in a low frequency earthquake.

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Seismic Analysis of A (G+7) Multi-storey Building with and without Hanging Columns-A Comparative Study

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Abstract

In the new multi-story construction in urban India, today buildings with the Hanging column have become a traditional feature. In building constructed in seismically active areas, these features are extremely undesirable. The importance of the role of the Hanging column in building analysis was clearly highlighted in this report. Alternate steps to minimize anomalies in the Hanging frames, including the stiffness balance of the first stage and above. Buildings with a Hanging column in the current scenario are a typical feature of contemporary urban India construction. In building constructed in seismically active areas, these features are highly unwanted. This research emphasizes the significance of the Hanging column in the building analysis specifically. Alternate steps to reduce the irregularity of hanging columns, including the stiffness balance of the first and last stages, are proposed. In order to investigate the response to different earthquake arouses the structure with different often contents and time-content factor, FEM codes are created for 2D multi-story frames with and without Hanging columns. Both frames with and without Hanging columns are determined by time history of floor shift, inter level drift, base shear, rotating moment. The research is conducted on a Hanging column structure. This detailed figure shows the structural layout of the building. The building considered for the analysis is a G+9 residential home by using STAAD. Pro Software. Each store's height is the same as other common data. Complete analysis where done and finally the building with Hanging column has been found to have less base shear than a building without Hanging column. The Hanging column also falls from the lower to top level of the base shear value as the Hanging column changes. Building with hanging column was also found to have more displacement than building without the Hanging column. Moving the Hanging column from the bottom to the top floors also improved displacement values. Building with hanging column was found to have more floor drift than building without a Hanging column. Shift of hanging columns from bottom to top rates was also observed to increase the storey drift values.

Keywords: FEM, G+9 Building, Hanging Column, Seismic Loading, Drifts.

1. INTRODUCTION

Today, several multi-story urban buildings in India are unavoidably accessible in the first floor. This is used primarily for parking or reception lobbies on the first level. Although the overall seismic basis shear encountered by an earthquake building depends on its natural duration, the distribution of seismic force depends on a height distribution of steepness and mass. In addition to the way the earthquake forces are brought to the ground, the action of a building in an earthquake depends critically upon its overall form, size and geometry. At different rates in a building the earthquake forces have to be carried down by the shortest path down the height to the ground; any inconsistency or discontinuity in this load transfer path contributes to a poor building efficiency.

Vertical reverse buildings (such as a hotel with few floors wider than the others) cause the earthquake forces to unexpectedly leap at discontinuity. Buildings with less columns or walls or with an unusually high amount appear to damage or collapse in the storey. Throughout the 2001 Bhuj earthquake, several buildings

in Gujarat with open ground floor to parking were collapsed or seriously damaged. Buildings with columns hanging or Hanging on beams in an intermediate floor that do not meet the base have discontinuities in the transmission route for loads

2. What is hanging column?

The Hanging column is a vertical component that sits on a beam but does not directly move the load to the foundation. There was a mistake. But on the beam rests the Hanging board. Column structure for hanging or Hanging. It ensures that the beam supporting the column acts as a foundation. This structure is known as a transmitting structure. A vertical component from base level and transferring the load to the ground is expected to be a column. The term hanging column is also a vertical feature that (due to the nature / position of the architecture) rests on a beam that is a horizontal part of the lower point (termination point). The beams move the load to other columns below it.

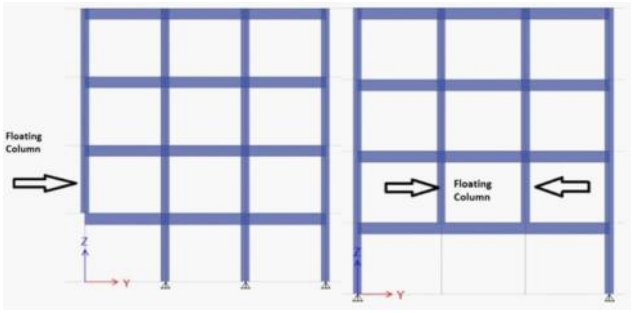

Figure 1: Hanging Column

Most projects include Hanging columns, in particular above the ground floor, where transfers are used to create more room in the ground floor. For assembly and parking purposes, such open spaces can be needed. In Earthquake zones, the transfer belt must be correctly constructed and described. The beam supports the board, a focused load.

With regard to the analysis, the column is always taken as a point load on the transfer beam and is fixed at the foundation. For the study of this type of structure, STAAD Pro, ETABS and SAP2000 may be used. Hanging columns are capable of bearing a weight load but the girder must be fairly steep with very limited deflection. Of course, looking forward, one can always find buildings more fascinating than monotonous. This should not, however, be achieved at the risk of bad conduct or building protection due to an earthquake. Architectural features that are detrimental to the buildings' earthquake response should be avoided. If not, they will be reduced to a minimum. If unusual features are used in buildings, considerably more engineering work is needed to design the building, even with simple architectural features the building may not be as good as the one. Therefore, in seismic areas, the structures already constructed with these discontinuous members are threatened. Yet such structures cannot be demolished; rather, research may be performed to strengthen the structure or to suggest some remediation. The columns on the first floor can be reinforced, the rigidity of these columns can be improved by up grading or braced to minimize lateral deformation.

3. Objective and Scope of present work

The target of the current research is

- Researching the behaviour, in earthquake encouragement, of multi-story buildings with hanging columns.
- The seismic analysis of the building with Hanging column is used for analyzes of the impact of Staad pro.
- Investigate the displacement of base shear between hanging columns in a G+9 Residential Multistoried building at different locations.

4. Research Significance

In urban areas, multi-story buildings are designed for the various purposes mentioned above by having Hanging pillars in the ground floor. Such hanging column buildings are built for gravity loads and safely subject to gravity loads, but not for earthquake loads. Therefore, in seismically prone areas these buildings are dangerous. Throughout the earthquake-resistant architecture of multi storage buildings, the project aims to raise understanding of these problems

5. Methodology

The methodology is the theoretical and systematic analysis of the methods used for the study area. This involves the systematic study of a variety of approaches and concepts connected to a information branch. Load taken into account

Dead loads

The dead load involves the weight of the walls, divisional flooring, false ceilings, false floors and the other permanent structures. A load set in its size and location is called the dead load. Dead loads may be determined by the scale and weight of various members.

For floors; unit weight of reinforces cement concrete= 25 kN/m^3 Unit weight of steel is = 78.5 kN/m^3

Imposed loads

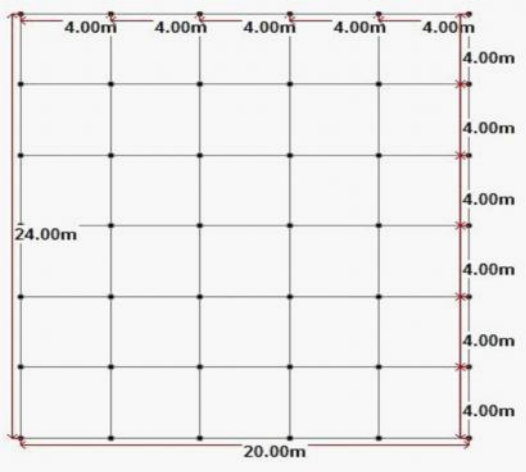

Figure 2: (G+9)-Story Steel Frame Structure

The imported load shall be generated by the intended use or occupation, in which the weight and vibrating loads and dust loads, including the weight of mobile partitions, loads dispersed and concentrated. Charges levied shall not include charges caused by the wind, the seismic activity, the snow and loads place on the structure, the differential settlements to which the structure which experience a temperature change, creeping and shrinking.

For residential buildings such as Hostels, hotels, boarding houses, lodging houses, dormitories, residential clubs: Living rooms, bed rooms and dormitories = 4.0 kN/m^3 (IS: 875, Part 2- 1987).

Wind loads

The strength of a structure due to the wind effect. As the building height increases the wind impact. At high wind speeds the wind typically blows horizontally to the ground.

6. Analysis of the Structure

The building employed in this study was designed according to the IS 800: 2007 and IS 1893 criteria (Part 1): 2002

STAAD Pro analyzes a multi-story steel structure

The architecture of the building depends on the minimum standards as laid down in the Indian Standard Codes. The basic standards for structural protection in buildings shall be protected by the concept of basic design loads to be assumed by the structure to bear for dead loads, imposed loads and other external loads. A 10 (G+9)-story steel frame is used for this analysis. The average height of the floor is 3 m and the building is 30 m. As shown in Figure 4.1, the laterals cover 24 meters by 20 meters and are divided into 4 square meter bays.

For research, the following structures are examined:

- A Rectangular Structure without a Hanging base.
- Rectangular, Hanging column structure on the ground floor
- The rectangular structure with the 3rd floor Hanging column
- The Rectangular Structure at fifth floor with Hanging column

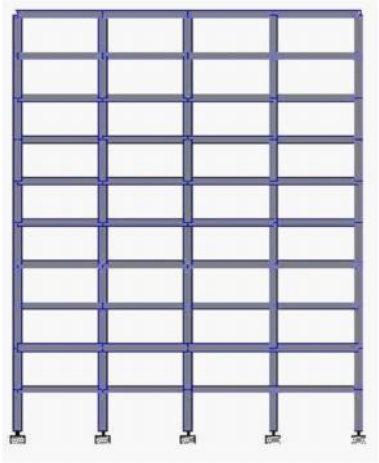

Figure 3: Rectangular Building without any Hanging column

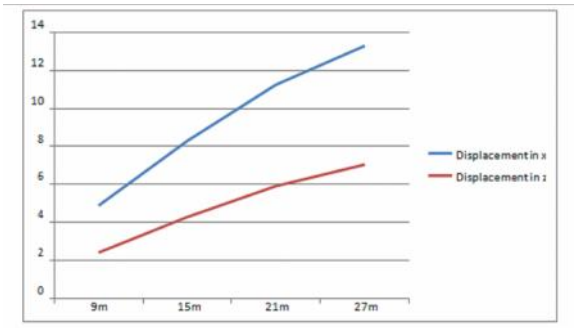

Figure 4: X-axis and Z-axis directions Displacements

It is observed from fig. 4.4 that as the height of building increases displacement is increasing from bottom to the top floor

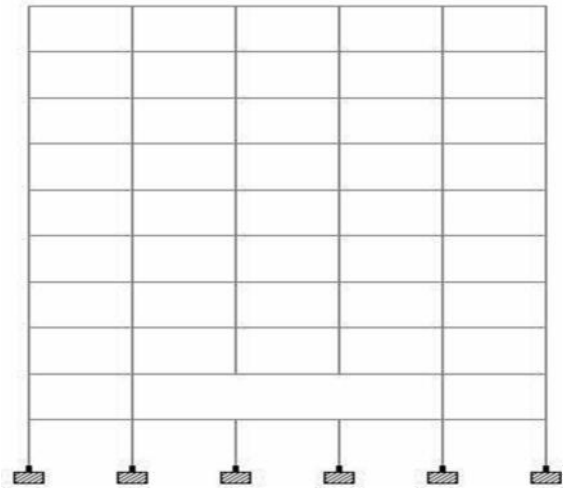

Figure 5: Square Building with hanging column at first floor

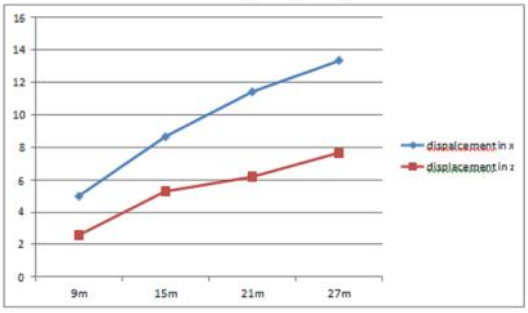

Figure 6: Displacements X-axis and Z-axis directions displacements

7. Results and Discussions

On the basis of base and shelf changes, the results of the comparative study between a building without Hanging column and a Hanging column are carried out.

Base shear:

Table 1 Base shear on different structures

S. No	Seismic Weight	Base Shear	Time Period
Structure 1	52959.43	2206.30	0.94
Structure 2	52590.00	2205.80	0.94
Structure 3	52844.92	2201.93	0.94
Structure 4	52755.85	2198.26	0.94

Displacements at different heights:

a) In x-directions (in mm):

Table 2 x displacements at different heights

S. No	9m	15m	21m
Structure 1	5.6032	9.2378	12.3277
Structure 2	6.0015	9.5231	12.3287
Structure 3	6.0004	11.3897	14.7385
Structure 4	6.1326	12.3726	16.7865

b) In z-directions (in mm):

Table 3 z displacements at different heights

S. No	9m	15m	21m
Structure 1	3.5574	5.5823	6.7277
Structure 2	3.8588	6.2626	7.2828
Structure 3	3.4724	6.8262	7.9282
Structure 4	3.6599	6.2762	9.2929

CONCLUSIONS

In comparison to the previous height classifications, a broad system classification was introduced. Various structural structures have been defined with a focus on creativity within each classification group.

The following conclusions can be drawn on the basis of the current study:

- The building with hanging column has been found to have less base shear than a building without hanging column.
- The Hanging column also falls from the lower to top level of the base shear value as the Hanging column changes.
- Building with hanging column was also found to have more displacement than building without the Hanging column. o
- Moving the Hanging column from the bottom to the top floors also improved displacement values.

- Building with hanging column was found to have more floor drift than building without a Hanging column.
- Shift of hanging columns from bottom to top rates was also observed to increase the storey drift values.

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PEDESTRIAN MID-BLOCK ROAD CROSSING BEHAVIOUR AND RECOMMENDATION FOR FOOT OVER BRIDGES

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Abstract

Pedestrain crossing and the behavior of pedestrians in different conditions espically at uncontrolled crossings is a subject which needs in depth study and analysis. At uncontrolled junctions the pedestrians and their behavior , safety of pedestrian crossing is neglected and no measures are taken to systematize pedestrian crossings at these junctions.Therefore a practical study of the pedestrian road crossing data is made in this study and stastical analysis of the data is done at uncontrolled crossing junctions in mixed traffic conditions of Indian scenario. The main objective of study is to analyse the pedestrian road crossing behavior at uncontrolled junctions.

Adopting multiple regression technique the various parameters which effect the behaviour of pedestrian. Vehicular gap,driver yielding behavior,frequency of attempts to cross, age and condition of pedestrian , rolling gap are some of the parameters that decide the pedestrian crossing time and other requirements. The surveys have been conducted at all junctions between Bowenpally to Kompally on national highway

***Key words**: PedestrianRoad Crossing, Children-Adult Crossing Behaviour under Signalized Mid-Block CrossWalk.*

Design and Modelling of G+5 Commercial Building by Autodesk Revit Architecture

E. Rakesh Reddy, S. Kailashkumar

ABSTRACT---In this project we are detailed explanation how do we design and modelling of G+5 commercial building by Autodesk revit architecture, which renders complete vision of construction. With BIM new technology it is easy to model the building and we can connect to revit architecture, Revit MEP, Revit structure, Built for Building Information Modeling (BIM). In general, for building design and model can be employed by the architecture of Autodesk Revit. In addition, it can give you an exact vision via design, construction and documentation. Use the information-rich models that Autodesk Revit Architecture is useful for make more informed Building designs decisions to support0sustainable design, clash detection, construction planning, and fabrication Installation. Revit Architecture will clear picture of building excellent visualization by using V-ray software, that is made for Rendering purpose. For commercial buildings it will very helpful for visualize building before construction is made in the field.

When the Revit Architecture window is displayed, there we can see the different types of templates such as construction template, structure template, Architecture template. To accomplish this project i.e for design and modeling we use to select Architecture template.

Keywords : Families, components, mass IN-site, Levels,Grid lines.

I. INTRODUCTION

The Revit Architecture software will give the plan view, 3d model with exllent elevation, detailing diagrams, schedules for each structural elements, and with V-ray rendering software we can have realistic view with high efficiency, Building information modeling (BIM) gives the information about project design, its different views, scope, quantities, and phases when you need it. In the Revit model, every project we did will give the 2d , 3d, section views, elevations with detailing and schedules, quantities also it will provide us.

Revit Architecture collects information about each structural elements material its visualization realistic in nature and its design such as thickness height and in schedule it will give no of data such as cost type of family, no. of brick, no of doors, no. of windows etc across0all other representations of the project. In revit we can have these all 2D, 3D, nd sectional views, elevations and detailing drawing etc. in one cpmplete sheet.

A. Building Information Modeling(Bim):

•Now a days it is need of deliver of projects rapidly, more economically, and wit enhanced potential for reduced environmental impact.

•The purpose of Autodesk Revit Architecture is made for BIM. BIM is an integrated process built on coordinated, reliable information about a project from design through construction and intooperations.

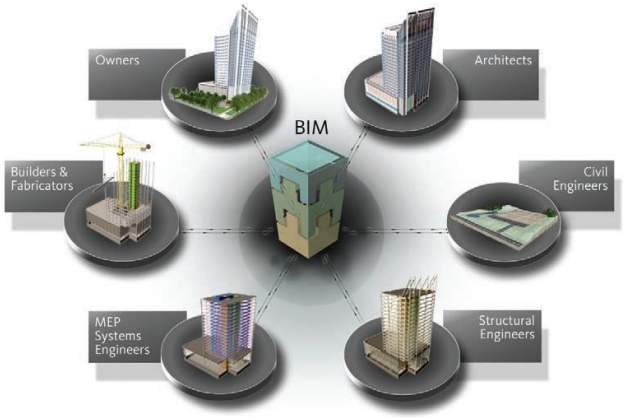

Fig. 1. BIM Process

B. Starting a Project:

1. Double Click and open Revit software
2. Initially 1st we need to select Revit architecture template from template panel
3. Then we will entering into the Revit GUI
4. We can see left side properties box and right side project browser.
5. In view menu manage units and set the units as per need
6. Now set the grids.
7. Go to application menu bar save the file with require name in specified folder.

II .PROJECT IN REVIT

A. Creating a Project:

1. Before going to design the model in revit get the plan from architect.
2. As per need set the units.
3. Using grid line draw the plan view.
4. Using draw panel draw the grid lines.
5. In draw panel we have line. circle rectangle, arc etc options.
6. Using these draw panel select the tools and complete the grid line diagram.
7. In properties box some modifying tools will be there to modify the grid lines.
8. Using copy, move, rotate, array options we can complete the grid diagram in less time.

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B. Name and Save The Project File:

1. After deciding project name save the file as soon as possible
2. If we save the file means we can avoid the file distraction at any moment due to power loss problem etc.
3. Click Application menu bar
4. Click on save
5. Select the required path folder, then give the name, to easy identify

B. Zoom To a View:

1. In Revit we have various zoom options to see the model very clearly.
2. Zoom in Region.
3. Zoom out (2X).
4. Zoom to fit.
5. Zoom all to fit.
6. Window zoom.
7. Zoom Sheet size.
8. We have full navigation wheel also to have clear visualization of the model.

C. Rename Levels:

1. As per the requirement we need to create the levels also for the multystoreyed building
2. For levels in go to architecture panel
3. Select level option in datum panel
4. Now draw the levels by giving floor height
5. Name the each level such grounf floor, 1sr floor etc
6. Using offset option we can give the floor height
7. In level at the two ends of the level line we have grids for adjusting level line and it will show temporary dimensions also for changing.

D. Components:

1. In component panel we have some categories in that we have doors, windows, Gates, Railings, Beds, all furnitures etc. objects, which have already created and it will available by installing Revit Architecture software itself.

2. We can import those components by selecting component option, go to browse, select the components as per need then place it in our model as per our requirement.

3. Wherever we want we can place it, and double click on that component it turns to new window in that we can modify the component modify it also, as per our need. This is best option in Revit, very userfriendly to modify the components as per our need.



Fig. 2. Component Panel



Fig. 3. Available Components

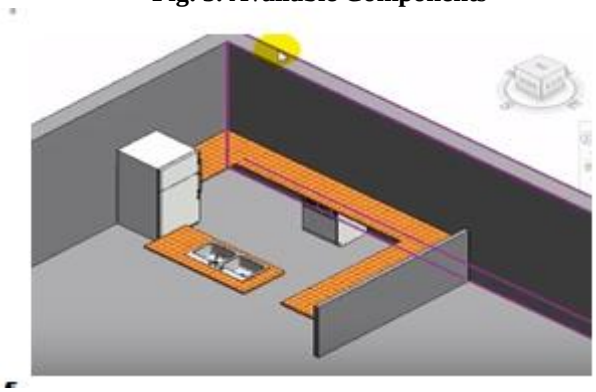

Fig. 4. Components Placed In our Model

6. Family Creation:

1. Families are nothing but components like door windows, furniture, railings, post balusters, columns, gates etc, but we need to create these as per need and we can place it in our model.
2. Creating families is very important in Revit Architecture
3. Using reference lines and reference planes, we need to draw Profile of the object as per our need
4. To make these components we have number of advanced tools.
5. Go to create panel in design panel we have tools like Extrusion, sweep, Blend revolve, Swept Blend etc
6. Using these above tools we can draw the components, and we have to save it in specifies path as family
7. To save go to application menu
8. Select save as
9. Then select family, save with required name example 'Table' could be considered one of the families within the category of Furniture.



Fig. 5. Family Creation Model

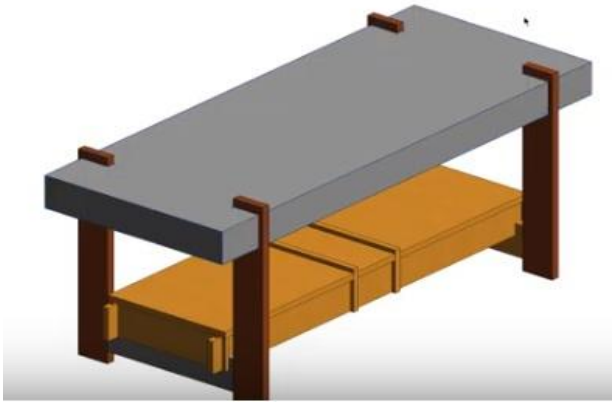

Fig. 6. Family in Realistic View Model

III. ADDING EXTERIOR WALLS

In this exercise, we will know how to create the wall and creating different types wall such as

1. Generic walls
2. Curtain wall
3. Stacked wall
4. Go to architecture panel
5. Select the wall panel
6. Then select wall Architectural
7. Then go to properties browser
8. Select the type of wall which you want
9. Then go to edit type, duplicate it and name it
10. Again go to edit option to change thickness material also
11. After that give the height for the wall
12. Then using draw panel draw the wall as per Architect plan by taking reference as the grid line diagram
13. But for the stacked wall, and curtain wall it will different:
14. For the stacked wall firstly we need to create normal walls of different thickness, height, as per need
15. Then we will combine those walls from properties browser.
16. For curtain walls there are 3 types:

1. Curtain wall: it will give directly plain type wall, there will be no curtain grids, mullions, we need add these after drawing the wall.
2. Exterior Glazing: it will available with Curtain grids only.
3. Store front: It will be available with Curtain grids and Mullions.

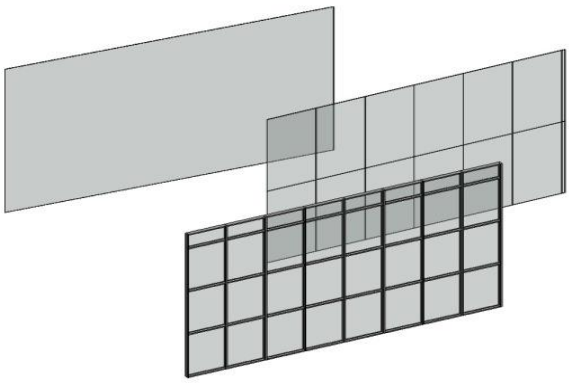

Fig. 7. Types of Curtain Wall

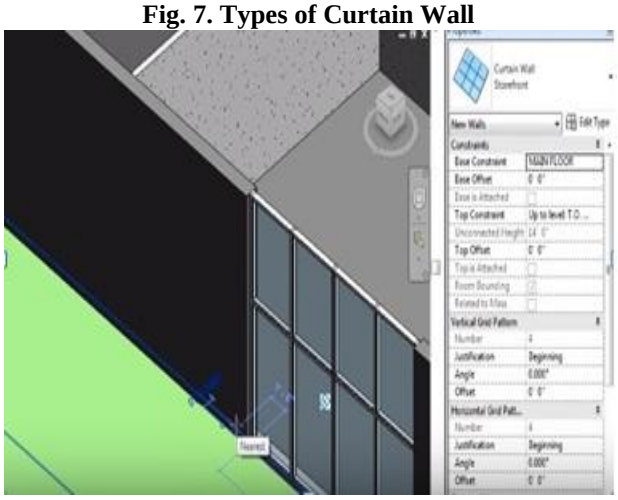

Fig. 8. Combination of Curtain Wall and Generic Wall

IV. ADDING A ROOF

In this exercise, we can know the how to create the roofs with diffent shapes and different types

1. Go to architecture tab
2. Select the roof
3. Then using draw panel draw the roof shape as per need
4. from properties we can give slope value as per need
5. By removing define slope we can have the flat slab.
6. We have roof by extrusion option to have the roof by drawing a plan like arc, line or combination of line and arc from elevation view

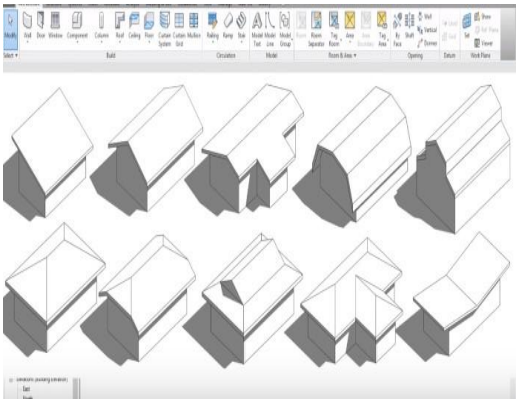

Fig. 9. Types of Roofs

1. Using offset option we can give the setbacks also
2. Using modify tools such as trim/extend, split tool we can modify the roof.
3. After creation of roof then from properties browser edit type we can change thickness and we can give the materials also.

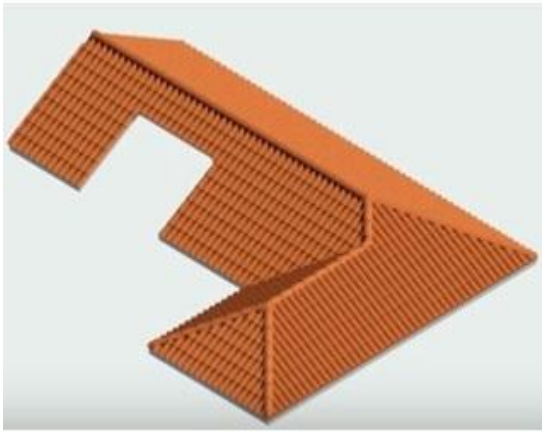

Fig. 10. Roof after Assigning Material

V. ADDING FLOORS

In this exercise, we can create floors in different shape

1. Select floor plan from project browser
2. Then architecture panel
3. Select architecture floor
4. Using draw panel draw the floor plan shape
5. Go to properties edit type, duplicate it, and name it with required name
6. We can change thickness and material also
7. We can the floors using the Pick line method, pick wall edge method
8. Drawing a closed figure in already drawn closed boundary will create hole in that particular area
9. Like that select each floor plan and draw the floors as per need
10. If the floors for all floors is same then we can copy also by using copy to clip board and paste option.



Fig. 11.Floor in Model

A. Temporary Dimensions Settings:

1. we can change the dimension by double click on dimension line
2. we can lock the dimension to avoid changing the dimension.

B. To Specify Temporary Dimension Settings:

1 .Click Manage tab

2. Additional Settings button
3. Temporary Dimensions.

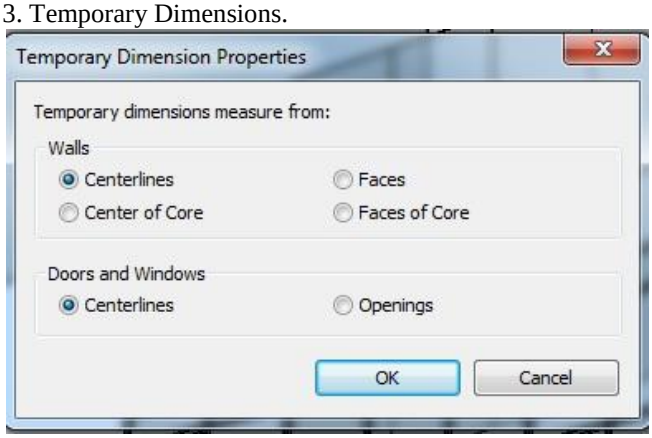

Fig. 12.Temporary Dimension Property

VI. RESULTS

Schedules & Quantities:

Procedure:

1. Click View tab
2. Create panel
3. Schedules drop-down
4. Schedule/Quantities.
5. In the New Schedule dialog, select a category from the category list as doors.
6. Select field from available fields such as family, width, height etc.
7. Click OK.
8. Select the scheduled Fields tab to add/remove field names in the schedule.
9. Using filter option we can filter the Doors by selecting the fields which we have selected previously.
10. On the Sorting/Grouping tab of the Schedule

We can sort by using different fields as we initially selected like height, thick, and family type etc.

11. Using formatting option we can set orientation and alignment for door specifications which we have selected initially.
12. Using Appearance tab we can change the grid lines, outer lines style, and also we can change the text style.

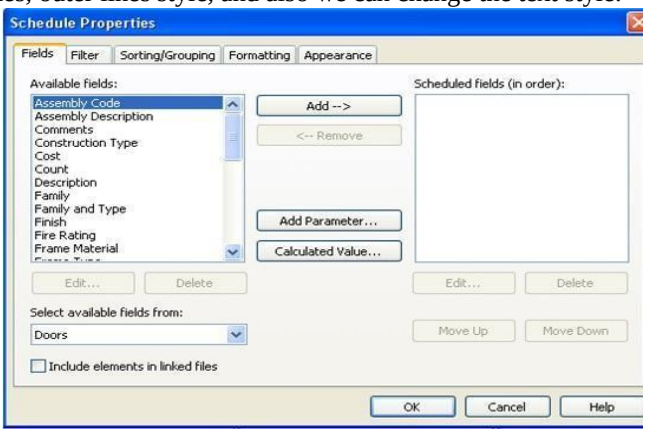

Fig. 13.Door Schedule Property Box

<Door Schedule>

A	B	C
Cost	Type	Count
2000.00	16" x 54" 2	15
2000.00: 15		
2200.00	36" x 80"	1
2200.00: 1		
2500.00		97
2500.00: 97		
3000.00		27
3000.00: 27		

Fig. 14.Door Schedule Fields Details

VII.CONCLUSION

This project gives the realistic modeling of building and accurate families ranging from furniture to lighting fixtures, as well as import existing models from other softwares like Auto CAD etc. We can get the approximate estimations of building also using Revit Architecture. In this Project we have done planning, modeling, scheduling of Doors and we have created families also for this commercial building.

A clear design and modeling of a commercial building with the efficient0structural and architectural plans. It provides the0overall knowledge of material take off and schedule/quantities in the model of the building defined in the0project. 3 D realistic view give0the clear picture about the family and the components placed with in the building model.

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Learning and Analytics in Intelligent Systems 2



Suresh Chandra Satapathy · K. Srujan Raju · Kumar Molugaram · Arkanti Krishnaiah · George A. Tsihrintzis *Editors*

International Conference on Emerging Trends in Engineering (ICETE)

Emerging Trends in Smart Modelling Systems and Design

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An Empirical Based Porous Flow Approach to Modelling Heterogeneous Traffic

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Abstract. The data required for the study was collected from YMCA road in Calicut city for frame based approach. Video-graphic technique was used for the data collection by the advantage over other data collection technique. For frame based approach video frames were taken approximately with a time lag of 3 s. From extracted data calculate the speed of vehicles, porous area, areal density, density and space headway of vehicles. From porous area data, pore space distribution function was determined by using easyfit5.5 software. The difficult was arises when extracting the traffic data from video frames. So for solving that problem on screen versus on ground distance graph was prepared. Best parameter to explaining the heterogeneous traffic system obtained as areal density rather than density measurement based on R-square value. The speed, areal-density model obtained was linearly decreasing relationship.

Keywords: Frame based approach · Arial density · Density · Pore space distribution

1 Introduction

Modelling of traffic flow provides the fundamental relationships between the macroscopic traffic stream characteristics and plays an important role in the planning, design and operation of transportation facilities as it predicts the behaviour of the traffic flow. Need for the study of traffic stream characteristics and the relationships between them was recognized during the middle of the last century. The studies resulted in models describing various aspects of traffic flow. Traffic flow may be described as homogeneous or heterogeneous traffic flow. Homogeneous traffic follows strict lane discipline and the vehicles have similar static and dynamic characteristics whereas heterogeneous traffic flow does not follow any lane discipline and the vehicles have varying static and dynamic characteristics. The heterogeneous traffic flow maybe composed of both slow moving and fast moving vehicles like trucks, buses, cars, three wheelers, two wheelers, bicycles and hand drawn or animal drawn carts. In India heterogeneous traffic flow conditions exists.

In Heterogeneous traffic, vehicles do not follow the lane discipline. Such traffic will observe in developing countries like India. The traffic models developed in homogeneous traffic conditions are not applicable for heterogeneous traffic conditions. In Heterogeneous traffic, vehicles can occupy any lateral positions based on lateral space

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availability and also vehicles move low speed to higher speeds. Traffic stream characteristics such as traffic volume and density is defined as a linear measurement and the characteristics are dependent only headway, are insufficient when traffic is heterogeneous. Measures such as areal density will assessed for suitability. Areal density is defined by "the sum of total area projected by vehicles on the ground per unit area of roadway (vehicles per square meter)".

Research studies on modeling of heterogeneous traffic are limited in developing countries. Previous studies mainly focused on understanding the interaction between vehicles in the case of heterogeneous traffic. A relation needs to be established between the microscopic behavior and the macro performance of the flow. The porous flow approach will conceptualizes such relationship. The aim of the present study is to model the heterogeneous traffic by using an empirical based approach.

2 Literature Review

Lighthill and Whitham [1] developed the first dynamic traffic flow model to different vehicle types. For each vehicle type developed the separate fundamental diagram. Authors assumed the traffic flow is related to density and conservation law was used to define LWR model.

Hoogendoorn and Bovy [2] developed the mesoscopic gas-kinetic models for heterogeneous traffic. The termed multiple lanes as multi lane multiclass phase space density model.

Heterogeneous traffic is explained by help of vehicular headway. The headway data fits the exponential and log normal distribution to explain the mixed traffic [3].

For model the mixed traffic flow, traffic composition, driver behavior, roadway geometry and maneuverability were considered [4].

Marwah and Singh [5] used the simulation analysis to model capacity of mixed traffic. Authors divided the traffic flow into four level of services.

Heterogeneous traffic flow was explained with a help of speed and headway distribution of the different vehicle types. The developed model used to evaluate traffic management measures like segregation of vehicles on major urban roads, provision of exclusive lanes for buses/bicycles etc. [6]. This research was continued by to quantifying the vehicular interactions in terms of PCU and considering the effect of road width and traffic volume on PCU values of vehicles [7].

Nair and Mahmassani [8] have developed on heterogeneous traffic model based on non lane based traffic flow. The model uses the concept of pores.

3 Methodology for Frame Based Approach

The main criteria considered for this approach was speed of the vehicle is not constant throughout road section i.e., speed of vehicle is changing time to time.

3.1 Location for Data Collection

The location selected was YMCA road. The road link was two lane one way traffic road. The 100 m road link was divided in 10 road sections i.e. length of each road section was 5 m. Digital camera used for capturing the traffic data. Digital camera was positioned on a building in such way that the digital cam was covered the entire road link (Table 1).

Table 1. Details of study locations for data collection

Location no	Location name	Length of section (m)	Width of section (m)	Length trap (m)
1	YMCA road	100	7.5	5

3.2 Retrieval of Data

The process of data retrieval includes transferring of the recorded digital video to computer and then time stamping the video graphs. These video graphs are then used to find out the traffic stream characteristics like areal density and speed. The description of the data retrieval process is given below.

3.2.1 Transferring and Time Stamping of Video Graphs

Traffic data videos are transferred into computer by using data cable. The videos were then time stamped by overlapping it with another video graph which displayed time to an accuracy of 1/100th of a second. This was done using the software Adobe Premier Pro. The videos were then played in Adobe Premier Pro to record the necessary data. The vehicle classification considered as Auto (A), Bus (B), Car (C), Jeep (J), Truck (T) and Two Wheeler (TW).

Traffic video frames were taken with a time lag of approximately 3 s. In the first frame, the frame time was noted. And then type of vehicles and these vehicles crossing at 0 m reference mark i.e. entry time of each vehicles were noted. After that distance at entry time and distance at frame time of vehicles were noted. Next second frame was taken the similar values were note like first frame. But in second frame the entry time of vehicles that were present in first frame were same as frame time of first frame. The similar procedure was followed for next frames.

The main difficult was obtained to note down the distance of vehicle from reference mark when vehicle was in between the tape marks i.e. multiple of 5 m length. For solving that problem a graph between on screen distance versus on ground distance were drawn. That was shown in Fig. 1. From the retrieved data, speed of vehicle, pore space area and areal density were calculated.

3.2.2 Stream Speed

The speed data was obtained from difference in vehicle distance at frame time and entry time divided by time difference in frame time and entry time of vehicles.

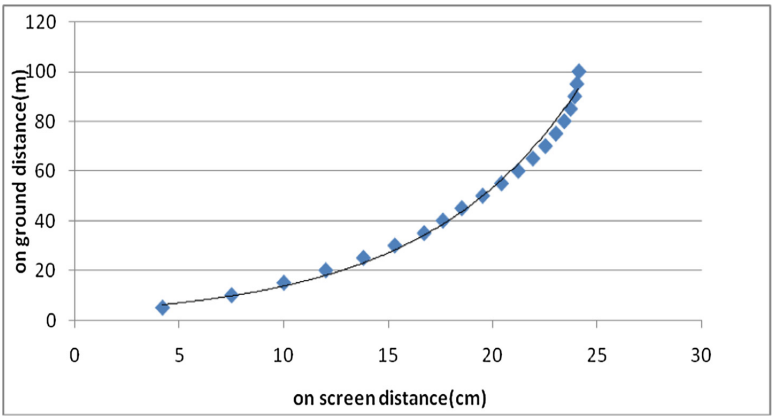

Fig. 1. Ground distance versus screen distance

3.2.3 Pore Space Area

Pore space area is defined as portion of the material (road) that is not occupied by solid material (vehicles). The vehicles length, width and area were shown in Table 2. The composition of vehicles was converted into vehicle areas. Pore space area was obtained by deducting the vehicle area from area of road section.

Table 2. Dimensions of different vehicle classes

Vehicle	Length (m)	Width (m)	Area (m^2)
TW	2.1	0.83	1.74
Auto	2.66	1.32	3.51
Car	3.5	1.50	5.25
Jeep	3.88	1.87	7.25
Bus	10	2.58	25.80
Truck	6.70	2.30	15.41

3.2.4 Areal Density

Areal density was obtained by dividing pore space area with area of road section.

4 Speed-Density-Areal Density Analysis

The speed in km/hr was plotted against areal density in vehicles/m^2. and is shown in Fig. 2 for frame based approach. The model equation and R^2 value is shown in Table 3. It can be observed from the plots that the speed varies linearly with density and there is a considerable scatter in the plot. The average speed range is 50 kmph to 30 kmph and areal density range is 0.01 Veh/m^2 to 0.24 Veh/m^2.

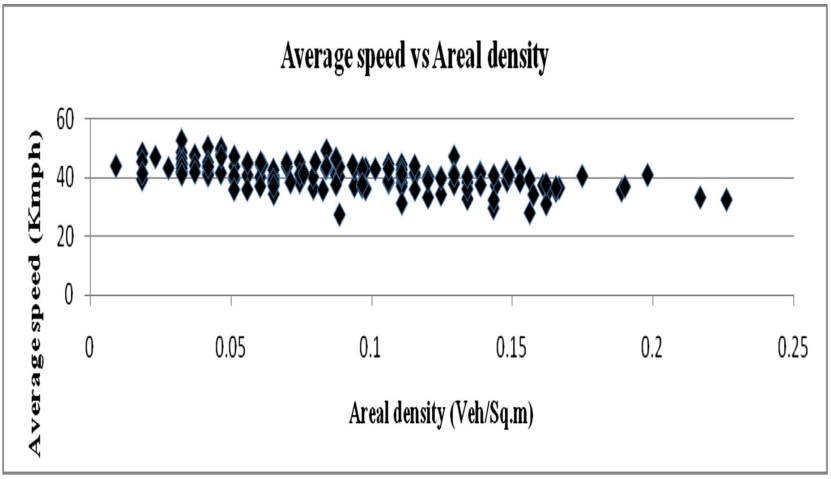

Fig. 2. Average speed versus areal density relationship

Table 3. Development of speed-areal density models

Type of model	Model equation	R-square value
Linear regression model	SPEED = (−53.74 * AREAL DENSITY) + 45.65	0.507

5 Speed-Density Analysis

The speed in km/hr was regressed against density in vehicles/km. The model equation and R-square value are given in Table 4. The speed in km/hr was plotted against density in PCU/km. The plot is shown is Fig. 3 for frame based approach. The model equation and R^2 value are shown in Table 5. It can be observed from the plots that the speed linearly vary with density and there is a wide scatter in the plot. The average speed range is 50 kmph to 30 kmph and density range is 20 Veh/km to 150 Veh/km.

Table 4. Development of speed-density models with density in Veh/km

Type of model	Model equation	R-square value
Linear regression model	SPEED = (−0.055 * DENSITY) + 45.01	0.337

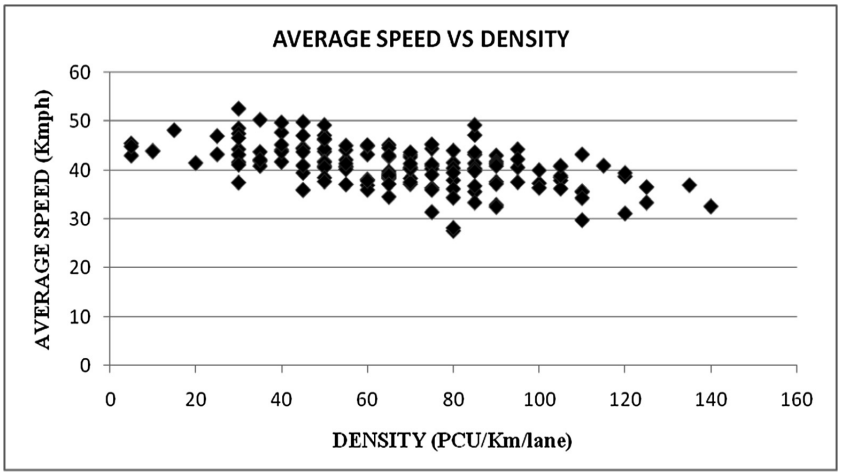

Fig. 3. Average speed versus density relationship

Table 5. Development of speed-density models with density in PCU/km for frame based approach

Type of model	Model equation	R-square value
Linear regression model	SPEED = (−0.853 * DENSITY) + 46.43	0.489

6 Model Development

A linear relationship with speed and areal density for frame based approach was best model equation and the R^2 value obtained was moderately good value. Exponential relationship between speed and areal density was also fitted and the models are shown in Table 6. These relationships also have nearly same R^2 value.

Table 6. Regression models of speed and areal density

Type of model	Model	R-square value
Linear regression model	Speed = (−53.74 * areal density) + 45.65	0.507
Exponential model	Speed = 45.78 * (expo(−1.34 * areal density))	0.500

7 Speed-Porous Area Analysis

The speed in km/hr was plotted against porous area in m^2 for frame based approach. The plot is shown in Fig. 4 for frame based approach. It can be observed from the plot that the speed values do not vary much with density and there is a wide scatter in the plot. Average speed range is 30 kmph to 50 kmph and porous area range is 655 m^2 to

750 m^2 for frame based approach. Average speed range is 30 kmph to 60 kmph and porous area range is 655 m^2 to 750 m^2 for section based approach.

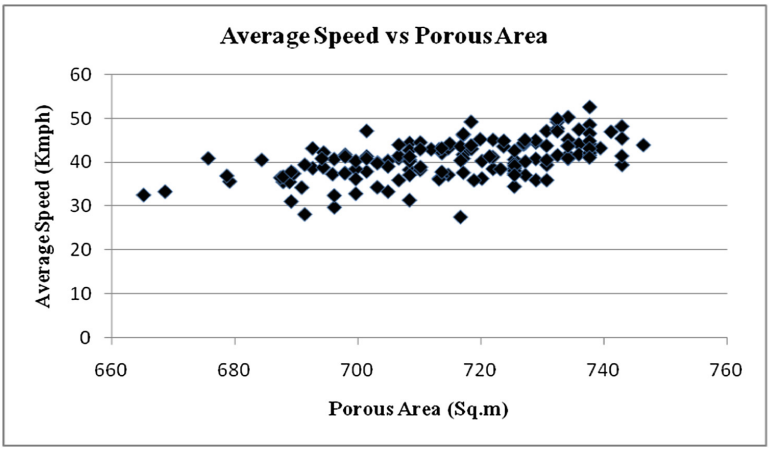

Fig. 4. Average speed versus porous area relationship

8 Porous Space and Headway Distribution Functions

From data regarding porous area are fitted in the distribution. The distribution obtained was GEV distribution. From data regarding space headway are fitted in the distribution. The distribution obtained was log-normal distribution.

9 Conclusions

Data analysis was carried out to find out the relationship between speed, areal density and density, speed and porous area and also pore space and headway distribution. After data analysis speed-areal density and speed-density models were developed. The best model obtained was linear regression model of speed-areal density of frame based approach. The R squared value obtain for linear regression model was 0.507.

From the data analysis conclude that average speed is linearly decreasing with increasing the areal density and speed of vehicles are increasing with more availability of porous area on the road section. The speed density model obtained as linearly decreasing relationship. Areal density parameter explains the heterogeneous disordered traffic system better than the density parameter. The pore space distribution follows the generalized extreme value distribution and headway distribution follows the log-normal distribution. This work makes the contributions to the limited literature on traffic flow theory.

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Effect of Aspect Ratio on the Buckling Load of Stiffened Circular Plates

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Abstract

This paper deals with buckling analysis of stiffened circular plates through numerical simulation techniques using ABAQUS 6.5. In the present numerical investigation, the effect of aspect ratio (R/T) of a stiffened circular plate on the buckling strength is determined for different mode shapes. Three different geometric shapes namely T, I and HAT are considered to reinforce the plate by way of stiffeners. For all cases studied in the present investigation, a circular plate with radius 0.5m is subjected to in-plain loading. The boundary conditions are such that, the edge is fixed but released in the radial direction during buckling. The results of the analysis for radius to thickness ratio of the plate, in the range from 200 to 250, with four intermediate steps are presented in the form of buckling loads corresponding to different mode shapes in tabular and graphical form.

Key Words: Buckling loads, Circular plates, Ring Stiffeners, Aspect Ratio, Thin shells.

1. Introduction

Thin circular steel plates are widely used in the fabrication of steel structures such cylindrical pressure vessels, storage containers in oil & gas companies, maritime and aerospace industry. While in service, these circular steel plates are subjected to mechanical loads and temperature variations leading to thermo-mechanical loads. As a result, the plates will undergo deformations due to buckling loads. A simple approach to increase the buckling strength of the steel plate is to increase its thickness. However, increasing the thickness of the plate directly increases the weight and cost of the structure. Hence, to increase buckling resistance of the plates, generally stiffeners are attached on the face of the plates. For stiffeners, commercially available steel sections with standard geometric shapes like T, I and HAT are chosen from the open market. Reinforcement of plates with stiffeners increases the buckling strength without adding much to the self-weight for the structure.

Estimation of buckling strength of a thin plate is possible through analytical solutions. But, it becomes difficult to determine the buckling load when stiffeners are attached to the plate. Therefore, one has to resort to either experiments or numerical simulations. It is known that, conducting experiments is not only expensive but also time consuming process. On the other hand, finite element based numerical simulations offer great advantage to incorporate a variety of stiffeners and boundary conditions. These simulations can be repeated several times to investigate the effect of different parameters. In the present investigation, it is proposed to determine buckling load of a circular steel plate with three different stiffeners attached to the face of plate through numerical simulations. For this purpose, ABAQUS is employed, which is one of the powerful FE based software tools for numerical simulations.

2. Literature Review

From the published literature, most pertinent studies conducted by the previous investigators are presented here to give a brief background. Rossettos and Yang [1] presented a treatment of asymmetric buckling problem of ring stiffened circular plates. They indicated a coalescence of the lowest symmetric and asymmetric mode eigen values involving ring torsional stiffness. Grondin et al [2] conducted a parametric study on buckling of stiffened steel plates. They considered stability of stiffened plates using finite element model. In their study, tee-shape stiffeners are used for buckling analysis and parameters included are 1) Initial plate imperfections, 2) direction and magnitude of residual stresses, 3) slenderness ratio of the plate, 4) aspect ratio of the plate and 5) cross-sectional area ratio of plate to stiffener.

Ma and Wang [3] investigated nonlinear bending and post-buckling of a functionally graded circular plate under direct mechanical and thermal loads. They used classical nonlinear von Karman plate theory, for axisymmetric large deflection and bending of a functionally graded circular plate. The types of loads considered in their investigation are mechanical, thermal and combined thermal–mechanical. Brubak and Hellesland [4] conducted an approximate buckling strength analysis for plates reinforced with stiffeners with arbitrary orientation. Ding and Lee [5] gave an analytical solution for a circular plate that is uniformly loaded and clamped at the edges.

Modarresi and Showkati [6] experimentally investigated the failure of diagonally stiffened circular plates to determine ultimate bending capacity. In their experiments, to strengthen the plate, two types of shallow and deep stiffeners of reverse L and rectangular cross-sections were attached. They considered simply supported and clamped edge boundary conditions for a circular plate subjected to lateral loads up to their final collapse. They compare experimental results with non-linear analysis of stiffened circular plates using FEM. The results are presented through load-deflection, load strain curves and volumetric charts. Finally it was concluded that increasing the height of the diagonal stiffener or changing its cross sectional shape may not be an effective way of increasing the load bearing capacity of the diagonally stiffened circular plates. It was recommended that, instead of using one diagonal stiffener, it is better to use two perpendicular diagonal stiffeners with same amount of steel as the first one.

LB Rao and CK Rao [7] presented an exact solution for elastic buckling of circular plates resting on internal elastic ring support and elastically restrained against translation at the outer edge. They used classical plate theory to solve the governing differential equations. Further, they introduced a Mathematica code to estimate the buckling load. Tran et al. [8] studied the buckling behavior of stiffened curved panels under uniform longitudinal compression to address the linear buckling and the ultimate strength of panel which are both influenced by the combined effect of curvature and stiffening. They finally proposed a design methodology for stiffened flat plates to be adopted by European Standards. They concluded that the plate curvature has to be taken in to consideration to optimize the design.

Daniel [9] attempted the stability problem of thin circular plates that are stiffened with thin cylindrical shell on the circumference and also on the plate. In his investigation, an attempt was made to determine the in-plane axi-symmetric critical load with a view to show the effect of cylindrical shell stiffener. Daniel [10] summarized the differential equations for the stability of shell stiffened circular pates and shell stiffened annular plates assuming the deformations are axisymmetric. Chiang-Li Yu et al. [11] focused their attention on the uniaxial ultimate compressive strength of stiffened panels with openings. In their work, experiments were conducted on longitudinal stiffened panels with rectangular openings applying combined loads. Numerical simulations were carried out on stiffened panels considering large elastoplastic deformation behavior using ABAQUS.

From the literature review it is found that, there are a very few papers but not too many focusing on the buckling of stiffened circular plates. But, investigations, concerning the buckling load as a function of plate aspect ratio, particularly when the plate is stiffened, are very much limited in open literature. Therefore, in the present investigation it is proposed to determine the effect of aspect ratio on the buckling load of a stiffened circular plates using the protocols specified in the user's manual of ABAQUS 6.5 [12].

3. Analytical Solution:

In a process industry, thin circular plates are subjected to in-plane radial compressive forces from the supporting structure when there is a change in the working temperature of the medium. As a result, buckling of the circular plates can take place. In the following section governing differential equations for plates subjected to buckling loads are presented.

Circular plate subjected to uniformly distributed in-plane compressive radial forces:

As shown in Fig.1, in the present analysis, a circular plate is considered that is subjected to in-plane radial compressive forces (q_r). In the buckling analysis we include only axisymmetric geometries such a circular plates. Thus, we can use polar coordinate system represented by r and Ø. Equation (1) that represents buckling of a rectangular plate can be transformed to a circular plate for convenience of analysis.

$$\frac{\partial^4 w}{\partial x^4} + 2\frac{\partial^4 w}{\partial x^2 \partial y^2} + \frac{\partial^4 w}{\partial y^4} = \frac{1}{D}\left(N_x \frac{\partial^4 w}{\partial x^2} + 2N_{xy}\frac{\partial^4 w}{\partial x \partial y} + N_y \frac{\partial^4 w}{\partial y^4}\right) \quad (1)$$

For a specific case, when the structure is in equilibrium, for an axi-symmetric loading condition,

We have $$N_x = N_y = N_r = -q_r, \; N_{xy} = 0 \quad (2)$$

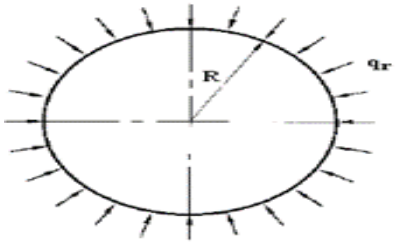

Fig 1: Circular plate subjected to uniformly distributed inplane compressive radial forces

Denoting, $$\mu^2 = \frac{q_r}{D} \quad (3)$$

and using the relations between the polar and Cartesian coordinates, we can derive an equation for axi-symmetric circular plate subjected to circumferential compressive force as shown in Fig.1., is given below.

$$\frac{d^4 w}{dr^4} + \frac{2}{r}\frac{d^3 w}{dr^3} - \frac{1}{r^2}\frac{d^2 w}{dr^2} + \frac{1}{r^3}\frac{dw}{dr} + \mu^2\left[\frac{d_w^2}{dr^2} + \frac{1}{r}\frac{dw}{dr}\right] = 0 \quad (4)$$

Now, let us introduce the following new variable:

$$\rho = \mu r \quad (5)$$

that denotes a non-dimensional polar radius. By means of new variable ρ, it is possible to rewrite the above Eq. (4), in to the form of Eq. (6) given below.

$$\frac{d^4 w}{d\rho^4} + \frac{2}{\rho}\frac{d^3 w}{d\rho^3} + \left(1 - \frac{1}{\rho^2}\right)\frac{d^2 w}{d\rho^2} + \frac{1}{\rho}\left(1 + \frac{1}{\rho^2}\right)\frac{dw}{d\rho} = 0 \quad (6)$$

Eq. (6) is a linear 4th order, homogeneous differential equation. The general solution for Eq (6) is given below.

$$\boldsymbol{w(\rho) = C_1 + C_2 \ln \rho + C_3 J_0(\rho) + C_4 Y_0(\rho)} \quad (7)$$

Where $J_0(\rho)$ is Bessel's function of first kind and $Y_0(\rho)$ is Bessel's function of second kind both for zeroth order. In Eq. (7), above, C_1, C_2, C_3 and C_4 are constants of integration. Since w (ρ) must be finite quantify for all values of ρ, including ρ= 0, then the two terms with ρ and $Y_0(\rho)$, having singularities at ρ=0, must be dropped for the solid plate because they approach an infinity when ρ=0. Thus, for the solid circular plate, Eq. (7) must be taken in the form

$$\boldsymbol{w(\rho) = C_1 + C_3 J_0(\rho)} \quad (8)$$

to determine the critical buckling loads q_r. These loads are assumed to be acting at the mid plane of the circular plate.

4. Finite Element Modelling:

FE modelling of the plate with T, I and HAT stiffeners is carried out using ABAQUS software version 6.5. From ABAQUS library, a 4-node, doubly curved, linear shell element is selected for the geometric modelling of the structure under consideration. To maintain acceptable aspect ratio for the element, shell elements were preferred over three dimensional elements. The choice of the shell elements will also ensures a reasonable mesh density. Stiffeners of three different geometric shapes T, I and HAT are chosen for reinforcement of the circular plate. As shown in Fig.2, on each plate any one type of ring stiffeners are placed at three different radial locations, first one at 0.1m, second one at 0.25m and third one at 0.4m. Mild steel properties are chosen for plate and stiffeners during the analysis. In-plane compressive load of 20 kN is considered acting on the circular plate with stiffeners. As shown in Fig.3, loading and the boundary conditions are such that the plate is fixed along the edge while released in the radial direction. ABAQUS 6.5 is employed to carryout FE analysis on the structure under consideration.

In the present numerical simulations the radius of circular plate is fixed at 0.5m. Thickness of the plate is varied such that the radius to thickness ratio (R/T) is in the range of 200 to 250 with an increment of 10 each. Height and thickness of the stiffeners are held constant at 0.007m and 0.002m respectively.

Material Properties of Mild Steel:

Young's modulus E=200GPa,
Poisson's ratio = 0.3.

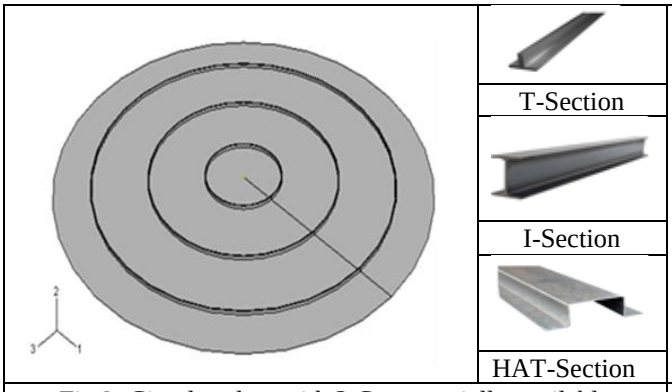

Fig 2: Circular plate with 3 Commercially available Stiffener Sections

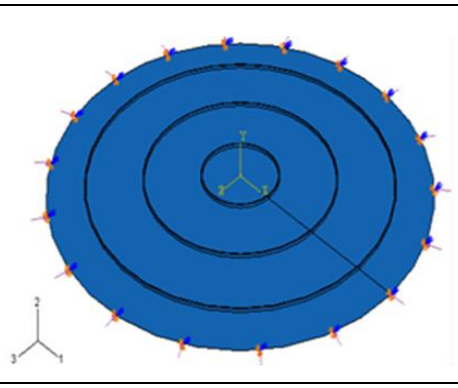

Fig 3: Loading and Boundary conditions for stiffened circular plate

5. Results and Discussion

The results of the simulaton studies to determine buckling load of stiffened circular plate as a function of aspect ratio in the range of investigation from 200 to 250 in steps of 10 are presented in the tables I, II and III. It is observed that, for a given mode of deformation the buckling load decreases with the increase of aspect ratio. It is also observed that for any given aspect ratio in the range of investigation, the buckling load increases with progressive mode of deformation from mode-1 to mode-6. Further, the plate with T-shaped stiffener has lowest buckling strength for all aspect ratios and all modes of deformation. The plate with HAT-shaped stiffener showed largest buckling load for all conditions. The plate with I shaped stiffener has larger buckling loads compared to plate with T-shaped stiffeners but marginally less buckling load when compared to plate with HAT-shaped stiffeners. However, the buckling loads for I-shaped and HAT-shaped stiffeners are closely comparable to each other. One set of results on buckling loads of plate with T, I and HAT shaped stiffeners are presented in Table IV for comparison. Typical sphapes of deformation of plates with T, I and HAT shaped stiffeners are shown in Fig.4, Fig.5 and Fig.6 respectively.

Table I: Buckling load of circular plate with T - stiffener under different modes for various R/T ratio.

R/T	Buckling Load (kN)					
	Mode-1	Mode-2	Mode-3	Mode-4	Mode-5	Mode-6
200	31.798	40.14	68.706	69.884	85.864	95.466
210	28.214	35.164	60.198	61.538	75.854	83.714
220	25.206	31.01	53.096	54.532	67.464	73.838
230	22.69	27.556	47.19	48.672	60.456	65.57
240	20.596	24.696	42.302	43.794	54.626	58.684
250	18.8638	22.344	38.284	39.756	49.808	52.988

Table II: Buckling load of circular plate with I - stiffener under different modes for various R/T ratio.

R/T	Buckling Load (kN)					
	Mode-1	Mode-2	Mode-3	Mode-4	Mode-5	Mode-6
200	42.008	46.976	81.142	84.204	108.112	109.956
210	38.042	41.83	72.244	75.116	97.126	97.284
220	34.668	37.504	64.764	67.396	86.568	87.79
230	31.806	33.878	58.496	60.86	77.546	79.874
240	29.384	30.85	53.262	55.352	69.99	73.188
250	27.35	28.336	48.92	50.744	63.706	67.574

Table III: Buckling load of circular plate with HAT- stiffener under different modes for various R/T ratio.

R/T	Buckling Load (kN)					
	Mode-1	Mode-2	Mode-3	Mode-4	Mode-5	Mode-6
200	42.1	47.57	82.278	85.08	109.512	111.058
210	38.148	42.442	73.406	76.026	98.426	98.596
220	34.778	38.12	65.928	68.314	87.724	89.3
230	31.916	34.488	59.648	61.77	78.696	81.404
240	29.454	31.452	54.392	56.244	71.122	74.726
250	27.456	28.926	50.024	51.612	64.816	69.114

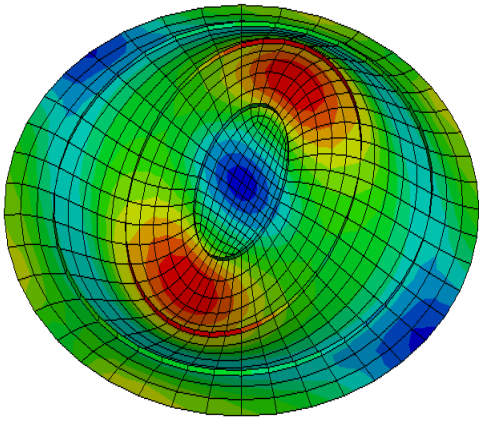

Fig 4: Deformed shape of circular plate with T-Shape stiffener

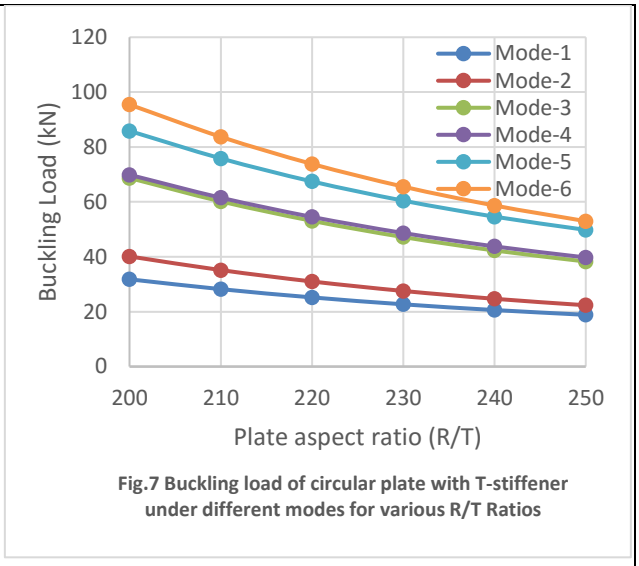

Fig.7 Buckling load of circular plate with T-stiffener under different modes for various R/T Ratios

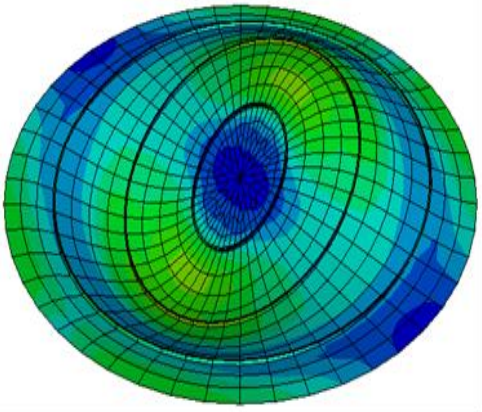

Fig 5: Deformed shape of circular plate with I – Shape stiffener

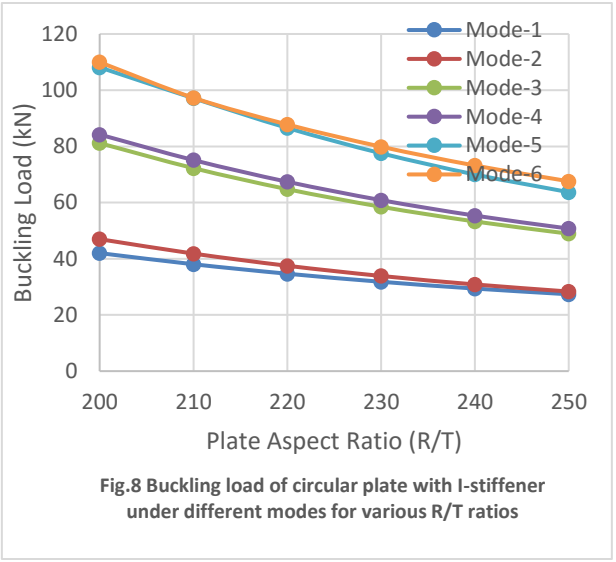

Fig.8 Buckling load of circular plate with I-stiffener under different modes for various R/T ratios

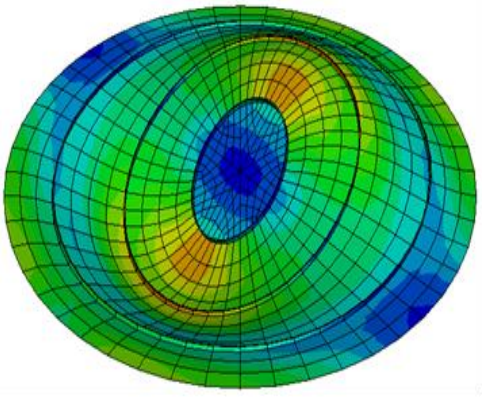

Fig 6: Deformed shape of circular plate with HAT-Shape stiffener.

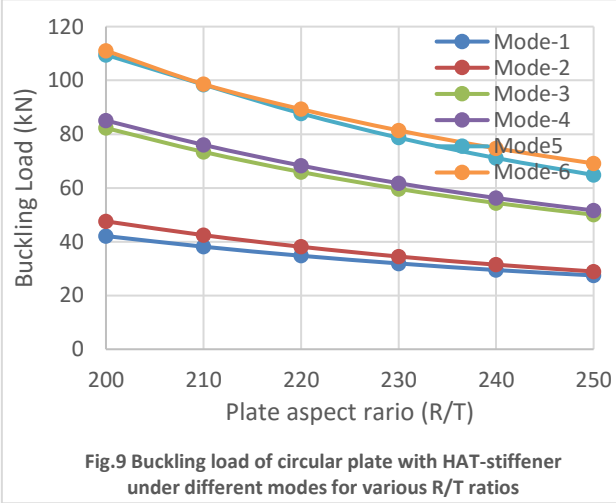

Fig.9 Buckling load of circular plate with HAT-stiffener under different modes for various R/T ratios

Table IV: Buckling load of circular plates with stiffeners of different Geometric shapes												
Stiffener	Buckling load (kN)											
	Mode-1						Mode-2					
	200	210	220	230	240	250	200	210	220	230	240	250
T- shape	31.79	28.21	25.20	22.69	20.59	18.86	40.14	35.16	31.01	27.55	24.69	22.34
I- shape	42.00	38.04	34.66	31.80	29.38	27.35	46.97	41.83	37.50	33.87	30.85	28.33
HAT- shape	42.1	38.14	34.77	31.91	29.45	27.45	47.57	42.44	38.12	34.48	31.45	28.92

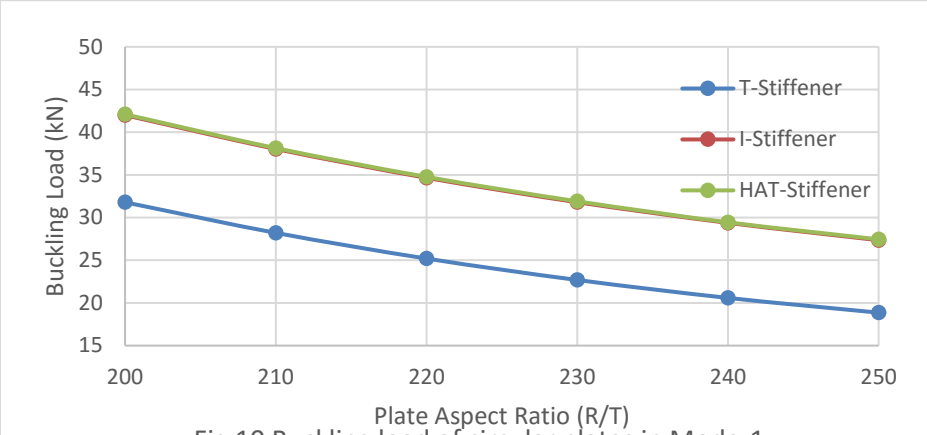

Fig.10 Buckling load of circular plates in Mode-1, with stiffeners of different geometric shapes

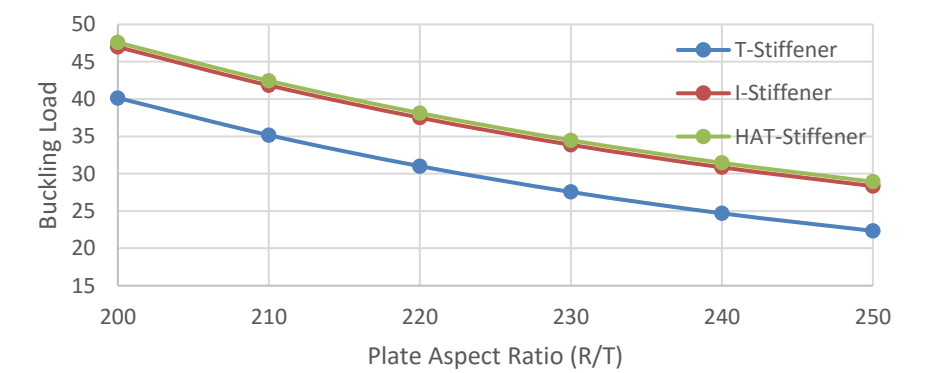

Fig.11 Buckling load of circular plates in Mode-2, with stiffeners of different geometric shapes

From the results in Fig.7, Fig.8 and Fig.9, it is observed that the buckling load curves of the stiffened circular plates are seen in pairs. Buckling load curves for mode-1 and mode-2 are close to each other and appears like a pair of curves. Likewise, buckling load curves for mode-3 and mode-4; mode-5 and mode-6 formed another two pairs of curves. This observation is consistent for all three types of stiffeners considered in the present investigation. Fig.10 and Fig.11 show the variation of buckling load as a function of plate aspect ratio for T, I and HAT-stiffeners in mode-1 and mode-2 respectively. It is further observed that there is not much of a difference between buckling load for plates with I and HAT-stiffeners.

6. Conclusions

In the present investigation buckling load for stiffened circular plates is presented for 6 modes of deformation as a function of plate aspect ratio in both tabular and graphical forms. From the present analysis, it is found that the circular plate with HAT-Shaped stiffener offers highest buckling strength. The plate with T shape stiffener offers lowest buckling strength. However, the plate with I shaped stiffener offered buckling strength in between the plates with T and HAT shaped stiffeners. Further, the buckling strength of plates with HAT shaped and I shaped stiffeners is closely comparable. It is concluded that the geometric shape of the stiffener is very important since it can affect the buckling load and overall buckling behavior of the plate considerably. Through this investigation the capabilities of ABAQUS software are demonstrated to determine buckling loads of stiffened plates. It is understood that the predictive capabilities of the numerical models and software tools greatly depends on the proper definition of the problem and well defined boundary conditions specific to a problem.

7. Acknowledgements

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40	Performance of DC Grid Based Wind Power Generation System in a Micro-grid	Dr. D. Raja Reddy	EEE	Journal of Engineering Sciences	2020	0377-9254	https://jespublication.com/	https://jespublication.com/upload/2020-1107137.pdf	UGC	Malla Reddy Engineering College(A)
41	Speed Control of AC Motor	Y Sudha	EEE	International Journal of Innovative Technology and Exploring Engineering (IJITEE)	2020	2278-3075	https://www.ijitee.org/	https://www.ijitee.org/wp-content/uploads/papers/v9i10/J75270891020.pdf	Scopus	Malla Reddy Engineering College (Autonomous)
42	Modern Approach For Diagnosing And Detecting Faults On Overhead Transmission Lines Using Artificial Neural Networks	N. Rajeswaran	EEE	International Journal of Mechanical and Production Engineering Research and Development (IJMPERD)	2020	2249–6890	http://www.tjprc.org/	http://www.tjprc.org/publishpapers/2-67-1596688153-IJMPERDJUN2020640.pdf	Scopus	Malla Reddy Engineering College (Autonomous)
43	Internet Of Things (Iot) In Electrical Research	Mrs.Suma Deepthi Veeraganti	EEE	Journal of Shanghai Jiaotong University	2020	1007-1172	https://shjtdxxb-e.cn/	https://shjtdxxb-e.cn/wp-content/uploads/2020/10/JSJ.U-2692.14-F.pdf	UGC	Malla Reddy Engineering College(Autonomous)
44	An Analysis Of Biometric Based Security Access System	P. Kamalakar	EEE	Journal of Mechanics of Continua and Mathematical Sciences	2020	0973-8975	https://www.journalimcms.org/	https://www.journalimcms.org/wp-content/uploads/18-jmcms-2009024-An-Analysis-of-biometric-pradeep-mullangi-Dr.-Rajeswaran-Nagalingam.pdf	UGC	Malla Reddy Engineering College (Autonomous)
45	Implementation of Hybrid Energy Storage System (Battery/Super-Capacitor) in DC Micro grid	P. Kamalakar	EEE	Aut Aut Research Journal	2020	0005-0601	http://www.autrj.com/	http://www.autrj.com/gallery/33-aut-september-2020.pdf	UGC	Malla Reddy Engineering college

46	Artificial Neural Network Based Power Quality Improvement Using Shunt Active Power Filter	Dr.T. Rajesh	EEE	Journal of Critical Reviews	2020	2394-5125	http://www.jcreview.com/	http://www.jcreview.com/fulltext/197-1594655235.pdf?1616437415	Scopus	Malla Reddy Engineering College (A)
47	Long Term Field Performance Analysis of 100kwp Grid-Connected Rooftop Solar PV Power Plant	Dr. D. Raja Reddy	EEE	Journal of Critical Reviews	2020	2394-5125	http://www.jcreview.com/	http://www.jcreview.com/fulltext/197-1594800318.pdf?1616437467	Scopus	Malla Reddy Engineering College (Autonomous)
48	Comparison of PI and AI Controllers Used For DC-DC Converter For EV Fast Charging	Mr.K. Ezhil Vignesh	EEE	Journal of Critical Reviews	2020	2394-5125	http://www.jcreview.com/	http://www.jcreview.com/fulltext/197-1594655000.pdf?1616437545	Scopus	Mallareddy Engineering College(A)
49	Advanced Honey Bee Algorithm For Optimization of Voltage Stability In IEEE 14 Bus System Using Facts Devices	Dr. T. Rajesh	EEE	International Journal of Engineering Trends and Technology (IJETT- Scopus Indexed)	2020	2231-5381	http://www.internationaljournalssrg.org/	http://www.internationaljournalssrg.org/uploads/specialissuepdf/ICT-2020/2020/OTHERS/P105.pdf	Scopus	Malla Reddy Engineering College
50	Design and implementation of an automatic solar tracking system for a monocrystalline silicon material panel using MPPT algorithm	Dr. T. Rajesh	EEE	Materials Today: Proceedings	2020	0976-6545	https://www.sciencedirect.com/	https://www.sciencedirect.com/science/article/pii/S2214785320365172	Scopus	Malla Reddy Engineering College(A)
51	Frequency control of PV-connected Micro grid System Using Fuzzy Logic Controller	Dr. T. Rajesh	EEE	Materials Today: Proceedings	2020	2348-2397	https://www.sciencedirect.com/	https://doi.org/10.1016/j.matpr.2020.10.255	Scopus	Malla Reddy Engineering College
52	Load Frequency Control of An Interconnected Renewable System Using PID Combined Anfis Controller	T. Sanjeeva Rao	EEE	International Journal of Electrical Engineering and Technology (IJEET)	2020	0976-6545	https://www.iaeme.com/IJEET/index.asp	https://www.iaeme.com/MasterAdmin/uploadfolder/IJEET_11_05_001/IJEET_11_05_001.pdf	Scopus	Malla Reddy Engineering College (Autonomous)
53	A Optimal Location Of D-STATCOM In A Distribution System Using Various Techniques	Suma Deepthi Veeraganti	EEE	An International Bilingual Peer Reviewed Refereed Research	2020	2348-2397	http://proteusresearch.org/	http://proteusresearch.org/gallery/pj-2722.24-f.pdf	UGC	Malla Reddy Engineering College (A)
54	D-STATCOM Optimum Position And Sizing In A Distribution System Using Various Approaches	Suma Deepthi Veeraganti	EEE	PROTEUS JOURNAL	2020	0889-6348	http://proteusresearch.org/	http://proteusresearch.org/gallery/pj-2722.24-f.pdf	UGC	Malla Reddy Engineering College

Industrial Drives Control based on Self Adaptive Fuzzy PID Controller Using Controller Area Network

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Abstract--- Now a day's modern industrial control technologies are more expected in the control of DC motors and induction motor. In this paper a proposed method of self-adaptive fuzzy PID (Proportional Integral Derivative) logic networked control using CAN (Controller Area Network) bus for dc motor and induction motor is explained and many factors discussed with the help of simulation results. The main aim of fuzzy PID logic controller method is not only to improve the characteristics but also comparing the results with fuzzy, PID and fuzzy PID controller. The simulated results are obtained by using MATLAB/SIMULINK and from the result it is concluded that DC motor can be controlled by self-adaptive fuzzy PID CAN control and for induction motor self-adaptive fuzzy PI CAN based control is the best.

Keywords--- Industrial Drives, PID Control, Fuzzy based Design, Self-Adaptive Approach and Controller Area Network.

I. Introduction

The Networked Control System (NCS) is defined as that the traditional feedback control system is closed through shared communication network with the condition of other nodes outside the control system. The best examples are dc motors, rotors and automobiles. In a normal systems the nodes were connected to the central location through the hard wired connections and also the system is designed such that all the information's collected from the sensors are sent to the central location and the errors and constraints are analyzed continuously and decision were taken and the instructions are passed to the nodes to control the entire system [1-3].

The constraint in the communication such as finite amount of information per unit time, affected the NCSs (Networked Control System) particularly in the Unmanned Aerial Vehicles (UAVs), planetary rovers, sensor networks. The signals after sampling and encoding transmitted as a continuous time signal and it is encoded in the receiver end and in some NCSs the signals are stamped also. Stamped means that the receiver estimates the delaying time and act correct according to the delay. The major difference between NCSs and standard digital control is during the transit the data may be lost through the network and some transmission protocols i.e., like TCP (Transmission Control Protocol), guaranteed will deliver the packet. But in NCSs the old data's are generally not useful [4-5]. Many researchers are trying to integrate control and communications algorithm to meet the unexpected changes in the network service. In NCSs many stations are sharing the network, so network delay is invariable [6-7] and signal must be delayed if another signal is transmitted and at the same time the large delay will affect the performance of the NCSs very badly.

Networked induced delay and data losses are the two major challenges in the NCSs. Because of less expensive, easy design and very effective the dc motors are generally controlled by PID controller limit at the same time mathematical model of the controller and tuning of PID are difficult and generally not used for non-linear systems. The above limitations are overcome by using adaptive PID controller with self-tuning after few mathematical derivations are made in the transfer function model of the motor. The fuzzy modeling is used for self-tuning of PID controllers and modified fuzzy logic controller model is simulated using MATLAB and SIMULINK.

II. Proposed Method

In order to take advantage of the networking, the network implementation should be carefully designed to satisfy real time requirements considering network delays. A network delay caused by more traffic in the communication channel is considered in protocol [8-9]. TCP/IP is a connection oriented protocol. Before transfer between nodes, TCP/IP protocol set up the connections which is time consuming and therefore not suitable for real time operations.

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In Token bus protocol, every node selection set the token bus access after a definite interval of time. Among the various protocols for communication we use scan protocol. In case of scan using arbitration, principle node wins the bus access to transmit data. Then the message identifier delivers printing message to transmitter node [10-11]. Price rating is the added advantage of CAN compared to other networks. The block diagram of networked speed control system of DC motor and Induction motor through CAN Bus is shown in the Fig.1.

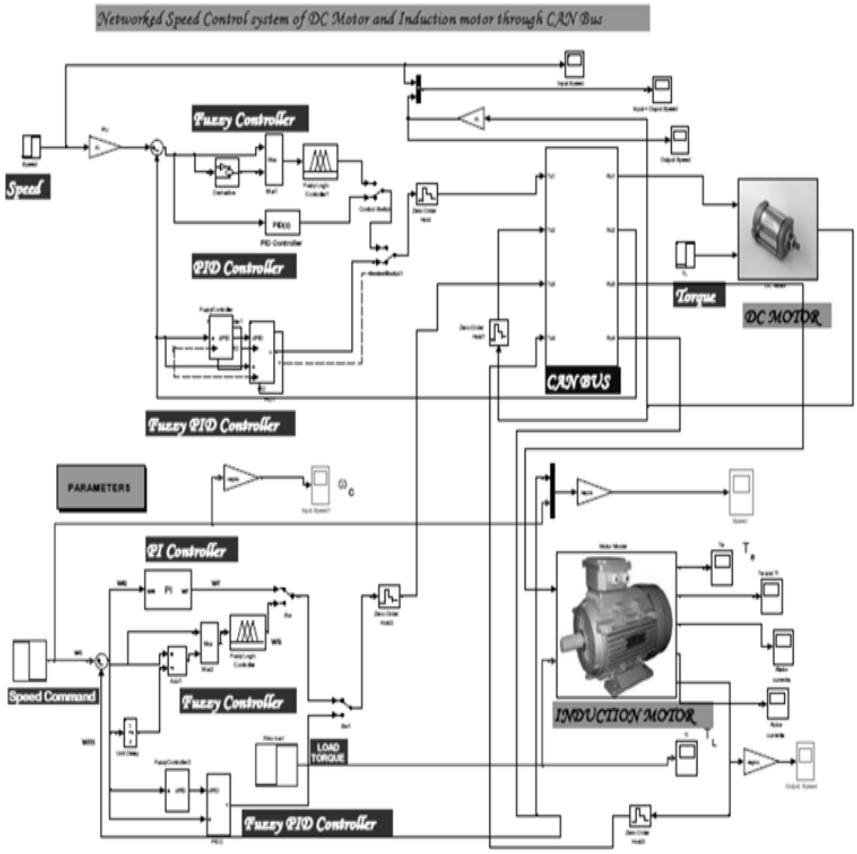

Fig. 1: Networked Speed Control System of DC Motor and Induction Motor through CAN Bus

III. Modeling of DC Motors

The motor variables to be controlled are the speed and the armature current. In the proposed fuzzy logic control scheme, the motor speed error and its error change are used as input variables to Fuzzy speed controller. However, the armature current error and its error change are the input variables to fuzzy current controller. The error and error change for both speed and current are scaled using appropriate scaling factors. These scaled input data are then converted into linguistic variables, which may be viewed as labels of fuzzy sets. For simplicity, the trapezoidal and triangular shaped functions are used in this application. In armature control of separately excited DC motors, the voltage applied to the armature of the motor is adjusted without changing the voltage applied to the field. Figure 2, shows a separately excited DC motor equivalent model.

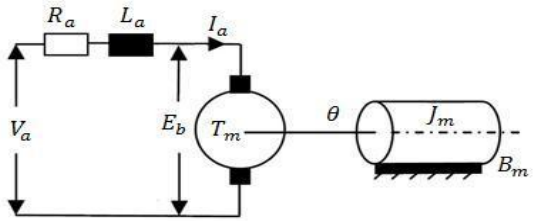

Fig. 2: DC Motor Model

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$$T_m(t) = J_m \frac{dw(t)}{dt} + B_m w(t) v_a(t) = R_a i_a(t) + L_a \frac{di_a(t)}{dt} + e_b(t) \quad (1)$$

$$T_m(t) = K_T i_a(t) \quad (2)$$

$$e_b(t) = K_b w(t) \quad (3)$$

Where,

Ra = Armature Resistance, Va =Armature Voltage, La = Armature Inductance

IV.Modeling of DC Motors

The equivalent single phase model transformed to the stator where the magnetic leakages are added and grouped in the rotor and designed by $N_e\omega_s$. The Figure 3, shown below is the resulting model of an Induction Motor.

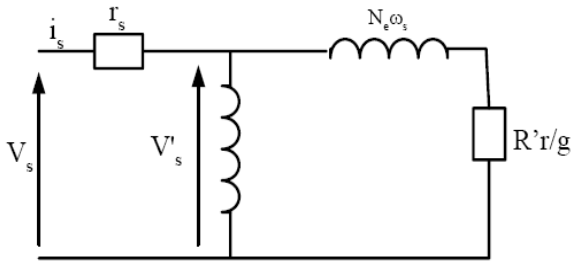

Fig. 3: Equivalent Mono Phase of the Induction Motor Model

It is assumed that the control of the 3-phase induction motor is scalar control using Fuzzy and PI controllers which can be selected using a switch. Scalar control strategy is designed based on the steady state operation of an induction motor.

The mathematical equations involved in dynamics of an induction motor in a synchronous rotating frame are given by

$$vds = rsids - \omega s \Phi qs \quad (4)$$

$$vqs = rsiqs - \omega s \Phi ds \quad (5)$$

$$vdr = rridr - (\omega s - \omega)\Phi qr \quad (6)$$

$$vqr = rriqr - (\omega s - \omega)\Phi dr \quad (7)$$

The d and q axis can be referred in a space vector if they are placed at real and imaginary axis respectively. Hence,

$$vs = vds + jvqs \quad (8)$$

$$is = ids + jiqs \quad (9)$$

$$ir = idr + jiqr \quad (10)$$

$$\Phi s = \Phi ds + j\Phi qs \quad (11)$$

$$\Phi r = \Phi dr + j\Phi qr \quad (12)$$

Deploying (1) and (2) in (5) yields:

$$vs = rsis + j\omega s \Phi s \quad (13)$$

Similarly, the rotor voltage of the induction motor is defined as:

$$vr = rrir + j\omega r \Phi r \quad (14)$$

Based on the equation system and equations (5)-(8), the stator and rotor flux in vector space are given by

$$\Phi s = Lsis + Mir \quad (15)$$

$$\Phi r = Lrir + Mis \quad (16)$$

The scalar induction motor model is:

$$G_m(s) = \frac{k}{1+\tau s} \quad (17)$$

Where k= 0.3478 and τ= 0.5184. τ is the time constant and k is the static gain of the system.

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$$C(s) = \frac{F(s)}{G_m(s)\,(1-(F(s))} \tag{18}$$

$$C(s) = k_p + \frac{1}{\tau_i(s)} \tag{19}$$

Where k_p= 0.6 and τ_i= 0.0899.

V. Simulation Results

The networked DC motor & induction motor control system are simulated using MATLAB/ SIMULINK under fully controlled environments for Fuzzy Logic Controller, PID Controller and Self-adaptive fuzzy PID CAN based Controller is shown in Figures 4 & 5. In simulation step signal is used as an input and the system running is observed in the oscilloscope. The delays are varied according to different effects of interest. The disturbance and loss of input signal, control signal and the feedback signal are adopted for few milliseconds at each stage and the corresponding results are studied without data losses. In the observation from the graph the self-adaptive fuzzy PID control system is given good response and significant improvements than conventional PID control. The PID controller is attractive for industrial use, because the operators can understand the algorithm and it is also well justified for NCS, since the computational time and memory requirements are fairly low.

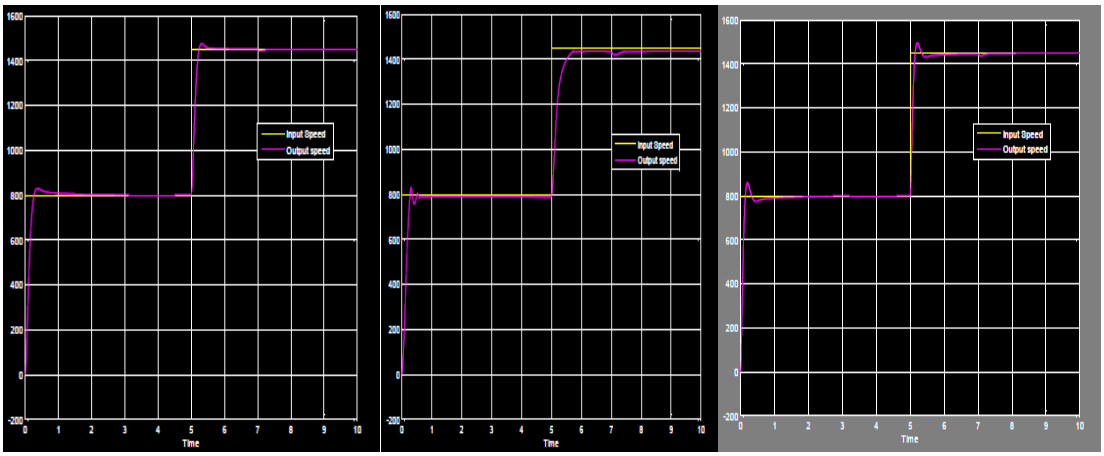

Fig. 4: (a) Fuzzy CAN based DC Motor, (b) Fuzzy PID CAN based DC Motor and (c) PID based DC Motor

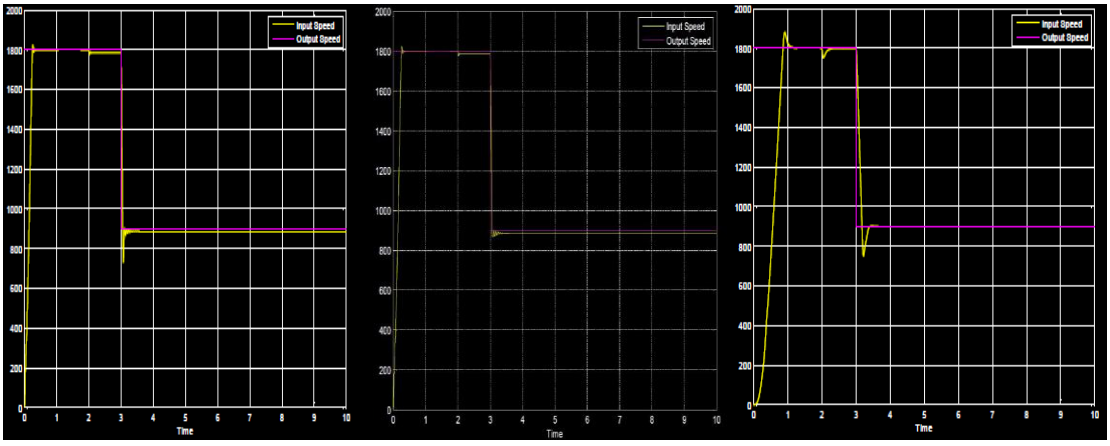

Fig. 5: (a) Fuzzy CAN based Induction Motor, (b) Fuzzy PI CAN based Induction Motor and (c) PI CAN Induction Motor

VI. Conclusion

Industrial drive applications network play a very important role for real time high performance networked control. The PID CAN Based network is used for the control of DC motor and Induction motor. The uniqueness of the performance necessities is very high in dynamic and static characteristics in the results.

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The self-adaptive fuzzy PID control algorithm in which the control system, use of PID CAN Based network little fuzzy control theory rules, is simple method and transparent and advantages of self- adaptive learning ability. After carefully analyzing the obtained results particularly settling time, maximum peak over shoot and steady state error, the self-adaptive fuzzy PID CAN based network control suits for DC motors and self-adaptive fuzzy PI CAN based network control suits for Induction Motor.

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Application of Modified ALO to Economic Load Dispatch for Coal Fired Stations

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Abstract*: This manuscript explores the novel Modified Ant Lion (MALO) Optimization to resolve the load dispatch problem optimally. The primary role of Optimal Economic Load Dispatch (OELD) is to obtain an efficient and economical operation of a power system network. The main aim of performing the OELD is for minimizing the fuel cost of the real power generation when the losses are neglected. An Modified Ant Lion (MALO) Optimization is a narrative nature-inspired algorithm and apes the tracking mechanism of ant lions in life. The random walk of ants, building traps, entrapment of ants in traps, catching preys, and re-building traps are the five main steps involved in the hunting process. The principal objective of OELD is to curtail the total generation cost while honoring effective constraints of accessible generating resources. The anticipated Modified ALO technique is utilized on three and six unit test system to various load demands for solving the load dispatch problem economically. A statistical result clarifies that the anticipated MALO method has lowest fuel cost and superior in quality of solution than other optimization techniques accounted in most latest literature.

***Index Terms*: Modified Ant Lion Optimization, Economic Load Dispatch, Fuel Cost, Different Load Demands, Real Power Generation, Coal Fired Station, Without Losses.**

I. INTRODUCTION

Economic Dispatch forms the significant analysis roles dealing with Operation in a power transmission system. Economic Dispatch (ED) is defined as the route of distributing real power generation to the each generating unit, so that the total network load is supplied with most economical manner. In static economic dispatch, the point is to evaluate, the output power of all generating units so that all the loads are energized at minimum cost, while satisfying the various equal and inequality restrictions of the network and the generator limits. Economic Dispatch models the electric power system and dispatch the essential load from the accessible, well, generating units for each control area in the most economic manner or in real-time situation. The point is to reduce the total generation cost (include fuel cost, but exclude the cost of network loss) by meeting the operational constraints.In modern days, different evolutionary and meta-heuristics optimization techniques have been designed for simulating natural phenomena such as: Bat Algorithm (BA) [1], Particle Swarm (PSO) Optimization [2], Moth-Flame Optimization [3, 15], Cuckoo Search Algorithm (CSA) [4], FireFly Algorithm (FA) [5], Real Coded Genetic Algorithm (RCGA) [6], DragonFly Algorithm (DFA) [7], Grey Wolf Optimizer (GWO) [8], Evolution Optimization Swarm Algorithm (EOSA) [9], Sine Cosine algorithm (SCA) [10], Glowwarm Swarm Algorithm (WSA) [11], Hybrid Big Bang-Big Crunch Algorithm (HBBBCA) [12], Ant Lion Algorithm (ALO) [13, 17], Novel Bat Algorithm (NBA) [14], stochastic whale optimization (SWO) [16, 18], Moderate Random Search PSO (MRS-PSO) [19], Multi-Verse (MVO) Optimizer [20] and Sine Cosine Algorithm (SCA) [21]. Some of the heuristics evolutionary algorithms are used to resolve economic dispatch problems, which is reported in published literature as Bat Algorithm (BA), Cuckoo Search Algorithm (CSA) [4], FireFly Algorithm (FA) [5], Real Coded Genetic Algorithm (RCGA) [6], Evolution Optimization Swarm Algorithm (EOSA) [9], Glowwarm Swarm Algorithm (WSA) [11], Hybrid Big Bang-Big Crunch Algorithm (HBBBCA) [12], Ant Lion Algorithm (ALO) [17], Novel Bat Algorithm (NBA) [14], stochastic whale optimization (SWO) [18], Moderate Random Search PSO (MRS-PSO) [19].This manuscript recommends, Modified ALO algorithm is utilized for the elucidation of economic load dispatch to condense the cost of fuel in steam power station for different load demands. The projected Modified ALO has tested on simple 3-unit and 6-unit test systems.

II. PROBLEM FORMULATION

A. Fitness Function

The aptness of the load dispatch hitch is to curtail the cost correlated to total generation while checking the limits of constrictions, when the essential power demand of a network is being supplied. The main objective of this task is to reduce cost given by the subsequent equation.

Minimize $F_T = F_i(P_{Gi}) = F_1(P_{G1}) + F_2(P_{G2}) + \text{-------} + F_n(P_{Gn})$

$$F_i(P_{Gi}) = \sum_{i=1}^{n} F_i(P_{Gi}) \qquad \text{.....(1)}$$

$$F(P_G) = \sum_{i=1}^{n} \left(a_i P_{Gi}^2 + b_i P_{Gi} + c_i\right) \qquad \text{.....(2)}$$

B. Equality Restraint

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The total generation of all generators should be meet the required load demand. The power balance equation without losses is given by

$$\sum_{i=1}^{n} P_{Gi} = P_D \qquad \text{.....(3)}$$

C. Inequality Restraint

The active power of all the generators in a coal fired station is to be inhibited within its functional limits.

$$P_{Gi}^{min} \le P_{Gi} \le P_{Gi}^{max} \quad i=1,2,.....n \qquad \text{.....(4)}$$

III. ANT LION OPTIMIZATION

A. Introduction

This article suggested a novel environment motivated algorithm called Ant Lion Optimization [13, 17] as a different practice to crack optimization problems. As the name signifies, Modified ALO algorithm emulates the sharp exploits of antlions in tracking ants in the atmosphere. The life series of AntLions is revealed in Fig. 1 and altered phases engaged while a corner and hunting the prey is publicized in Fig. 2 [13].

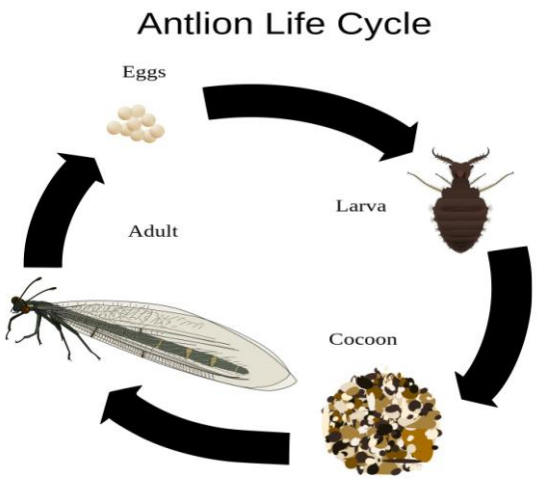

Fig. 1: Existence of an Ant Lions

The life cycle of antlions comprises two phases are of Larvae & Adult. A total lifespan can take up to 3 years, which mostly transpires in larvae. Antlions undergo metamorphosis in a cocoon to turn out to be an adult. Ants typically pursue in larvae and the parenthood era is for reproduction.

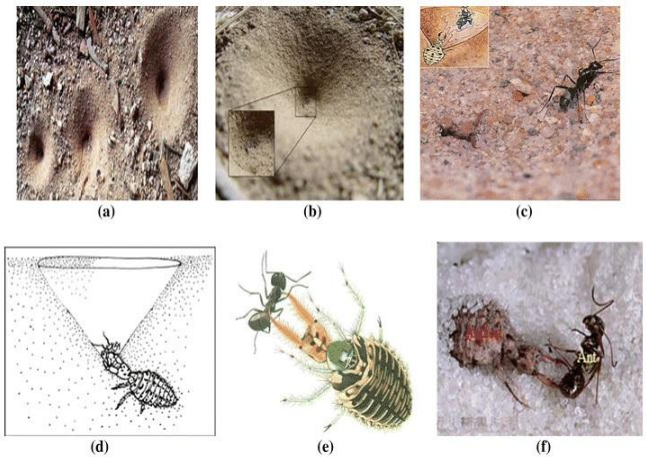

Fig. 2: a–c Erection Traps And Snare Of Ants In Ruses; D–F Contagious The Prey And Re-Building Traps

The ALO mimics relations involving ant-lions and ants in the trap. Since ants voyage stochastically in life when penetrating for groceries, a random walk using roulette wheel is preferred for the modelling ant movement.

The random walks within the search space are kept within boundaries, normalized using min–max normalization.

$$X = \left[0, CumSum\left(2*\left(rand\left(\max\_iter,1\right) > 0.5\right) - 1\right)\right]$$

$$RW(i) = X(i) = \frac{\left((X-a).*(d-c)\right)}{(b-a)} + c \qquad \text{.....(5)}$$

$$\text{Where,} \quad a = \min\left(Rand\_Walk\right)$$
$$b = \max\left(Rand\_Walk\right)$$
$$c = lb\left(dim\right)$$
$$d = ub\left(dim\right)$$

$$ant\_pos(i) = \left(ant\_pos(i).*\left(\sim\left(Flag4ub + Flag4lb\right)\right)\right) + ub.*Flag4ub + lb.*Flag4lb \qquad (6)$$

Pseudo Code

```
% Initialize input data, search agents and maximum iteration
% Initialize generator coeffecients, lower and upper limits each generator
% Initialize the positions ants
% Initially, evaluate the fitness
for i = 1:n
    for i = 1:dim
        RandomWalk(i) = (d(i) - c(i)) * rand + c(i)
        Calculate Ant_Pos(i) = RA(i) + RE(i) / 2
    end
end
% Boundar checking
% Update positions
% If any antlinons becomes fitter then Update elite position
% Update convergence criteria
display Best_score as Ant_Lion Fitness
```

B. Flow Chart for Optimal Economic Load Dispatch

The flow chart for Economic load dispatch problem by using Modified ALO algorithm is presented in Fig. 3. The ants travel stochastically in nature, while penetrating for food.

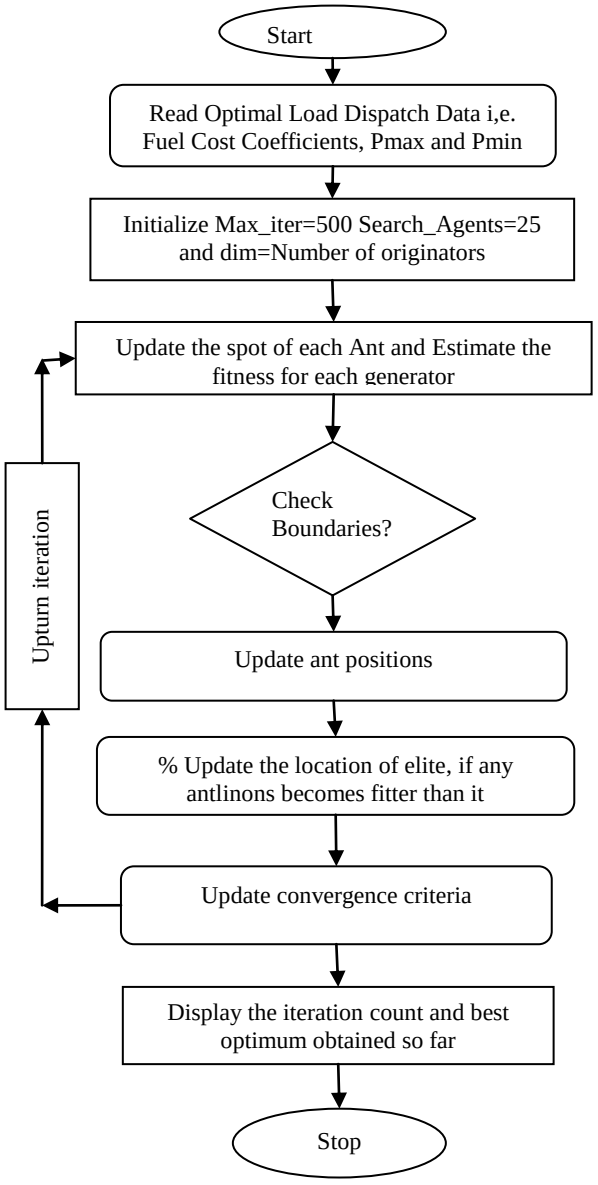

Fig. 3: Flow Chart For ELD Problem Using Modified Ant Lion Optimization

IV. UNITS

The Modified ALO is executed to decipher ELD problem with benchmark 3 and 6 thermal units. The MATLAB code tested on Version R2014a on an Intel, Core™ i3-3227U, CPU@ clock speed of 1.90 GHz, and 8GB RAM, 64-bit OS. The assessment results of the three and six unit systems are revealed. The capricious parameters of Modified ALO are offered in Table. 1.

TABLE I. ALO PARAMETERS

Organize Parameters		
1.	Search Agents	100
2.	Maximum Iterations	500
3.	Dimensions	3 (for 3-Gen system) 6 (for 6-Gen system)

A. Three-Unit System

The generator coefficients and lower, upper boundaries for each generator in a thermal system data are revealed in Table. 2. The planned Modified ALO is realized in the OELD problem when transmission losses are not included and end results of the fuel cost for altered load demands, i.e. 350, 400, 450, 500, 550, 600, 650, 700, 750 and 800 MW are offered in Table. 3.

TABLE II. GENERATOR COEFFFICINTS AND INEQUALITY CONSTRAINTS OF 3-GENERATOR SYSTEM

Unit	a	b	c	Pmin	Pmax
1	0.03546	38.30553	1243.5311	35	210
2	0.02111	36.32782	1658.5696	130	325
3	0.01799	38.27041	1356.6592	125	315

TABLE III. OPTIMUM LOAD DISPATCH RESULTS OF 3-GENERATOR SYSTEM

Load Demand (MW)	P_1 (MW)	P_2 (MW)	P_3 (MW)	Fuel Cost (Rs./hr)
350	64.97302	155.9829	129.0441	18315.5651
400	75.7237	174.0416	150.2347	20480.2969
450	86.47439	192.1003	171.4253	22683.1507
500	97.22508	210.159	192.6159	24924.1263
550	107.9758	228.2177	213.8066	27203.2239
600	118.7264	246.2764	234.9972	29520.4433
650	129.4771	264.3351	256.1878	31875.7847
700	140.2278	282.3938	277.3784	34269.2481
750	150.9785	300.4525	298.569	36700.8333
800	163.5053	321.4947	315	39171.2478

B. Six-Unit System

The 6-unit test system generator coefficients, min and maximum limits for real power generation of data are exposed in the Table. 4.

TABLE IV. GENERATOR COEFFFICINTS AND INEQUALITY CONSTRAINTS OF 6-GENERATOR SYSTEM

Unit	a	b	c	Pmin	Pmax

1	0.15240	38.53973	756.79886	10	125
2	0.10587	46.15916	451.32513	10	150
3	0.02803	40.39655	1049.9977	35	225
4	0.03546	38.30553	1243.5311	35	210
5	0.02111	36.32782	1658.5596	130	325
6	0.01799	38.27041	1356.6592	125	315

The planned Modified ALO is realized and the outcomes of the fuel cost for various load demands, i.e. 600, 700 and 800 MW are offered in Table. 5.

TABLE V. OPTIMUM LOAD DISPATCH RESULTS OF 6-GENERATOR SYSTEM

Load Demand (MW)	600	700	800
P1	21.1895	24.97371	28.7579
P2	10	10	10
P3	82.0860	102.6604	123.2360
P4	94.3706	110.6347	126.8982
P5	205.3642	232.6838	260.0032
P6	186.9897	219.0473	251.1047
Cost(Rs./hr)	31445.6229	36003.1239	40675.968

C. Comparison of Six-Unit Test System Results

The test results of 6-unit system are compared with the other meta-heuristic optimization techniques which are previously published articles in the literature under the same operating conditions and presented in Table. 6.

TABLE VI. COMPARATIVE OUTCOMES OF 6-UNIT SYSTEM

Power Demand	FFA [5]	MFA [5]	VSMFA [5]	MFFA [5]	Proposed MALO
600	31489	31447	31576	31481	31446
700	36075	36006	36036	36021	36003
800	40739	40676	40701	40740	40676

From the above comparison, detect that Modified ALO attain the least amount of fuel cost for different power demands as evaluated when the losses are neglected. The convergence criteria is also improved by modified ALO.

The graphical representation of comparative results for 600MW, 700MW and 800MWare exposed in Fig. 3, Fig. 4 and Fig. 5 correspondingly.

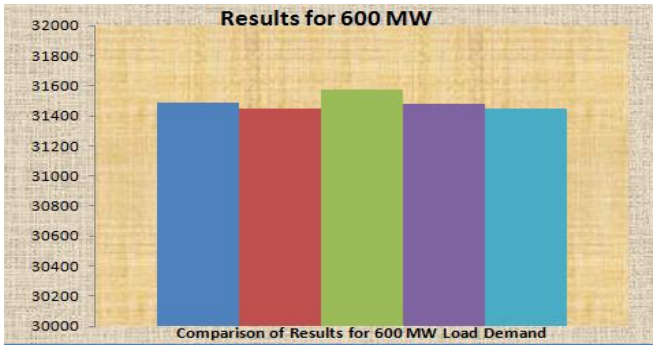

Fig. 4: Graphical Representation For Load Demand 600 MW

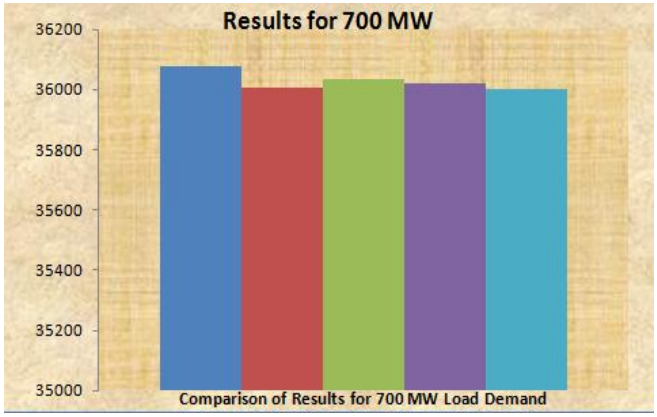

Fig. 5: Graphical Representation For Load Demand 700 Mw

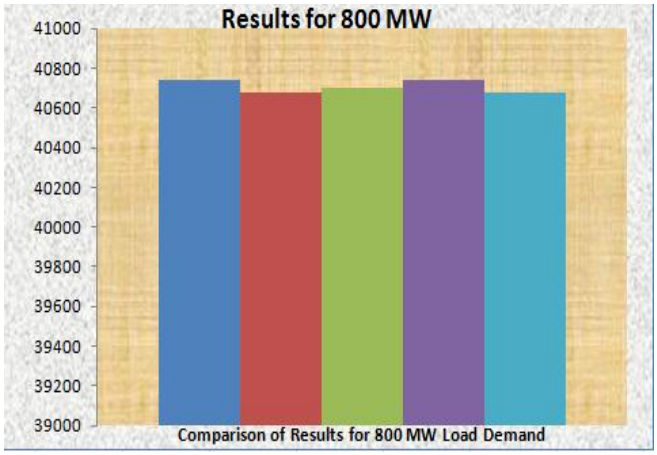

Fig. 6: Graphical Representation Load Demand For 800 MW

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A Revised RLS Algorithm for Low Frequency Electromechanical Oscillation

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Abstract--- The significant method for the strengthening of the permanence of an AC power distribution system is resolute by the static synchronous compensator. Further most it is castoff in supply level to ease power quality singularities but also at transmission level for voltage control in addition to Power Oscillation Damping (POD). STATCOM by technique of energy storing is previouslymountedbesides it is castoff for power flow controlling then voltage control. POD controller by E-STATCOM has remainedadvanced in an adaptive method in this paper. For approximation areformed RLS algorithm has been castoff and therefore an optimal custom of the existing energy supplyobtainable in this result.

Keywords--- Power Oscillation, STATCOM, Damping, FACTS, POD.

I. Introduction

Static synchronous compensator is a crucial scheme for the strengthening of solidity in an AC controlsystem. Even though characteristically it is used for reactive power booster lone by providing the STATCOM with drive storage, related to the dc-link of the converter additional malleable regulator of the transmission scheme can be attained. Setting up of a STATCOM by means of energy loading is now inductee for power stream board and electrical energy control. Among the countless devices beneath the FACTS family, free of other system parameters a STATCOM is a variable device, which can be used to regulate the movement of reactive power in the system[1].A STATCOM includes three phase inverter (generally a PWM inverter) by SCRs, MOSFETs or IGBTs, a DC capacitor that compromises the D.C voltage intended to the inverter, a connection apparatus relates the inverter production to the ac source cross, strainer apparatuses to sift out the high frequency components owing to that PWM inverter.

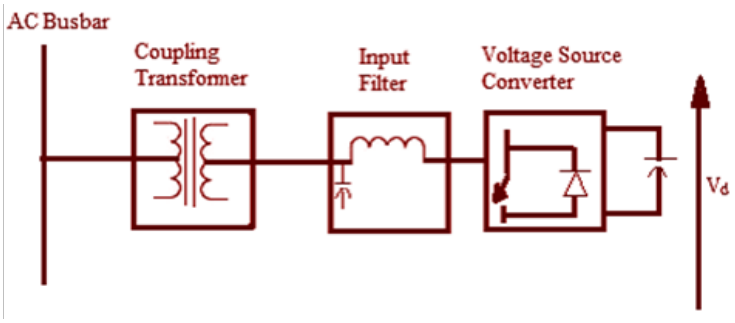

Fig. 1.1: Static Compensator

For two AC sources, which have the similar frequency and are associatedover a series inductance, the dynamic power arrangements starting, and the fore most supply to the casing supply along with the sensitive power streams one subsequently to the advanced voltage scale source to the minor voltage scalesupply [2].Static VAR compensation can be operated to regulate voltage, regulator power factor, and soothe power flow. Static VAR compensators built on a voltage sourced inverter, identified as STATCOM, have been proposed and demonstrated in an exertion to more progress recital, diminution size, and rise flexibility [3-7].

There are two facets to the delinquent of reactive power compensation: load compensation and voltage support. Load compensation entails of improvement in power factor, corresponding of actual power strained to the source, healthier electrical energy control, etc. of great changing loads. Voltage support includes of reduction of voltage fluctuations at a given fatal of the transmission line. Two types of compensation can be used: series and shunt compensation [11]. These quite reasonably do the job of fascinating or making sensitive power through a sooner period reaction also derived under Bendable AC Transmission Systems.

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1.1 Facts

A Flexible Alternating Current Transmission Scheme (FACTS) is a scheme of immobile apparatus castoff and designed for the AC conduction of electrical energy. It is frequently a power electronics-centred system. FACTS are distinctby means of the IEEE as "a power electronic centred scheme besides an extra immobile device that propose regulator of one or additional AC transmission system constraints to enhance controllability and increase power transmission competency." According to Siemens "FACTS upsurge the dependability of AC lattices besides lessen power delivery costs. In modern years, technological advances in power electronics have simplified the progress of electrical equipments that bid the capability to handle large amounts of power [1] [10-12]. The connection of FACTS campaigns (with serial or parallel connections) in a wind farm substation or in the terminals of wind turbines is collective fast owing mainly to the conditions listed in the transmission system operators' grid codes which require that wind turbines should offer ancillary facilities similar to those of conformist synchronous generators.

Numerous non-linear control systems like VSC based STATCOM controller have been useful in power system control for damping multi- mode oscillations [1]. The act of non-linear controllersis subjective by the parameter ambiguity and external disturbance. The planned controllers can deliver worthy hindering in cooperation confined approach as well as inter-zone mode oscillations. Anadvantage is, these controllers can make availablekey damping to both limited mode and put in the groundpart mode oscillations.Drawback of this scheme is area limitations.There are schemes for the integration of battery energy storage and STATCOM [2] [10].The addition of an energy storage system, such as battery energy storing, hooked on a FACTS device can deliver dynamic decentralized active power capabilities and abundant desired litheness for justifying spread level power flow problems. Anadvantage is, it reduces firm state voltage oscillation. Diminishes the inverse power flow. On behalf of hindering of squat rate of recurrence scheme oscillations, there is regulator scheme for full-scale conversion centred on current of airpower plants [3]. Restraining of low frequency power fluctuations is oneof indispensiblecharacteristics of keeping power system stability. Inliterature, it can be found periodicals on damping capability ofextra fed induction generator created wind turbines.The benefit is effective damping controller plan.Including feedback signal variety and regulatorefficacyraises performance.Disadvantage is a massive setup.Energy storage type STATCOM is available for power system stability improvement [4].The energy storing in the STATCOM is aforward-thinkingmalleable BC transmission schemeexpedient, which controls both reactive and active power injection/captivationto the power system. An advantage is innovative flexible ac transmission system device. Control equally reactive and active power injection immersion to the power systems.

Disadvantage of the system is multifaceted computation. Low frequency oscillation suppression in greater part of power system is also carried out by FACTS/ESS [5]. Squatrate of recurrence by its oscillations in the consistentpower schemes are pragmaticaltogetherfor the universe. An advantage is energy storing devices can be castoff and intended to power scheme Squat rate of recurrence by its oscillations due to hindering. Achieve higher efficiency in the system. Disadvantages are, a generator with different directing trend is to be handled differently [8]. Relating the three sinusoidal voltage waveforms with the triangular voltage waveform, the three phase converter voltages can be found [6] [9].

The essential frequency of the converter voltage i.e. f1, modulation frequency, is resolute by the frequency of the regulator voltages, where the converter switching frequency is unwavering by the frequency of the triangular voltage i.e. fs, carrier frequency. Thus, the modulating frequency f1 is alike to the supply frequency in STATCOM. The damping in inter-area oscillations in power systems can be done by STATCOM [7] [9-10]. Rotor of the engine behaves as rigid frames and oscillating energy will be interchange between the machines over transmission line. Native mode oscillations consuming frequency ranges from .7 HZ to 2HZ and these phenomena is related with a single generator or generator plant. Inter mode fluctuationsfrequency ranges from .1 HZ to 8 HZ .An advantage is Modifiable active power movement complete the networks. Drawback are better damping is still needed to well regulation.

II. Proposed System

2.1 Block Diagram

This scheme consists of two dissimilar voltage sources. Then each cause is connected in the transmission lines complete a bus connection. Then STATCOM is allied in the bus segment of the broadcast lines, grounded on feedback mechanism it approximations the influence oscillations in the transmission intermediate.

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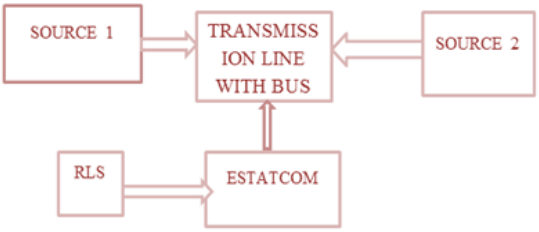

Figure 2.1: Block Diagram

Power flow equation in STATCOM,

$$S = \frac{3V_S V_C}{X_L} Sin\alpha - j3\left[\frac{V_S V_C}{X_L} Cos\alpha - \frac{V_S^2}{X_L}\right] = P - jQ$$

Q is the reactive powerflow,

$$Q = \frac{V_S}{X_L}(V_C - V_S)$$

2.2 RLS

The aim of the algorithm is to approximate the signal module that entails the low frequency oscillation. Evaluate the frequency phase of the contribution signal. Compared with the position signal and finds the variation. Change the frequency, phase of the input signal based upon the fault. Processes are repeat eduntil input signal is inexact equal to the reference signal [5]. Finally, we get the power oscillation damped signal.

2.3 E-STATCOM

The scheme has E-STATCOM, which is connected in the transmission track and the oscillations are condensed. Regulator approach aimed to the E-STATCOM used when Power oscillation occurs. For this, aadapted recursive (RLS)-centered approximation algorithm as predefined in addition it is castoff to abstract the essential regulator indications on or after nearby restrained signal.

III. System Modelling for Controller Design

An easy power system method is showed which is castoff to revise the effect of the E-STATCOM happening in the power scheme underlying forces. The transmission system entails of two transformers considered by their correspondent leakage reactance and a transmission trackby way ofcorresponding reactance. The cutting-edge damages in the transmission scheme are present abandoned for simpler under covert erminologies.



Figure 3.1: Simplified Two-Machine Scheme with E-STATCOM

3.1 Two Machine Scheme Model

The active power generated to the real power, which is used to effort, the electrical signals. Minimizing the effect of reactive power compensation when the power generation variations occur from the generator, the reactive power is unsatisfactory in the transmission lines.This leads to the power oscillation. In order to evade damping, by consuming RLS Algorithm and dropping of power oscillation [9-12].

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When scheming a cascaded controller, the quickness of outer control loop is typically carefully chosen to be ample deliberate than the innermost to guarantee stability. The level of power oscillation damping as long as by the converter hang on how considerable the dynamic power productivity starting to the producers is tempered by means of added current. Doubtfully, the mechanical hindering in the producers is present injured, damping for the inspected scheme is identical to nil.

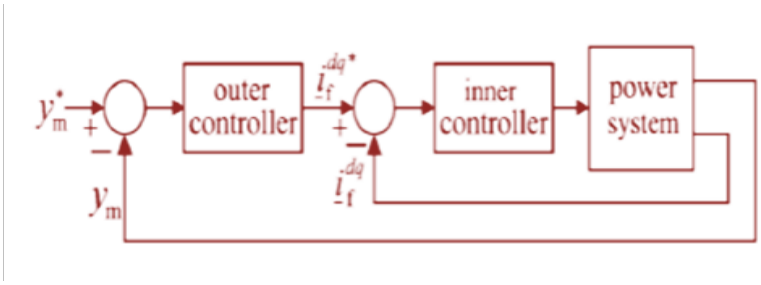

Fig. 3.2: Control scheme

The block diagram consist of

1. Outer controller
2. Inner controller
3. Power system

3.2 Outer Regulator

The external regulator hoop, which would be POD regulator or dc-link voltage, an AC voltage, circles the position current aimed at the inner current regulator [10]. The regulator procedure is applied in d_q-reference mount wherever a phase-locked hoop is castoff to path the lattice power angle starting the lattice voltage trajectory.

3.3 Inner Controller

In inner control loop, the active and reactive powers in the stable state are zero. When scheming cascaded controller, the speed of external control loop is classically selected to be must slower than the inner one to assertion stability. Therefore, the E-STATCOM should be unveiled such as a precise ultimate current source [12].

The near of control oscillation damping on condition that the converter be subject to on, the dynamic power output beginning the producers is cramped by the injected current. The change in active control output after the producer sowing to inserted dynamic besides sensitive power commencing the E-STATCOM.

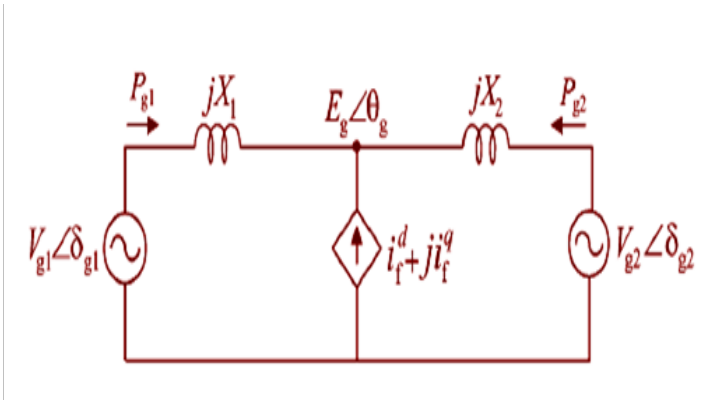

Figure 3.4: Equivalent Circuits for Two-Machine Scheme with

E-STATCOM

Inductors (reactors) are understood to store or absorb reactive power, since they store energy in the form of a magnetic field. Capacitors are said to create reactive power, because they store energy in the form of an electric field. The impedance of transmission outlines and the need for covering VAR by most machines in a generating system, out comes the ingesting of reactive power, thus distressing the stability bounds of the system as well as transmission lines [12].

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3.4 Distribution system

An electric power distribution scheme is the vital stage in the delivery of electric power; it transmits electricity from the transmission scheme to person consumers. Delivery substations connect to the transmission system and lower the transmission voltage to medium voltage extending between 2 kV and 35 kV with the use of transformers. Customers severe a much higherquantity of power may be accompanying directly to the prime distribution level or the subtransmission level [9].

Power factors less than 1.0 necessitate an effectiveness to create much higher than the least volt-amperes compulsory to supply the real power (watts). This increases generation and transmission costs. For instance, uncertainty the capacity power factor be there as squat as 0.7, the seeming power will be 1.4 epochs the actual power castoffby dint of the load. Track current in the circuit moreoverbe there 1.4 epochs thus the current mandatory at 1.0 power factor, consequently the damages in the circuit would be creased (since they are proportional to the square of the current) [11].

IV. Pod Controller Design

4.1 Derivation of Control Input Signals

By means of shortened two-machine system, the dynamic power output after every initiator would alter in amount to the variation in its rapidity to deliver hindering. Commencing a minor-indication fact of assessment in addition to below the declaration that the PCC-voltage scale end to end the track were not take alteration knowingly, the mandatory controller input indicators could be resulting after the PCC-voltage phase as well as transmitted dynamic power.

The PCC-voltage phase has derivative and taken dynamic power exist both reliant that scheduled the rapidity variation of the producers. In addition, the derived of the PCC-voltage phaseis influenced byon the position of E-STATCOM, through the restriction, as well as the mechanical dynamics of the generators [11] [12]. Supercilious equivalent inertia continuous for the two producers, not at all hindering is on situation that by injection of active control by the electrical centre of the track such as the control yield of the two producers might be same then the net impact is zero.

4.2 Alteration of Orthodox RLS Algorithm

The collection of is a trade-off between a good discernment for the estimator and its speed of retort. By cumulative assessment speediness, the rate of recurrence discrimination of the procedure diminishes. Intended to this motive, the orthodox RLS algorithm need to be enhanced in orderto accomplish fast transient estimation [10]. Thus, a frequency reworking mechanismis executed to path the spot-onoscillation frequency of the input from the calculation of the oscillatory section.

4.3 Modification for Multiple Oscillation Modes

The inspected control process has been resulting underneath postulation of a particular oscillation frequency factor in the input signal. Thus, the POD controller can be changed accordingly to control each mode self-reliantly.

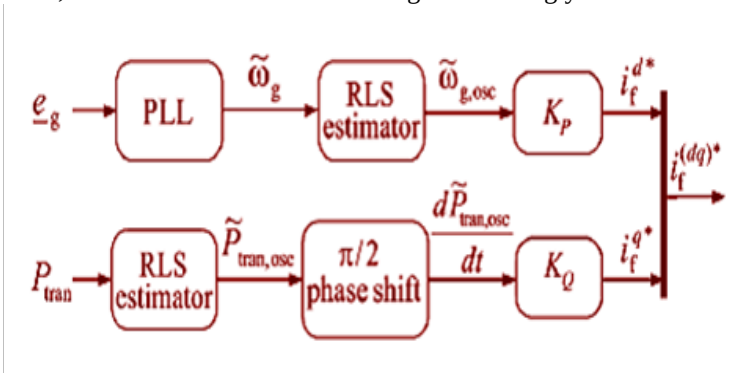

Fig.3.5: POD Regulator-Block Diagram

The POD controller described is confirmed via PSCAD/EMTDC simulation by means of the fine recognized four-machine, two-area scheme. The realized system is rated 20/230 kV, 900 MVA besides the parameters for the generators then transmission system collected with the loading of the system are given in detail [12].

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A three-phase error is useful to the scheme in which one of the transmission tracks bordered by bus 7 then bus 8. The error is vacant later 120ms by separating the criticized track. With the POD controller erection describes the routine of the E-STATCOM succeeding the error by three dissimilar locations.

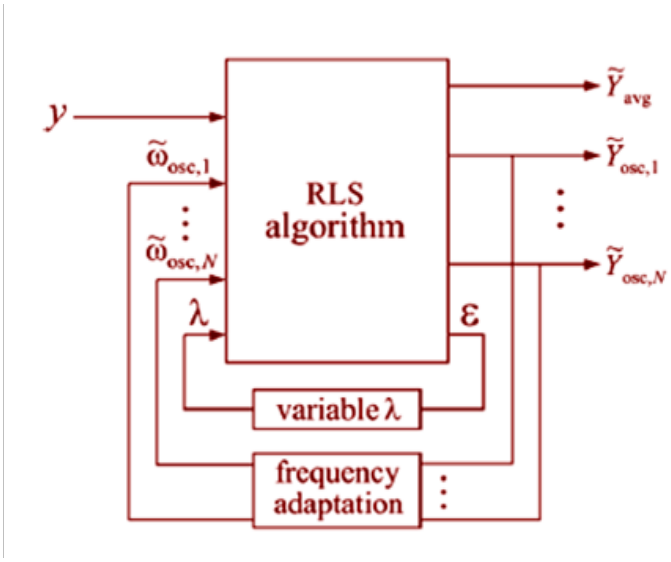

Fig 3.6: Modified RLS Estimator for Multiple Oscillation Modes- Block Diagram

4.4 Proportional & Integral Controllers

PI regulator will eliminate forced oscillations as well as stable state fault subsequent to process of on-off regulator thus to P controller correspondingly. Thus, PI regulator will not increase the speed of response. PI controllers are very often used in industry, expressly when speediness of the rejoinder is not aproblem. A control without D mode is used when:

a. Firm response of the scheme is not essential
b. Large instabilities and noise are existing during process
c. Is only one energy stowing in process (capacitive or inductive)
d. There are huge transport delays in the system

4.5 Adaptive PI Controller

Even though conventional PI/PID (proportional integral/comparative integral derivative) regulators must remained further most usually cast off in HVAC schemes, it takes now and then, being hard to recompense entirely aimed at load commotion besides to retain exact variables near to normal point standards surrounded by the arranged variety. In order to get good regulator possessions, nearby around three communal approaches for modifying the PI/PID regulator in HVAC schemes: physical, self-tuning also adaptive regulator methodologies.

Personality-tuning method of an essential only organizer for thermal load disturbances, most HVAC systems have period changing active appearances in system's limitations are flexible throughout the procedure, so it stays not necessary to use a self-tuning controller [11] [12].

4.6 Constancy Investigation of System Model

To observe the concert of the POD regulator aprecise model of the structure is unconventionally is castoff by expending dynamic in addition to sensitive power accumulation. At the mass-scaled electrical usual of the contour wherever the delaying can be as extended as stays nil.

In circumstance of sensitive power inoculation only, an optimistic damping is one if using the fractious connection relations besides an extreme hindering exists at the electrical intermediate of the contour (i.e., for a balanced system) somewhere scale is supreme. The E-STATCOM program of the poles for the system as a purpose of the setting is shown trendy output [1] [5].With this defined controller policy, injected active power is zero at the fact where the consequence of active power inoculation arranged in hindering is nil. This is atthe electrical norm of this line.

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V. Simulation and Results

MATLAB is a high-concert linguistic for technical calculating. It mixes calculation, imagining, and software design in an easy-to-use environment where problems and explanations are articulated in accustomed mathematical representation. MATLAB is acollaborative system whose elementary data element is acollection that does not need dimensioning.

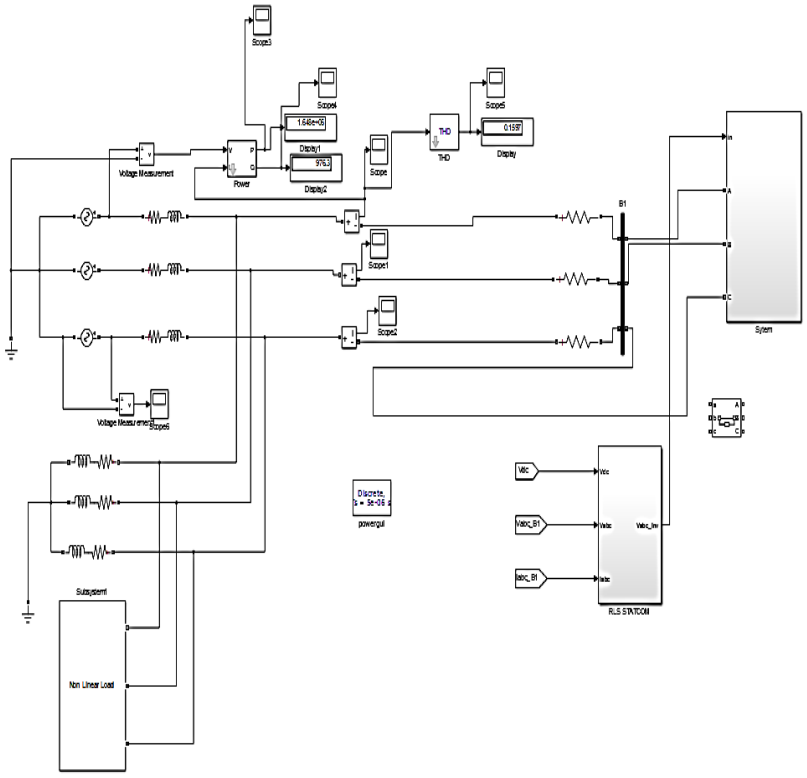

Fig. 5.1: Simulation Diagram with E- STATCOM

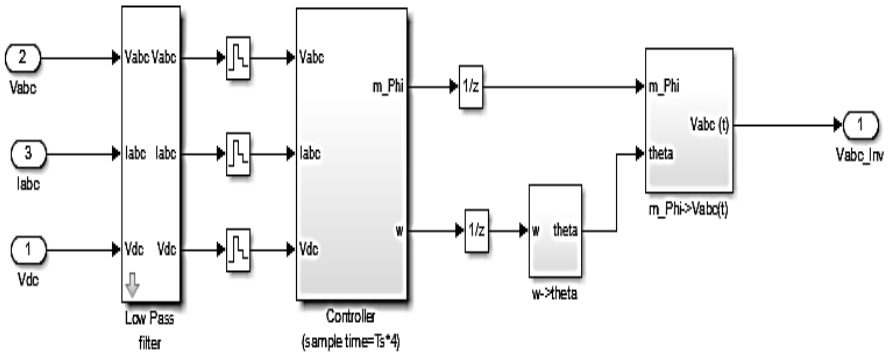

Fig. 5.2: RLS STATCOM

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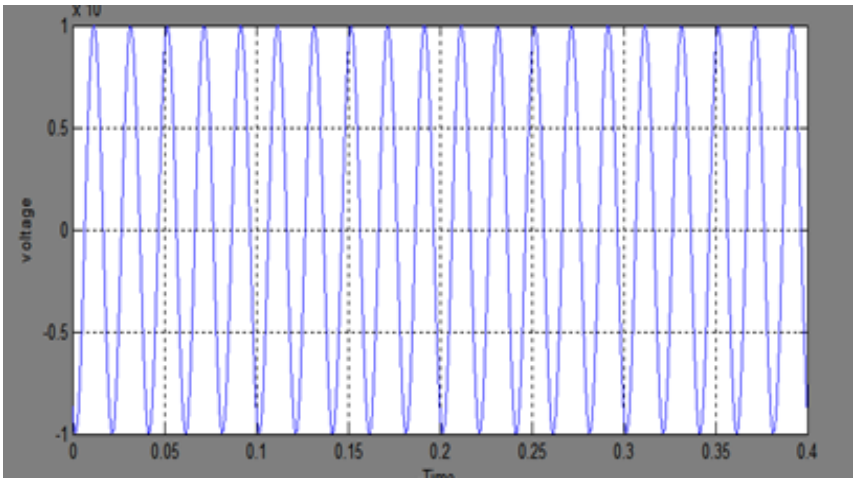

Fig. 5.3: Input Voltages

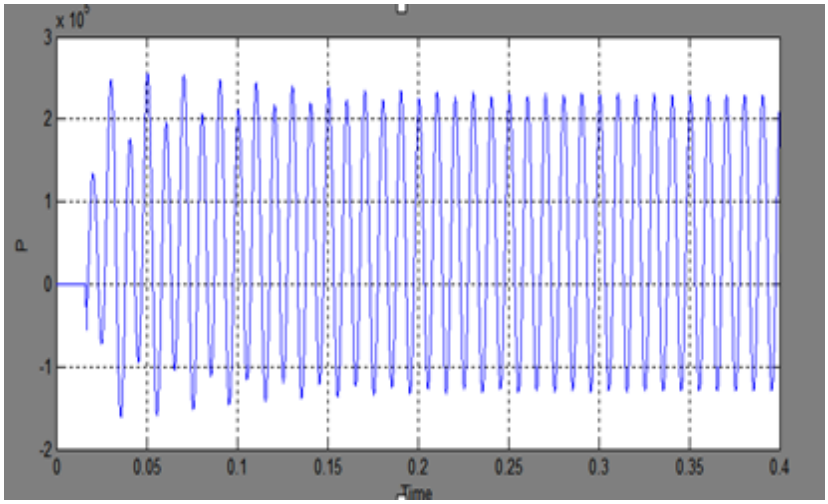

Fig. 5.4: Real Power

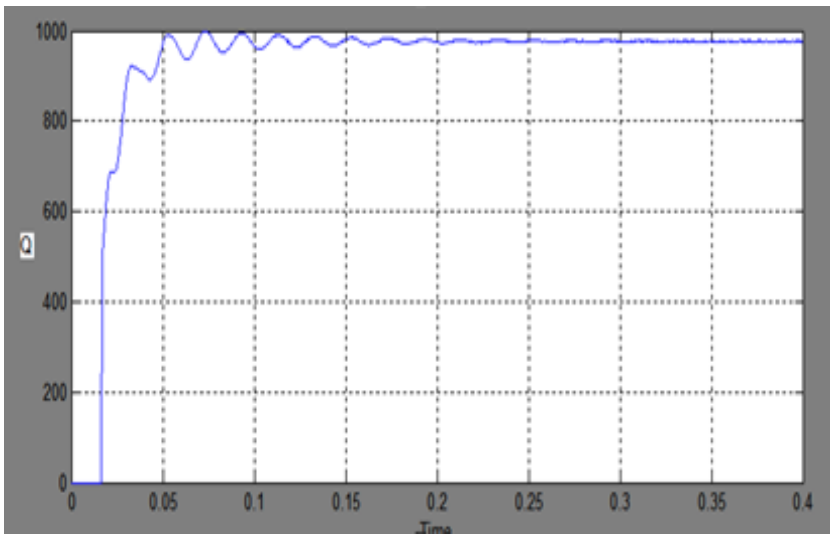

Fig .5.5: Reactive Power

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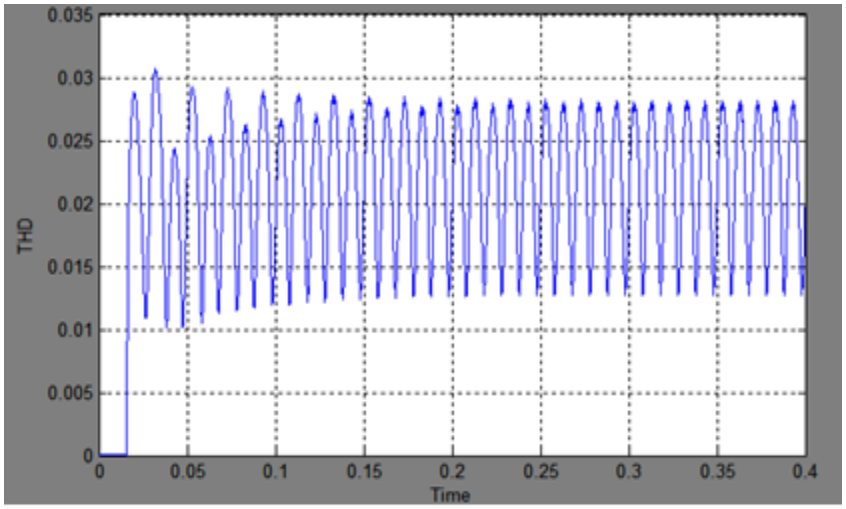

Fig. 5.6: Total Harmonic Distortion

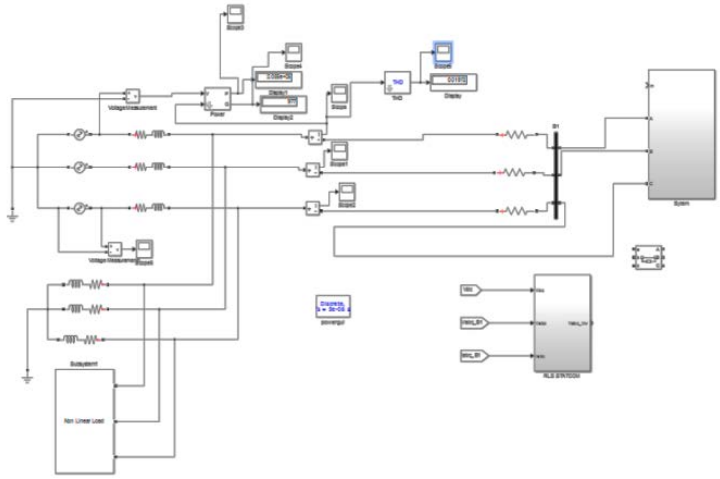

Fig. 5.7: Simulation diagram- without E-STATCOM

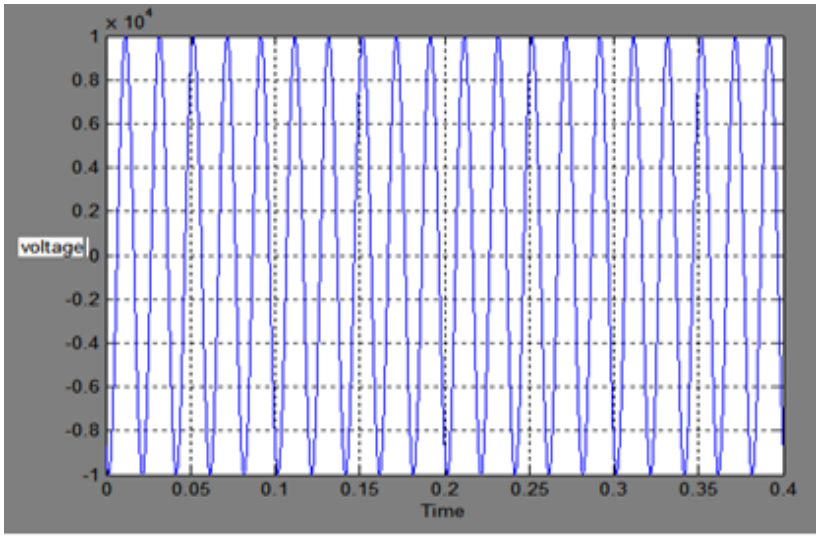

Fig. 5.8: Input voltages

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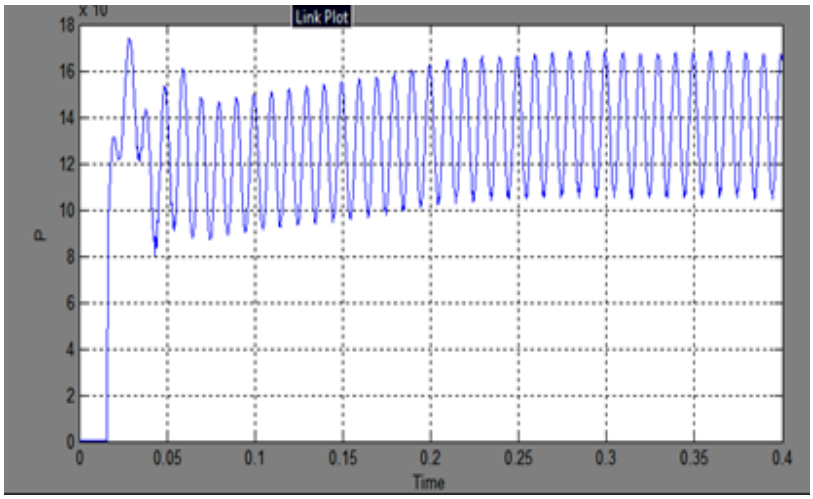

Fig. 5.9: Real Power

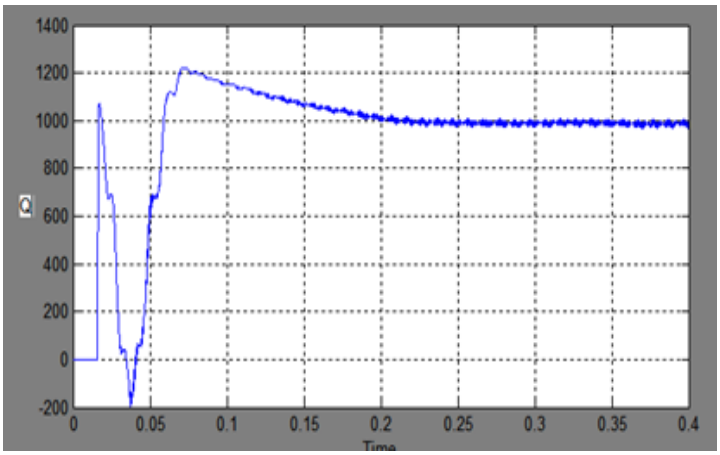

Fig. 5.10: Reactive Power

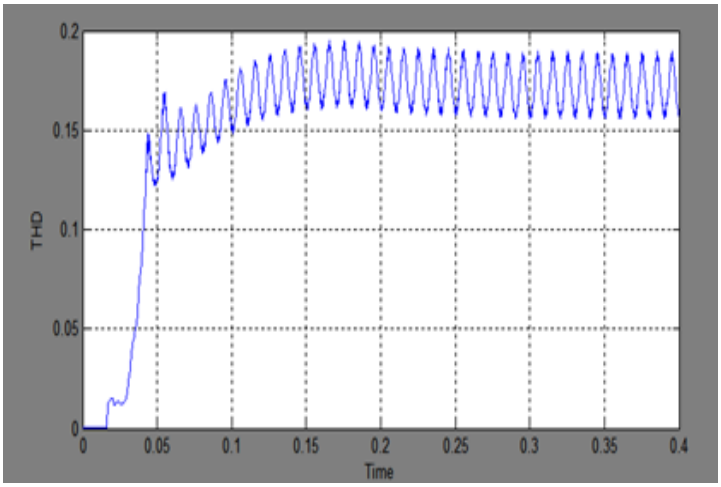

Fig. 5.11: Total Harmonic Distortion

VI. Conclusion

An adaptive POD regulator by E-STATCOM has been technologically advanced in this paper. For this, a reformed RLS algorithm is castoff for assessment of the little-frequency electromechanical oscillation works on or

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after nearby measured signals throughout power system conditions. The strength of the endorsed algorithm in contradiction of system factor fluctuates has also been **complete over** through investigational tests. This is an optimum results that custom the existing energy source.

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SIMULATION ON THE GENERATION OF ELECTRICITY FROM RUNNING TRAIN WHEELS

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ABSTRACT

The existence of industrial actions and our communal construction depends on low cost and continuous supply of electrical energy. Even the advancement of a country is self-possessed in positions of per capita intake of electrical energy. The same is in the case of trains, the major network of transport in India. This paper emphasis on the design of electrical energy in the supreme advanced technique. In this paper rotational energy is used for the assembly of electricity. When associated to other procedures of energy like solar, fuel cell etc., the rotational energy has extraordinary efficient ways and means for producing electricity. This paper purposes of setting up miniature power stations at the foul points of the railway rail wherever the fuel supply is limited. The prevailing structure of train wheels are operated in the making of electricity over other minor rollers close-fitting to the rail. These minor rollers rotate and this rotational energy can be amplified and transformed. This obtained electrical energy supply that can be used as unrestricted power supply for railway utilities such as water streaming, charging electrical gadgets, LCD display supply for traveler list, train time scheduling, lighting the podium bulbs, fan, signal lights etc. Most crowded cities like Mumbai, Chennai and Delhi etc. in India such scheme can be definitely implemented. The proposal of the corresponding scheme equally at the entrance and departure path in the railway station or when mounted at intersections nearby rural area, can afford electricity free of cost for minor scale actions.

KEYWORDS: Rotational Energy, Traction, Train Wheel, Roller, Podium, Regenerative Braking, Conversion, Rotational Speed, Tensile Strength & Fouling Mark

Original Article

INTRODUCTION

An electric power commencing has an additional source of prime energy in the electricity generation and its development. While considering the electrical efficacy, this is the major method that used in the commutation of clients using electricity [1][3]. Thus in further developments transmission, distribution, in addition electrical power storage and its recovery by means of pumped storage methods are approved by electric power industry. Electrical energy is an utmost produced at power station mainly driven by heat engines fuelled by combustion or nuclear fission by using electromechanical generators. This similar action occurs by an extra means which is comparable to kinetic energy of flowing water and wind [2]. Mainly the energy sources comprise of geothermal power as well as solar photovoltaic.

The main factor of generation of electricity has followed by several methods but depend on the demand and utility it deserves. The region where the generation of the system implemented also has an importance. There

were lots of power plant like hydro electrical, thermal, tidal, nuclear and even based on the renewable sources [4]. Each of these power plants have its own pros and cons. Most of the power plants got developed due to the demand of the energy within source duration. So nowadays power grids ought to change the load on the requirement, but each selection of the base load by the day- to-day minimum usage of power. This affects an interrupted running of the power plant [3][4].

The Indian Railways are the major network of transport, the large quantity in the number of trains; therefore the amount of wheel power that gained in this arrangement is huge. India is a nation by major largest transport system, that i.e.; the trains reach each corner of the nation but have not electricity. Around thousands of villages are immobile of lacking electricity [5]. Likewise Indian Railways merely get well around 57% of cost of travel on a normal.

LITERATURE REVIEW

Indian Railway is one of the prime transportation that brings the revenue to the country. Moreover it is the public transport system that used by all people without considering the financial backup. Considering to any other transport system the train journey provide a feasible amount to pay. This all comes under the control of Ministry of Railways [1][6]. Rather than any other modes of transportation Indian Railway connected to 29 states in India and 7 union territories with around 40,000 miles or 64,373.76 kilometers as per 2014 world census Indian Railways is the fourth major railway in the universe which is carrying around 8435 million commuters. In India, railways are a rebellion in relations of provided an occupation, regular commutation of commuters and carriage of goods and chattels through the length and breadth of the country. Railways have progressed from a period of steam engines to electrically activated engines/ trains [7][8]. The wind energy, solar energy and mechanical energy can be transformed to electrical energy by means of train and podiums as a medium; in a method not supposed by anyone earlier.

STUDY OF EXISTING SYSTEM

Electric railways custom electric engines to drag commuters or goods in distinct cars for electric manifold entities for the customer with their private vehicles. Generation of electricity is usually in huge and compared to any other modes of generating electricity has effectual generating stations and thus it gets transmitted to the railway and further distributed in trains [2] [9]. Nowadays certain electric train has its own generating stations near to the railway station and commonly called as substation with certain voltage rating which usually provides its own distribution lines, switches and transformers. These substations transmit for the electric utility. The railway electrification scheme delivers electric power to railway trains and trams deprived of an involved major mover or limited fuel supply [10]. Dissimilar systems are custom for city and direct zones; certain electric trains can change to diverse supply voltages to consent tractability in the process. Power is delivered to moving trains through a (nearly) constant conductor running sideways of the rail that typically earn one of two arrangements.

In cooperation with overhead wire and third-rail schemes regularly custom the consecutive rails as the reoccurrence conductor however certain arrangements custom an isolated fourth rail for this drive [11]-[13]. Various electric traction schemes offer regenerative braking that tries to change the train’s kinetic energy return into electricity in addition return it to the source system. This is to be cast off using supplementary trains or the complete efficacy of grid [12]. Although diesel locomotives use petroleum, thus electricity is produced commencing miscellaneous sources with numerous amount of carbon dioxide such as nuclear power besides renewable forms for counting wind, geothermal, hydroelectric plus solar [10].

The production of electricity in 2012 there 25,353TWh. Foundations of electricity be present are fossil fuels 68%, renewable energy 18% (mostly hydroelectric, wind, solar as well as biomass), besides nuclear power 12% also supplementary sources remained 4% [2][11]. The mainstream of fossil fuel custom intended for the production of electricity with coal plus gas. Oil stayed 7% as it is the furthermost exclusive communal product that used to yield electrical energy. 95% of renewable energy is there in hydroelectric who trailed by wind at 7% besides geothermal at 2.32%. Solar photovoltaic were 0.89% also solar thermal were 0.008%. Overall energy expended at entire power plants aimed to the production of electricity be there 4,469,768 ktoe (kilo ton of oil equivalent) which has 38% of the aggregate of prime energy sources (TPES) in 2012. Gross electricity amount produced were 1,867,539 ktoe (21,185 TWh), along with efficiency were 41.23%, and in addition to the remaining of 64% were produced heat. A negligible amount (148,251 ktoe, which were 5.5% of the entire input) of the high temperature were employed at coproduction of heat and power plants. The more intake of electricity besides power transmission damages were 290,359 ktoe. The quantities delivered to the ultimate user were 1,445,285 ktoe (15,630 TWh) which stood 34% of the whole energy paid at power plants also high temperature and power co-production (CHP) plants [1]-[9]. Nearly entire electrical power on World is produced by rotational energy by means of water, turbine, compelled by wind, steam or burning gas. The turbine energies an initiating power. Around there were countless dissimilar approaches of emerging mechanical energy, together with heat engines, hydro, wind then tidal power [3].

Meanwhile the Indian Railways has devoted to electrification of traction, it is significant to deliberate the features of effectiveness also carbon discharge, even though it sourcing the power. The conservative technique of sketch power since the dominant grid is wasteful and carbon concentrated. A change to distributed production at several facts resolve not merely to increase the effectiveness and worth of power distributed, on the other hand it drive to diminish the carbon footprint in Indian Railways. 25 kV Single Phase is the greatest favored one and collectively the recognized voltage norm for the overhead traction scheme. To rise overhead voltage. 2×25 kV arrangement is established so that at motor vehicle level, the voltage leftover up to 25 kV [7][8]. Certain Railways need desired system for 50 kV then again the similar is inadequate to heavyweight haul committed the rail structure in which the train likewise it leftover and restricted in that zone. This traction system has no many suppliers.

SYSTEM DESCRIPTION AND WORKING

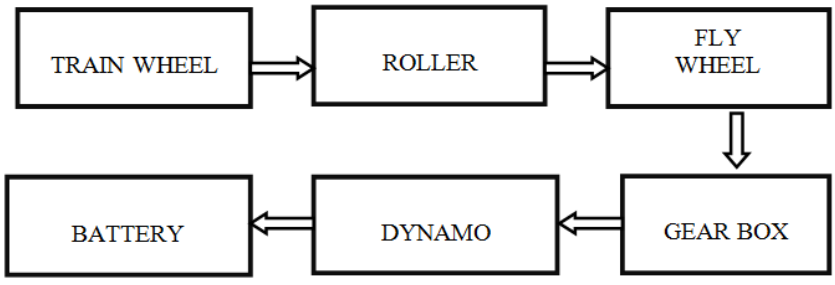

Figure 1: Block Diagram

The energy retained in the train can't be completely enhanced by regenerative braking. This scheme can be effortlessly assumed from the specified block diagram. Overall (Indian railway) while arriving into the railway station, the speediness of the train (irrespective of the type of service) is detach at FOUL MARK. (It is a mark, which is 1200 m gone from the station – Indian railway rules) [7]. Thus the train will travel merely by its own moment of inertia. The energy kept

in the train cannot be abundantly improved by regenerative braking. To hit that wasteful energy to convert it into electrical energy. The rotational energy is transmitted from the train wheel to the static roller. This static roller develops with a flywheel in direction to sudden shoot in the torque rate. Then the mechanical energy is turn into constant by gearbox and it is served to the generator that causes any changes in the mechanical energy which in turns convert to electrical energy. Thus obtained electrical energy is kept stored in battery. The block diagram describes the complete assessment of the paper. The comprehensive work will consist of several elements to be comprised for the endless storage in addition to stream of electricity supplied.

SIMULATION TOOL

The MATLAB SIMULINK (R2015A-version 7.0.14.739) is castoff for simulating as well as defining the possible output of planned paper with an actual time constrictions somewhere the speed of the running train also the conceivable rotation of the rollers that detailed in the software by designing the elements. The direct current is the prime source aiding the rotation of wheels in trains. The simulation is taking place by placing the block of D.C motor which symbolizes the speed of the train. To show the mutual drive of the train wheels in addition to the static roller in touch through the wheel edge of the train, the micro-turbine should designed consequently. This micro-turbine generates the mandatory mechanical torque used for the induction machine where it is attached with the previous one. Therefore the induction machine rotates by means of a papered speed by means to generate the very nearly continuous current which is yet again set to the charging circuit. This is to make stable input current to aid charge the battery positioned then. Additionally an inverter is engaged to get the output current of an identical and an alternate current system which is at last supplied to the grid of the railway sub-station.

EXISTING SYSTEM

The State Electricity Board (SEB) deliveries 11kV to Railway Substation, after there it is step down to 400V by the Delta-Star, 3-phase transformer. There exist two transformers at the railway substation; one is retained as supplementary one. The railway substation deliveries 230V to required podiums by concerning one phase in addition the neutral to the railway podium. In a directive to evade the whole black-out throughout the time of load shedding, the railways so long as an emergency lighting inverter. The arrangement is described over simulation. The elementary form of the Indian railways power distribution network is illustrated in the simulation block diagram. The recent railway subsystem accepts a voltage of 11KV totally drawn as well as exploited from the State Electricity Board during the day. The simulation output in figure 2 displays the graph demonstrating the state electricity board supply voltage and current. The 100V dc output voltage attained after the simulation of the mechanical arrangement is deposited into a battery and can be extra employed in railway podium. Therefore the output voltage created from the running wheels of the train requirements to be transformed, controlled in addition to synchronize the counterpart of the podium restrictions of voltage. A closed loop boost converter is castoff in the simulation apparatus which is controlled by P controllers of suitable gains. The converter boosts up the dc voltage of around 230 V and the controller safeguards 80% state of control in the battery. PI controller orders the voltage to retain it restricted to the vital value of 230V AC. The controlled output is provide into the grid somewhere from the podium receives the power which can one or the other be taken from the SEB or the proposed arrangement.

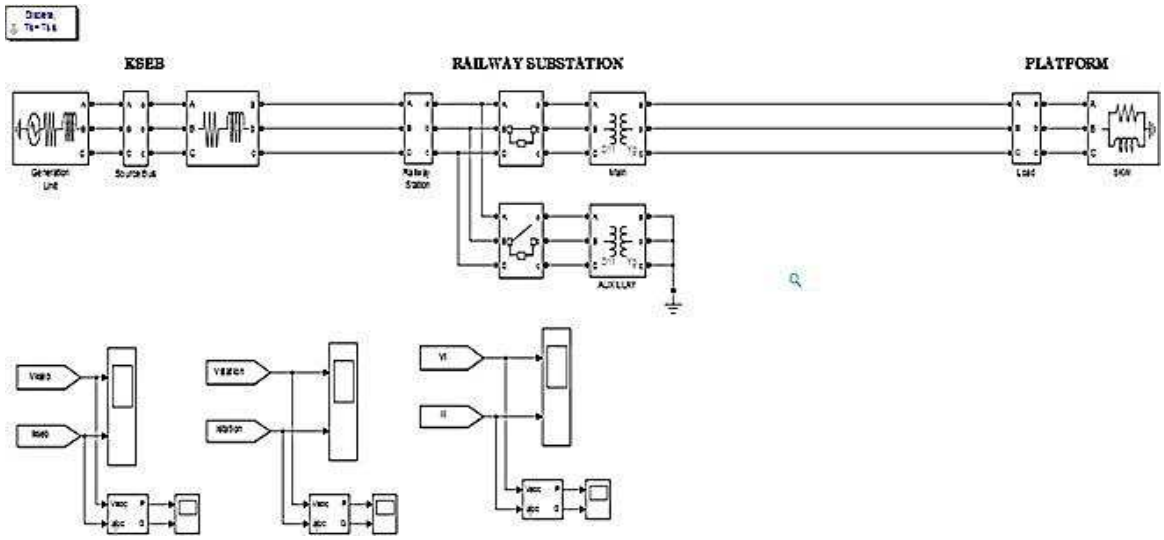

Figure 2: Existing System

MECHANICAL SYSTEM

The mechanical system in this paper is depicted in the simulation by means of elements which comprises of micro-turbine besides flywheel scheming. The output of the micro turbine along with the flywheel is the operative torque produced in the system that is equivalent to the mechanical torque output in the realistic design of the paper [14][15]. The output so found by this setup is once more corrected to portray the dc output that motive which will received from the dynamo in repetition. The output is established to be 100 V.

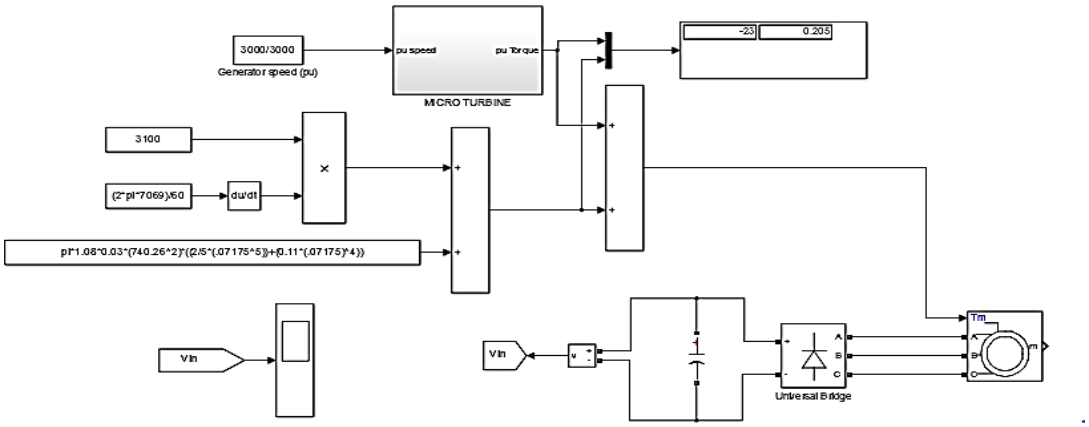

Figure 3: Mechanical System

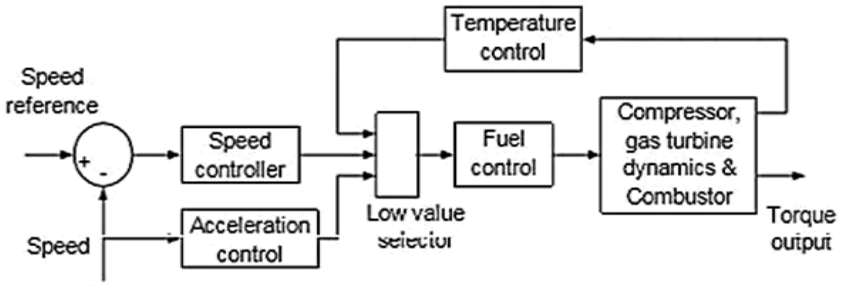

Figure 4: Basic Block Diagram of Micro Turbine

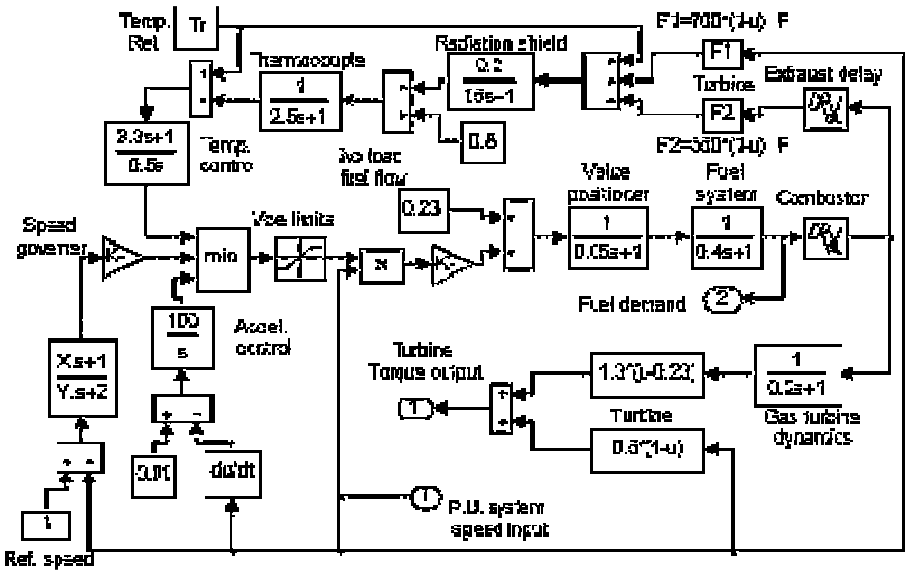

Figure 5: Micro Turbines Simulink Model

It is simply a torque device (AC Induction Motor/generator). The equation that rules the flywheel is simply

$$T = I\omega' + Td \tag{1}$$

Here T is depicted as the shaft torque, while Td is aerodynamic drag torque in the flywheel. Rotational inertia is represented as I in addition to that ω' symbolizes the time derivative of angular velocity, D is the cylindrical by thickness of flywheel, the shear drag coefficient symbolize by CDf , where ρ is the fluid density

$$Design\ Td = \Pi\, \rho\, CDf\, \omega^{4} (2\, r^{4} + Dr^{4}) \tag{2}$$

So here D is the thickness of roller

r is the radius of roller

Roller dia = Height of Rail–Flange Height

= 172mm− 25.5mm

= 143.5mm

Assume, Thickness of roller,

D=(3/4)×Roller dia =.75×143.5mm

= 0.11m

To find Roller speed in rpm, $N1D1 = N2D2$ Where,

$N1$=Wheel speed in rpm,

$D1$=Diameter of wheel

$N2$=Roller speed in rpm

$D2$=diameter of roller

$D1$ =915mm

$N1$= 30kmph = 1109rpm

$D2$=143.5mm

From this we obtain the value of $N2$ = 7069rpm = 53.11mps Inertia I=0.03

$$C_{Df} = \frac{0.455}{(\log(Re)^{2.58})} = 0.03 \quad (3)$$

$$T_d = (\pi * 1.08 \times 0.03 \times (740.2)^2) \times (^2 * (0.07175)^5 + 0.11 * (0.07175)^4) = 0.21Nm \quad (4)$$

ELECTRICAL PART DESIGN

The contribution for boost converter is the output from DC generator/Dynamo. Boost converters are castoff to lift up the magnitude of voltage beginning one level to an additional. Here the output voltage after mechanical part (100V) is boosted to 230V DC [16]. The usefulness in acoustic noise reduction is contingent. For being an united form in the PWM strategy. For error compensation a P controller is also depicted [19].

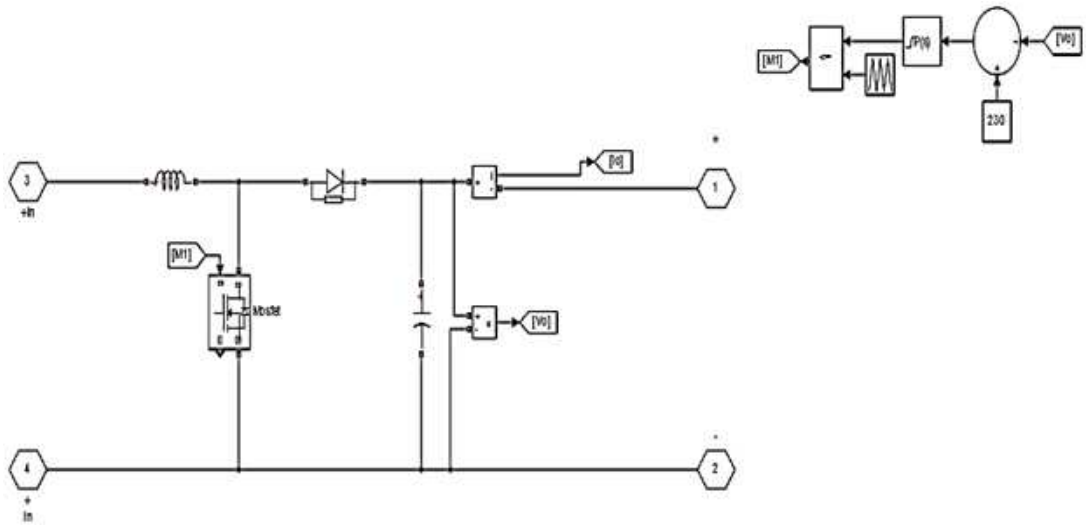

Figure 6: Boost Converter

V_{in}=100V V_o=230V

$D = 1 - Vi/V_0$ =(1-($\frac{100}{230}$))=0.565 (5)

Power output=3000W

$Io = \frac{Po}{Vo}$ (6)

$\frac{300}{230}$=13.04A (Full output current)

Samples F_s = 50 KHz

Inductor selection habitually bounces a series of suggested inductor standards in the data sheets

V_{IN}= nominal used voltage as input

V_{OUT} = desired voltage in the output region

F_s = converters least switching frequency

Ripple current is 20% to 40% of the output current as per estimation for the inductor chosen.

ΔI= ripple current assessed in inductor

$I_{OUT\,(max)}$ = extreme output current used in the application

$$L = \frac{V_{IN} * (V_{OUT} - V_{IN})}{(V_{IN} * (V_{OUT} - V_{IN})} \quad (7)$$

$$\Delta I_l = 0.2 * I_{OUT\,(max)} * \frac{(V_{OUT}}{V_{IN}} \quad (8)$$

$\Delta I_l = (0.2 * 13 * (230/100)) = 5.98$ (9)

$$L = \frac{100 * (230 - 100)}{(5.98 * 50 * 1\,000 * 230)} = 18\ mH \quad (10)$$

- Schottky diodes are used to decrease the losses. The maximum current output is equivalent to the forward current rating. The average rating of Schottky diodes is less but the current rating has a far complex peak [17].

  I_F= average forward current used in the rectifier diode

  V_F = rectifier diodes forward voltage

  $$P_D = I_F * V_F \quad (11)$$

- Existing PWM topologies are used for the good enhancement for the working of the components in simulation, thus it effects the THD minimization and form the deterministic PWM topology [20].

- To custom very low ESR the best method is to decrease the ripple on the output voltage by using capacitors. Generally ceramic capacitors are used for this action if the dielectric material is X5R [17].

- While some of the capacitors charge beyond the suggested limit as per the data sheet that used; the converter will take an exterior compensation however the compensation has to be familiar for the used output capacitance.

  $$Cmin = \frac{I_{OUT\,(max)}}{(fs * \Delta V_{OUT})} \quad (12)$$

  $$\Delta V_{OUT} = \frac{I_{OUT\,(max)}}{(C1 - D) + \left(\frac{\Delta I_L}{2}\right)} \quad (13)$$

  $$\Delta V_{OUT} = \left(\frac{13}{(1 - 0.56)}\right) + \left(\frac{5.98}{2}\right) \quad (14)$$

  $$Cmin = \frac{18.58}{(50 * 2 * 1\,000 * 21.8)} = 4.4\mu F \quad (15)$$

  $R_0 = V_0 / I_0 = 230/13 = 17.65\Omega$ (16)

- In most of the power applications inverters are vibrantly used. Power electronics upgrade to the foremost level for the last two decades.

- According to this inverters that ultimately doing a conversion process which change from DC-AC power [18].

- Thus the system can be further used for the High Voltage DC Transmission (HVDC) that can be generated from the higher voltage DC which is form the single phase AC[22].

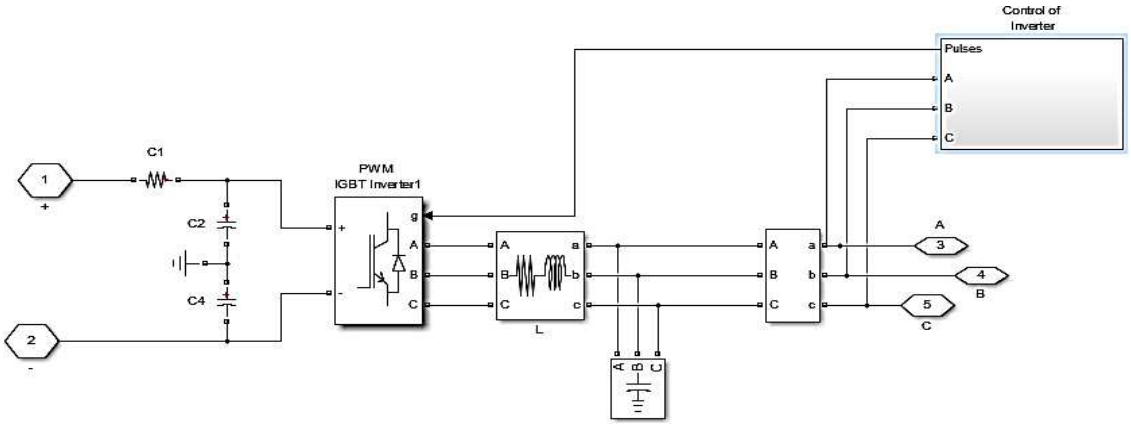

Figure 7: Inverter

In this proposed scheme DC output commencing the boost converter is specified to safekeeping a battery. And it is linked to an inverter. For error compensation a PI controller is presented. In solid state drives with fixed switching frequency, the harmonic power is concentrated in discrete harmonics of the output voltage. The harmonic power is spread as a continuous spectrum in drives with randomly varying switching frequency [22]. Basically an inverter is just a converter which converts DC power to AC power. Most prominently the conversion of DC to AC is taking place in an inverter and Voltage Source Inverters (VSI) are attain. In VSI the fixed voltage from the device is taken (DC supply) and these convert into an AC supply with variable frequency. Using grid voltage the output voltage is synchronized; so that a huge amount of ripple current from the PWM inverter will give to the grid.

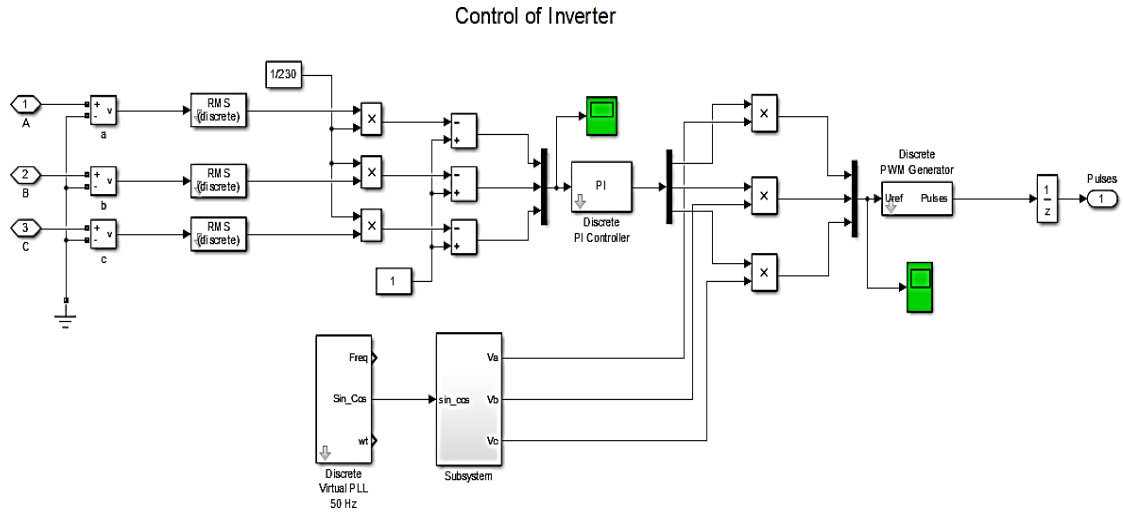

Figure 8: Controlled Inverter

SIMULATION RESULTS

KSEB resolve the source 11KV to the railway substation. In addition to railway locations it is stepped down using a transformer. Current taken from the KSEB is approximately zero. However nearby there happens definite leakage current. Voltage also current waveform in the podium is portrayed. Subsequently in our simulation one railway podium is connected at a period to the railway substation and supplementary podiums are detached through circuit breaker

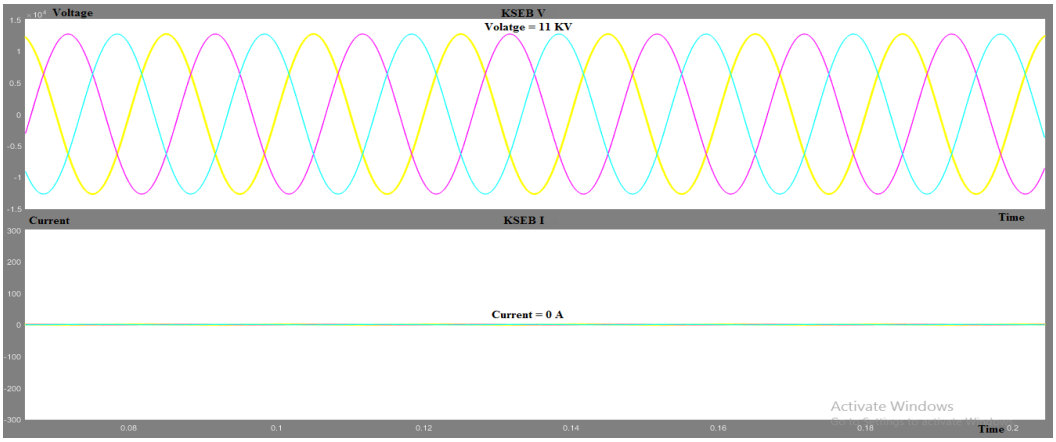

Figure 9: KSEB Supply

For a single phase ac source the dc link voltage fluctuation problem is more serious for an inverter system [21]. The load pulls simply a single phase current. The voltage is 230V in addition Current drawn is 13A.

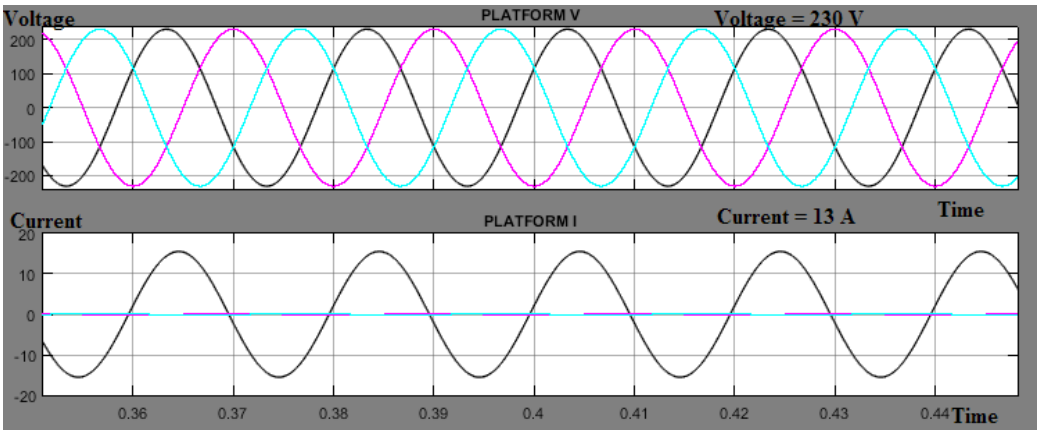

Figure 10: Platform Supply

MECHANICAL OUTPUT

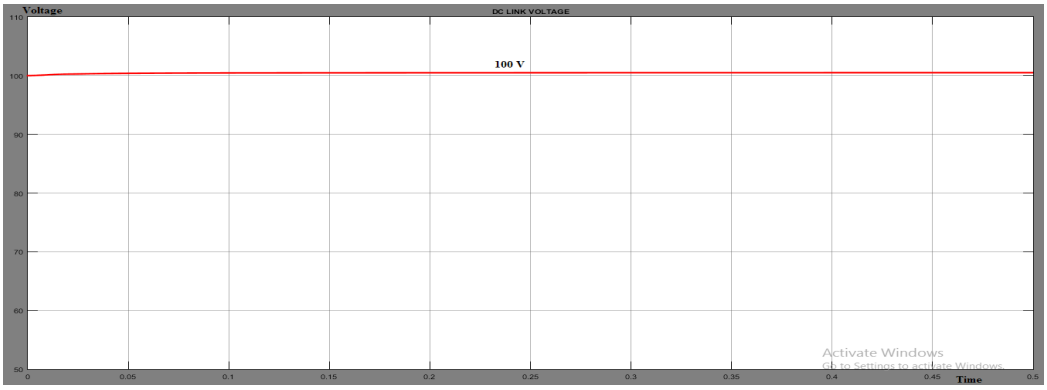

Figure 11: Mechanical Output

From the above Power output at inverter it has been showed that excess current is taken from the inverter portion than State Electricity Board. Since it custom the reactive power pull commencing the proposed scheme is which specifies the power adding to the loads. The voltage at the inverter portion is 230V in addition to Current is 35A.

OUTPUT OF PROPOSED SYSTEM

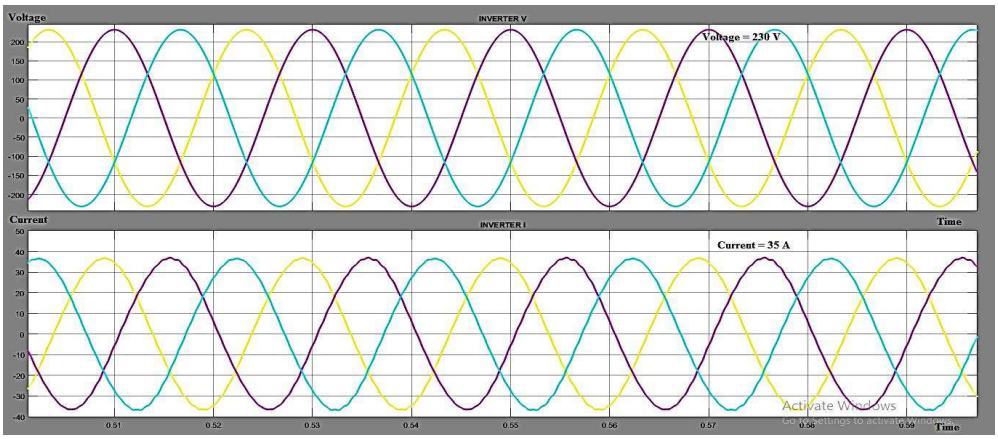

Figure 12: Inverter Voltage and Current

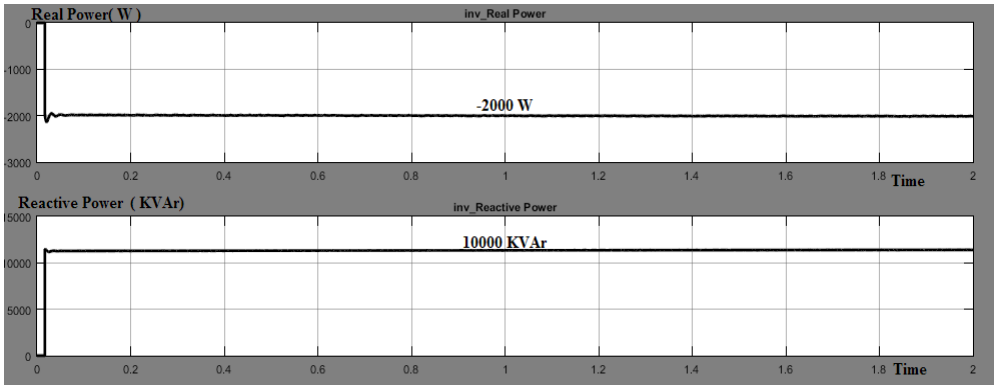

Figure 13: Power Output at Inverter Portion

CONCLUSIONS

In this paper electrical power produced by the train wheels is an extra effective and can be meant for the electrification of the railway station. While comparing to an additional renewable resources like solar energy, fuel cell etc., the rotational energy takes unexpected efficiency of producing electricity. This paper is an emphasis on the novel idea of wheel power that can be put in storage too use modestly. The electrical energy produced by consecutive running wheels of train can be used as an able power source for railway customs such as water stock, to charge cell phones, laptops etc., in the railway podium. The overall expense for this scheme is a smaller amount. So the government of India can effortlessly implement this plan. We expect this technique can be simply accepted in the contemporary era.

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Sensor Based Smart Monitoring and Controlling System for Cultivation using Labview

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Abstract*: Agriculture is the most important back bone of India. Now a day's farmers are reduced because of various problems like water problem, real estate, technology etc. Here our proposed system is to make use of existing technology to improve the farming percentage, gardening and nursery in a smart, effective and accurate method. Our proposed design is an automatic smart monitoring and controlling field system based on IoT which is implemented with NI LabVIEW and NI myRIO interfacing device. NI LabVIEW is a tool for testing, automation, measurement and monitoring system. NI myRIO is an embedded hardware where sensors like Temperature sensor, Moisture sensor, Rain sensor, Humidity sensor, Motor and communication protocols are interfaced with the help of LabVIEW. In this paper, we proposed ground water harvesting though that rain water is stored in the water tank which can be used in future for sprinkling water when soil moisture is less. This proposed design is the best way of economical accuracy and low-cost maintenance system. The concept of IoT in this paper is to monitor the status of the field like water level indicator in the tank, temperature of the field, to know the moisture of the field and detection of rain by using mobile phone or PC or Tab form any part of the world. This research will help the small-scale, mid-scale and high-level forming lands and it will increase the yield percentage and save the agriculture.

***Index Terms*: IoT, NI LabVIEW, NI myRIO, Sensors, Monitoring and controlling system.**

I. INTRODUCTION

In order to make smart field system which helps the farmers for easy farming technique, we used LabVIEW for better programming and accuracy of sensor values [1-2].LabVIEW is a virtual instrument were sensor readings and data's can be monitored and controlled [3]. NI myRIO is an embedded device was we have interfaced all the sensors and myRIO is programmed with LabVIEW. This is the automation process and closed loop system were Moisture sensor, Rain sensor, IR sensor, Temperature sensor and Motor are inter linked with LabVIEW and IOT.

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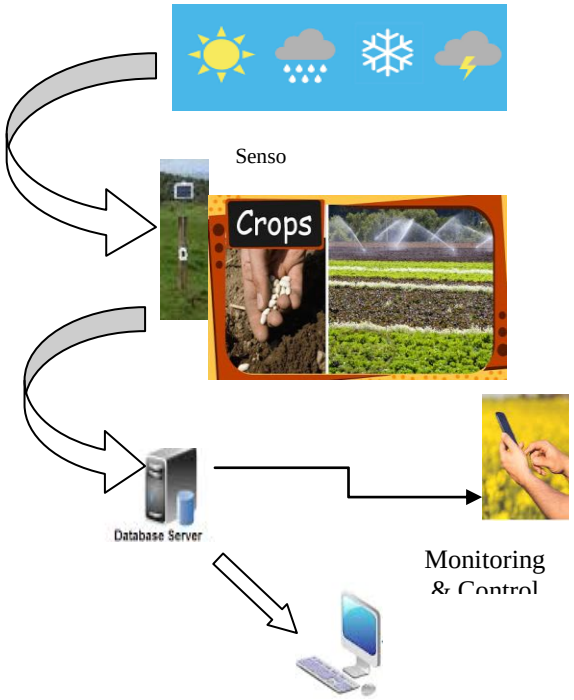

Figure 1: Smart Field System using IoT

In Figure 1 shows the smart filed system integrated with sensors and system. The farmer will get the immediate message from data base server about the weather condition in real time monitoring from remote locations. Based on the information he can able to do the work in the field. This smart field system using IoT reduce the burden of the farmer in weather monitoring and will yield more crops in their fields in better way [4].

II. SENSORS

Thingspeak is clouds sever where you can store you real time data and can be monitored and controlled from any part of the world [5-6]. NI myRIO: NI myRIO is an embedded hardware where sensors like Temperature sensor, Moisture sensor, Rain sensor, Humidity sensor, Motor and communication protocols are interfaced with the help of LabVIEW [7].

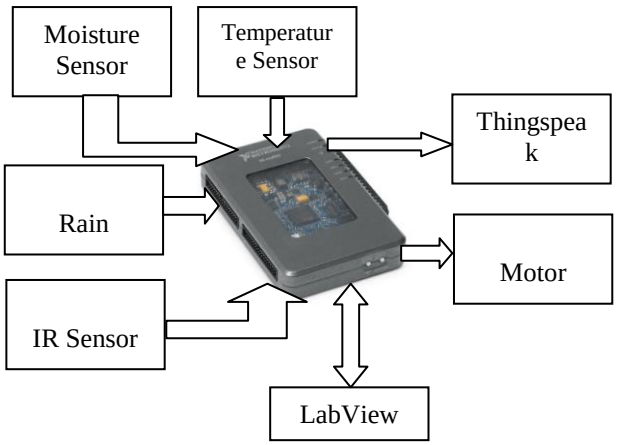

Figure 2 : Block diagram of Interfacing unit

In Figure 3 in our proposal, we used rain sensor to detect weather it is raining or not. If it is raining ground water must be stored in the tank and sprinkler should be off if it is on. Behalf of it we are measuring the rain level and monitored through IoT.



Figure 3: Rain Sensor-HL

In Figure 4, Soil moisture sensor is to detect the moisture of the soil and gives the reading to myRIO. myRIO will send data to cloud.

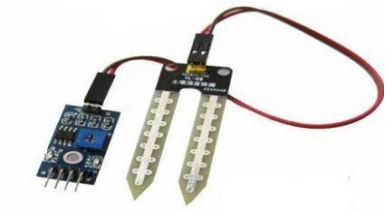

Figure 4: Moisture Sensor-YL69

In Figure 5, our proposal we used IR Sensor to check the tank level. If tank level is less than the threshold value motor is on to fill the water if water reaches the threshold IR sensor will detect and send signal to myRIO to stop the motor.



Figure 5: IR Sensor

The effective distance range 2 ~ 10cm working voltage of 3.3V-5V.The detection range of the sensor can be adjusted by the potentiometer, with little interference, easy to assemble, easy to use features, can be widely used robot obstacle avoidance, obstacle avoidance car assembly line count and black-and-white line tracking and many other occasions.

In Figure 6, the purpose of tank motor is to fill the tank when water level is less than 90%. If it is raining the tank motor will be off.

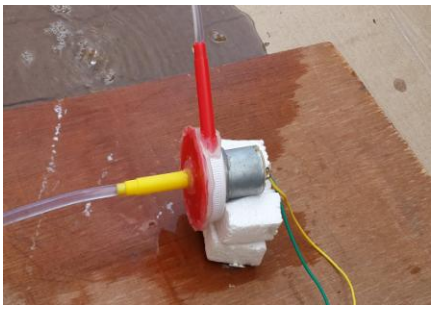

Figure 6: 5v DC Motor

In Figure 7, the purpose of sprinkler is to sprinkle the water automatically when the soil moisture is less than the threshold level.



Figure 7: Sprinkler

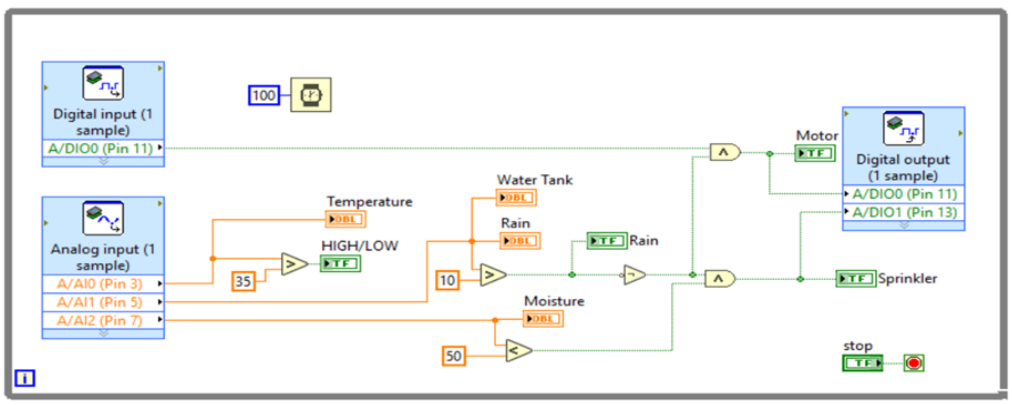

Figure 8: LabVIEW Interface for Proposed Model

I. PROPOSED TECHNIQUE

In Figure: 8 the block diagram of LabVIEW Interface for smart field system is shown. It will give graphical analysis of the rain sensor, temperature sensor and moisture sensor whenever the hardware module of system is connected to software. The motor can also be manually controlled in the Graphical user interface. The status of the motor pump is also shown in the LabVIEW GUI for easy analysis of the moisture and rain sensor module. LabVIEW is a tool which uses Graphical programming language for testing, measuring, monitoring and automation. NI LabVIEW is used to program myRIO to interface sensors [7].

The following steps are the proposed system undergoes.

Step 1: Data Initialization and power supply to interface devices - **START**

Step 2: Read the Temperature(T) range.

Step 3: If T <= Fixed threshold value, the pump in OFF mode i.e, No irrigation in the field.

Step 4: if T > Fixed threshold value, the pump in ON mode i.e, Start irrigation in the field.

Step 5: Read the Moisture (M) level

Step 6: If M > Fixed threshold value, no need to irrigation, the pump will be off.

Step 7 : Read Rain (R) Also if it's raining, repeat step 6.

Step8: : if T > Fixed threshold value, and no rain conditions the pump in ON mode i.e, Start irrigation in the field.

Step 9: Initialization of pump and displaying data on LabVIEW interface and Thingspeak. GUI can also control the motor manually.

Step10: Once the process is completed, it returns back to original state (step3).

Step11: Process **STOP.**

In LabVIEW front panel all the indicators are placed so that farmer can know what is happening in the field through mobile phone. When moisture of the soil is very less the sprinkler motor will automatically starts and prays the water till the moisture of the soil is above threshold point. When there is a rain, the rain sensor will detect the rain and stops the sprinkler motor if it is on and stores the rain water into the water tank through ground water harvesting. IR sensor is used to detect the water level in the water tank, if the water in the tank is less than 90% the motor with automatically on to fill the tank. This project is a feedback system in which all the sensors interfaced with myRIO will communicate with each other and works accordingly. The Table 1 shows the different range of setting used in the LabView module for the simulation.

Table 1: Simulation Parameters

Sl.No	Parameters	Range
1.	Digital Input	0 or 1 Logic
2.	Analog Output	0 to 5 V
3.	Temperature Sensor	0 to 5 V
4.	Rain Sensor	0 to 5 V
5.	Moisture Sensor	0 to 5 V
6.	Water Tank	0 to 5 V
7.	Motor	0 or 1 Logic
8.	Sprinkler	0 or 1 Logic

II. RESULTS & DISCUSSIONS

Table 2 shown the experimental setup connected to myRIO and sensors.

Table 2: Experimental Output

Type of Soil	Time	Dry Condition (V)	Wet Condition (V)	Temperature (C)
RED	9:20:25AM	4.34	1.23	30.65
	12:40:12PM	4.77	1.53	32.52
	01:35:4PM	4.81	1.86	33.32
BLACK	9:23:27AM	4.45	1.32	29.52
	12:30:15PM	4.78	1.36	30.34
	1:45:34PM	4.56	1.67	29.67
CLAY	9:15:29AM	4.56	1.28	30.61
	1:15:18AM	4.71	1.31	31.78
	02:05:34PM	4.83	1.89	33.26

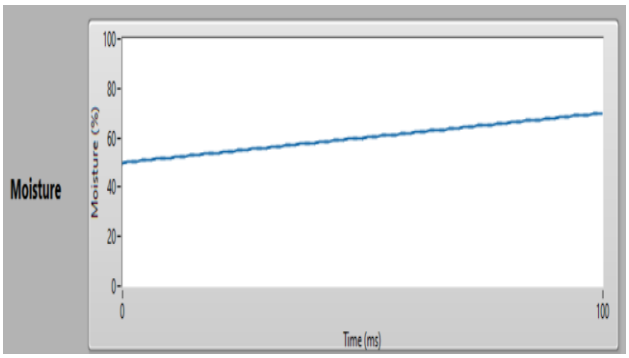

Figure 9: Experimental setup

In Figure 9 graph indicates the soil moisture percentage range with respect to time, when its percentage range is less than 40% the sprinkler will automatically switch on, when the moisture percentage is more than 40% the sprinkler will be automatically switched off.

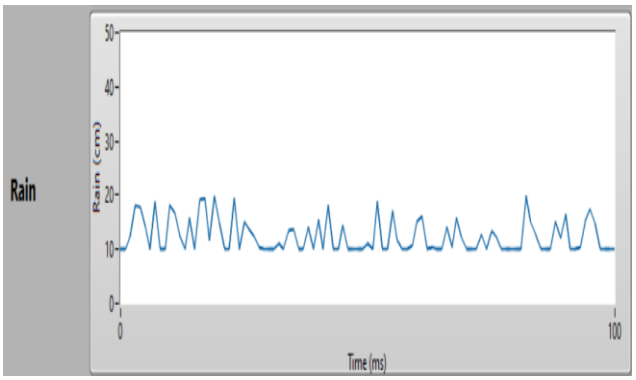

Figure 10: Experimental setup

In Figure 10, graph indicates the detection of rain. When there is rain there will be change in graph or else constant line will be displayed.

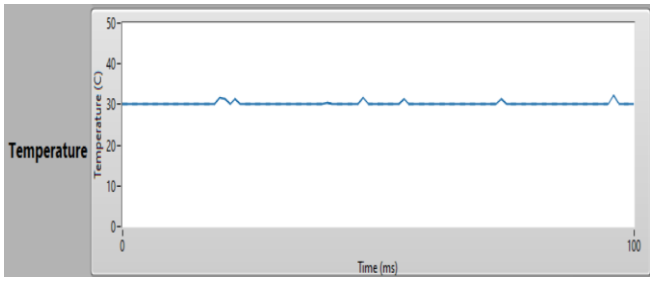

Figure 11: Temperature monitoring

In Figure 11 graph indicates the field temperature. Based on high /low indicator in the front panel the former can do the necessary actions to be performed.

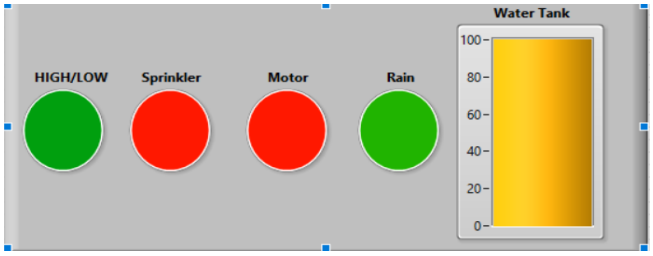

Figure 12: Level of Indicators

In Figure 12, different level of indicators indicates whether temperature is in range or not, sprinkler is on /off, Motor is on /off, is it raining or not and rain water and motor water will be stored in water tank.

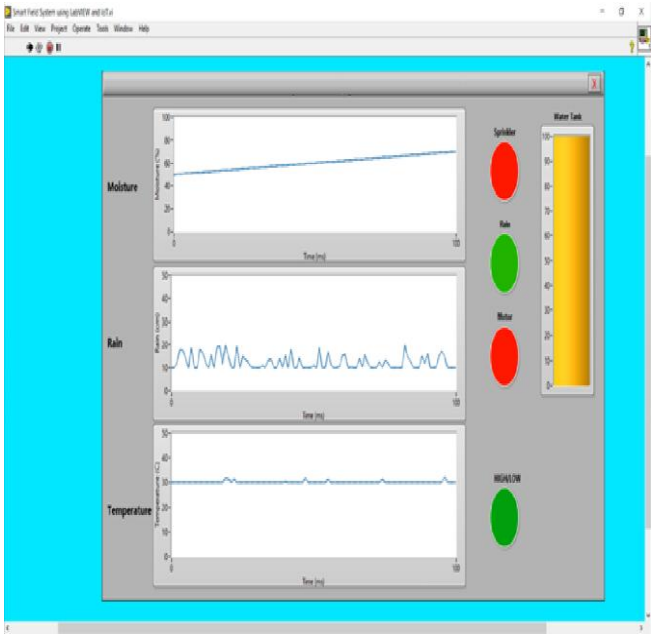

Figure 13: Monitoring and Controlling system

In Figure.13 the front panel screen which is displayed to farmer in mobile phone through cloud. Based on this the farmer can do agriculture from home are from office. This is the reason making this forming as smart field system.

III. CONCLUSION

This concept is a similar design technique of monitoring and controlling the farming parameters using LabVIEW. Providing valuable tools that need to build any measurement or control application graphically in less time, LabVIEW is the unique development tool for innovation, discovery and accelerated solution for human problems. We have combined the power of LabVIEW software with reconfigurable hardware myRIO to overcome the ever - increasing complexity involved in providing measurement and control systems on right time and less cost. The rain sensor is very important to avoid unnecessary power wastage by motor as well as saving the water. Moisture measuring is critical in agriculture to help farmers manipulate their irrigation process more successfully. This paper will help the farmers to use less water to grow a crop though increase growth in yields. Embedded system for computerized irrigation of agriculture gives a real-time solution to assist web page- precise irrigation control which permits farmers to increase their productivity and develop the nation.

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An Efficient Technique to Remove Gaussian Noise and Improve the Quality of Magnetic Resonance Image

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Abstract*: Medical Resonance Imaging (MRI) is very useful in different medical applications for diagnosis the diseases in human body. But the main problem arising in MRI images is presence of various noises. These noises are affecting the originality of the MRI images and producing erroneous results. Here Brain MRI images are used for analysis of noise. Brain images are fractal in nature and especially those images are affected by various noises. In this paper we discussed about the Gaussian noise in brain MRI image. The effect of this noise is reduced by wavelet based thresholding techniques. They are namely Visu shrink, SURE shrink and Bayes shrink. These three methods are applied to the brain MRI images and obtained results are compared by PSNR(Peak signal to Noise ratio), MSE(Mean Square Error),Absolute error, Fractal dimension, IEF(Image Enhancement Factor),Normalized cross correlation and structural content.

***Index Terms*: MRI Images, Gaussian Noise, Wavelet Thresholding, PSNR,MSE, NK, and IEF.**

I. INTRODUCTION

Many researchers are focusing the medical image processing for removal of noises. Because, the noise affected MRI images produced the erroneous result and misleading the user for false observation of diseases. Image restoration technique is used to deal larger part of image processing with or image denoising, denoising the noise affected images plays a major role to diagnose the diseases in a proper manner and to retain the image up to its quality[1-2]. One of the best method suggested many researcher by image denoising and this will helpful for the reduction of noises in MRI images. The different fields this technique applicable and tradeoff between the image features and noise reduction must be taken into account while denoising. Many soft computing techniques are recently used for removal of noises in MRI [3]. MRI (Magnetic Resonance imaging) is used for taking medical images. CT (Computed Tomography) and Ultrasound imaging techniques are also used in medical images. Among these MRI sounds better in giving high resolution images of the soft tissues in human body. Human brain is the soft and most complex organ of human body. An image of human brain consists of several complex patterns that are independent of scales. Thus brain image is a self similar structure and is fractal in nature [4-5]. Salt and pepper noise, Gaussian noise, speckle noise and fractional Brownian motion noise (fBm noise) are also affected the MRI images [6-7].

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II. PROPOSED TECHNIQUE

Now days, wavelet transform technique is most popular because of accuracy and classification of images. Here, DWT (Discrete Wavelet Transform) is used [8-9]. Using this technique can represent an image with high resolution. To remove the noise presented in brain MRI images Wavelet denoising technique is proposed in this paper. Also it preserves the image details without considering the frequency content of the image and so it suits well for medical images. In DWT the brain MRI image is considered to be consisting of small functions called wavelets [10]. The three wavelet techniques are explained below,

A. Visu Shrink

Here fixed threshold is applied and is given by the equation,

$$T_u = \sigma_n^2 \sqrt{2 \log N}.$$

Where N is the size of the image and the median absolute deviation of noise σn2 is given by,

$$\sigma_n^2 = \left[\frac{median(HH1(n,m))}{0.6745}\right]^2 \qquad (2)$$

Here n and m are the pixel indices of the sub band HH1 which is obtained by the first level of wavelet decomposition.

Visu shrink considers only the images of size N and the standard deviation of the noise. Visu shrink threshold value increases as the number of pixels in the image increase and as a result, the significant coefficients are killed. Visu shrink minimizes the overall error in the denoised image and produces overly smoothened estimation. This method does not work properly if there are discontinuities in the signal.

B. SURE Shrink

The combination of universal threshold and the Stein's unbiased risk estimator constitutes SURE shrink. Each sub-band is having separate threshold here. This is best suited to image with sharp discontinuities. This performs well in denoising the image and it has minimum value for mean square error. The threshold function is given by,

$$T_S = \min(T, \sigma_n^2 \sqrt{2 \log N}) \qquad (3)$$

Here T is the value that minimizes the Stein's unbiased risk estimator.

C. Bayes Shrink

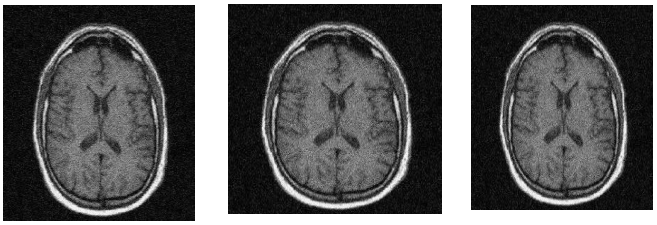
Bayes shrink models the wavelet coefficients with general gaussian distribution. This adapts to both signal and noise characteristics. The threshold is given by the relation,

$$T_B(\sigma_x) = \frac{\sigma_n^2}{\sigma_x} \qquad (4)$$

Here σx denotes the standard deviation of the image in each wavelet sub band.

III. Simulation Results and Discussions

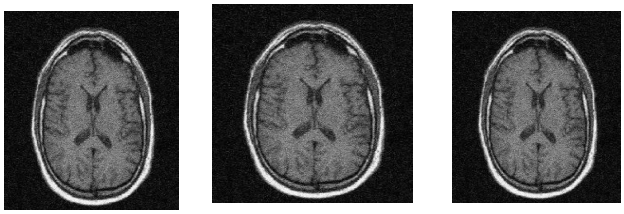
The wavelet based thresholding techniques are implemented by using MATLAB (R20111a) and the simulation results for Visu shrink are given in the Fig. 1. The Fig. 1(a) shows the original image. The Fig. 1(b) shows the noisy image. The Fig. 1(c) shows the denoised image. Here in the noisy image the value of the Hurst parameter is 0.11 (for a classical Brownian motion, the Hurst parameter h=0.13).



(a) (b) (c)

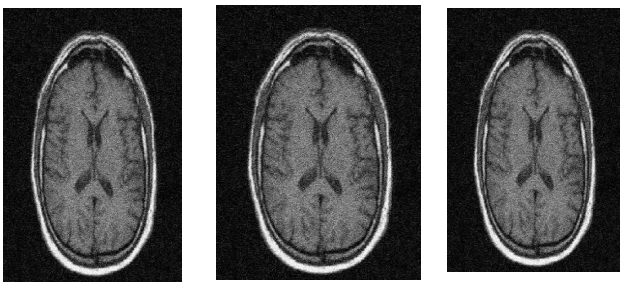
Fig.1. Simulation results for Visu shrink

The simulations results for SURE shrink are given in the Fig. 2. The Fig. 2.(a) shows the original image. The Fig. 2.(b) shows the noisy image. The Fig. 2.(c) shows the denoised image. Here also the noisy image takes the value of 0.11 for H.



(a) (b) (c)

Fig.2. Simulation results for SURE shrink



(a) (b) (c)

Fig. 3.Simulation results for Bayes

The simulation results for Bayes shrink are given in the Fig.3. The Fig.3. (a) shows the original image. The Fig.3.(b) shows the noisy image (with Hurst parameter of 0.11). The Fig.3.(c) shows the denoised image.

The performances of all the three thresholding techniques are listed in the following Table. 1.

Table 1: Comparison of wavelet thresholding techniques

S.No.	Performance Metrics	VISU Shrink	SURE Shrink	BAYES Shrink
1	MSE (Mean Square Error)	0.6465e+02	0.2525e+02	0.1854e-02
2	PSNR (Peak signal to Noise ratio)	30.9852	50.2565	80.0658
3	FD(Fractal Dimension)	1.9844	1.9526	1.9965
4	IEF(Image Enhancement Factor)	1.2365	1.4424	9.000
5	SSIM (Structural Similarity Index)	1.000	0.6556	1.000
6	NK(Normalized Cross correlation)	0.6554	0.9912	0.9932
7	AD(Average Difference)	236	165	46
8	SC (Structural Content)	1.0000	1.0000	1.0000
9	MD(Maximum Difference)	251	228	254
10	NAE(Normalized Absolute Error)	0.6545	0.0563	0.0053
11	Time Elapsed when attempt to denoise	1.2604 sec	8.1924 sec	1.0801 sec

The following figures (Fig. 4 to Fig. 8) show the comparison graph for all the performance metrics for various samples of brain MRI images.

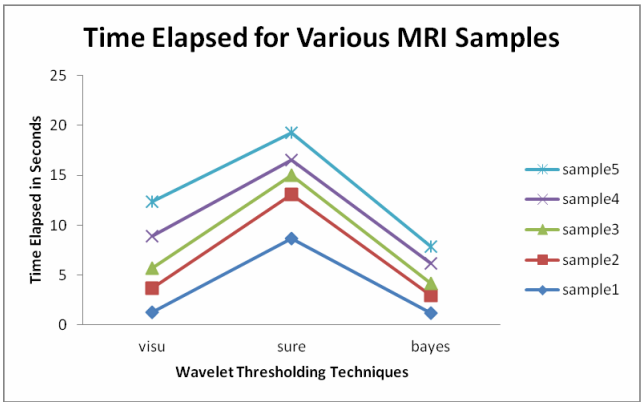


Fig.4. Chart for MSE

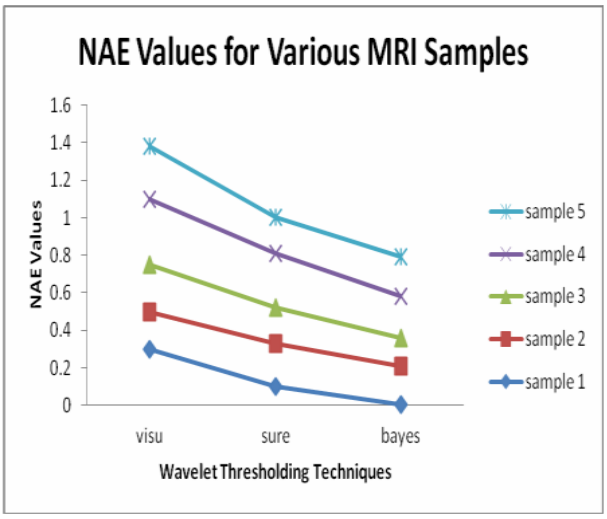


Fig.5. Chart for Normalized Absolute Error-NAE

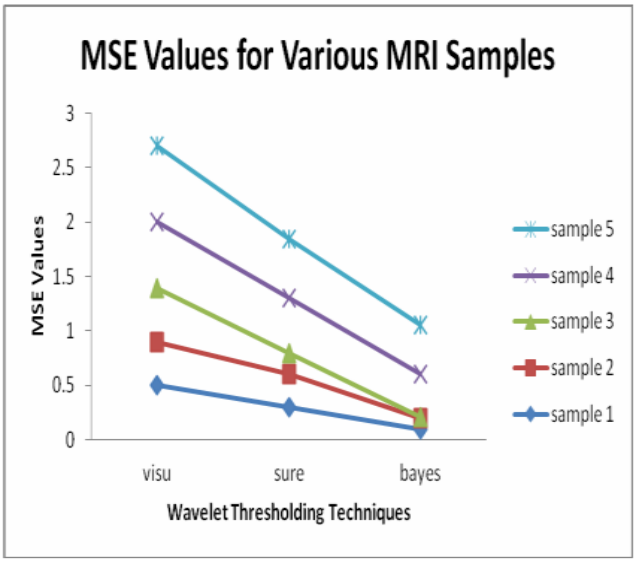


Fig.6. Chart for Cross Correlation-NK

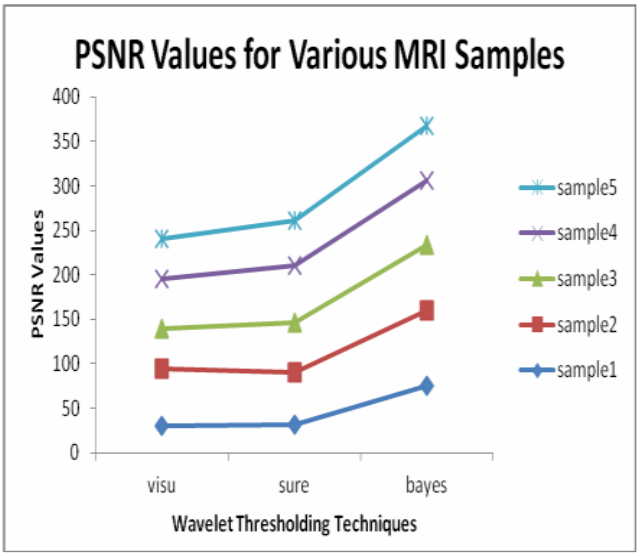


Fig.7. Chart for PSNR

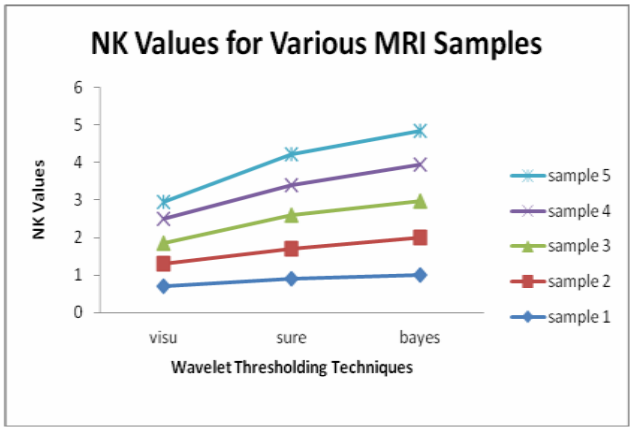


Fig.8. Chart for Time Elapsed to produce denoised image

IV. CONCLUSION

The inference from all these implementations are that Bayes shrink performs better in terms of all performance metrics. It has high PSNR ratio, lowest MSE and lower Normalized Absolute Error. In future this work may extend to analyze and implement by different filters for removing noise in MRI images. The conventional noise removal technique uses only the homomorphic filtering approach. The future scope also aims to propose a new type of filter that best suits to remove the noises and to test the performance of the filters using various evaluation metrics.

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Position Tracking of ML System using CSA Based PID Controller

P. Ananthababu, K. Rama Sudha

Abstract*: The classical proportional integral derivative (PID) controllers are still use in various applications in industry. Magnetic levitation (ML) systems are rigidly nonlinear and sometimes unstable systems. Due to inbuilt nonlinearities of ML systems, tracking of position of ML Systems is still difficult. For the tracking purpose of position, PID controller parameters are found by choosing Cuckoo Search Algorithm (CSA) of optimization. The ranges of parameters are customized by z-n method of parameters. Simulation results show the tracking of position of ML systems using conventional and optimized parameters obtained with the CSA based controller.

***Keywords*: Conventional Controllers, Nonlinear Magnetic Levitation System, Optimization algorithms, z-n method**

I. INTRODUCTION

ML is a method to levitate the object in free space against the direction of gravitational force with support of magnetic field [1] [2]. Position tracking of a levitated object becomes more difficult with conventional controllers. Conventional controllers fail in producing perfect performance when the systems are nonlinear and uncertain. Zhenyu Yang et al, [3] designed an automatic Conventional controller using Non-dominated Sorting Genetic Algorithm (NSGA-II) for one dimensional Non-linear Magnetic Levitation system (NMLS). Pallav S K et al, [4] developed a conventional controller for MLS with the derivative filter concept. Marria Hypiusova et al, [5] proposed a robust PID controller to stabilize the NMLS using frequency domain approach. In this approach, the controller chosen does not guarantee stability conditions; if it fails then the controller design has to be repeated. Witchupong W et al, [6] proposed state PI controller to achieve the control over the states of the MLS. Chang-Hyun Kim [7] proposed a robust air-gap controller considering disturbance force produced by magnetic suspension for MLS.

Optimization has gained superior power and influence in many applications like industrial design and engineering. The main objective of optimization is to be maximize or minimize the main function. Hongpo Wang et al, [8] designed a controller using optimizing the control algorithms for the MLS based on the state observer. R. J. Wai et al, [9] proposed a PSO PID controller for transportation system by controlling the ML system. I. Ahmad et al, [10] designed PID controller for MLS based on GA for the parameters of the conventional controller. Literature show, that CSA satisfies the convergence requirements in global when compared with other optimization techniques, so it can guarantee the global convergence properties [11]. Civiciglu, P et al, [12] and Dhivya, M et al, [13] have made an attempt to shown CSA is very efficient for the applications of data fusion and wireless sensor networks and also mentioned the CSA produces more robust results when compared with other algorithm, PSO, ABC etc. In this paper an attempt has been made to control the MLS, by using cuckoo search based PID controller. Section II describes the real time ML system. III Section describes the design of PID controller based on cuckoo search algorithm. IV Section describes performance of cuckoo search based PID controller for position tracking of ML system, and finally section V contains our conclusions.

II. REAL TIME MAGNETIC LEVITATION MODEL

The MLS mainly consists of Levitated steel ball, position IR sensor, controller & actuator. The levitated ball is controlled by current in the primary electrical circuit. The net force acting on the levitated ball is due to the current in the coil and distance y between coil & centre of the steel ball [2]. Fig. 1 shows the experimental setup of MLS.

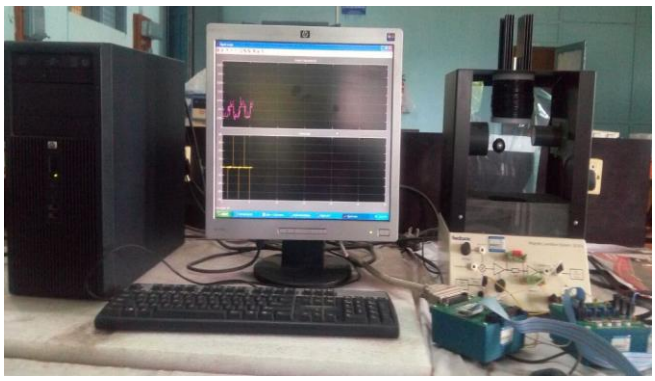

Figure 1 Real time setup of MLS

The non-linear model of ML system, which is expressed in current 'i' in the coil and the position 'y' of the levitated object as

$$m\ddot{y} = mg - K\frac{i^2}{y^2} \quad \ldots (1)$$

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Where K is the constant, depends on parameters of the coil, m mass of the levitated object, g is gravitational constant.

The maglev system in (1) is of nonlinear type, it is linearized in and around equilibrium point $i_0 = 0.8\ A$ & $y_0 = 0.009$ meters.

$$f(i,y) = K\frac{i^2}{y^2} \quad \ldots (2)$$

The linearized maglev system as

$$\Delta\ddot{y} = \left(\frac{\partial f(i,y)}{\partial i}\Big|_{i_0,y_0}\Delta i + \frac{\partial f(i,y)}{\partial i}\Big|_{i_0,y_0}\Delta h\right) \quad \ldots (3)$$

Using (3), calculating partial derivatives and taking the laplace transforms,

$$\frac{\Delta y}{\Delta i} = \frac{-k_i}{s^2 - k_y} \quad \ldots (4)$$

Where k_i and k_y are constants for the MLS and those are

$$k_i = \frac{2g}{i_0},\ k_y = \frac{2g}{y_0}, \quad \ldots (5)$$

With reference to electrical circuit, the current in the circuit is proportional to the control voltage V

$$i = k_1 V \quad \ldots (6)$$

Where, 'k_1' is proportional constant. transfer function of Maglev system is turned into

$$\frac{\Delta y}{\Delta V} = \frac{-k_1 k_i}{s^2 - k_y} \quad \ldots (7)$$

In above transfer function, ΔV is change in voltage.

Adding sensor gain to above transfer function, overall transfer function of the maglev system as

$$\frac{\Delta y_{so}}{\Delta V} = \frac{-k_1 k_2 k_i}{s^2 - k_y} \quad \ldots (8)$$

Here , Δy_{so} is output voltage at the sensor

For any value of the parameter of ML system without feedback has transfer function of 2nd order. The ML system has oscillations in its closed loop response. Due to closed loop response of ML systems, levitated object will fall down or will attract to electromagnet. In order to meet the performance specifications there is a need of controller.

III. PID Controller Design based on Cuckoo Search Algorithm

In general, conventional controllers are preferred for Industry application, parameter of controller are searched in a certain space. Parameters found in search space satisfies the required performance indices, those are best parameters of controller. These parameters ranges can be extended based on the parameters obtained with Z-N Method [14].

In order to get optimal parameters of PID Controller, nature inspired metaheuristic algorithm is required i.e. Cuckoo search algorithm [15]. CS uses levy flights for its global search, so that it can extends the search space effectively [16]. The steps involved in finding the optimal parameters of PID controller are as follows.

A. Cuckoo Search Algorithm

Step 1:- Confirm the function to be minimum $f(x), x = (x_1, x_2, \ldots, x_{nd})^T$, where nd is the number variables. Objective function as integral square error.

Generate the set of values for each variable in the function to be minimum, i.e., $x_i (i = 1,2, \ldots, m)$ randomly, and the other parameters - size, number of variables, probability to be maximum P_k and max. no. of iteration a;

Step 2:- with reference to the function to be minimum, confirm the solution function $p(x)$, $x = (x_1, x_2, \ldots, x_{nd})^T$, calculate the solution for each value of the variable, and note it.

Step 3:- record the best solution of each parameter value in every generation, using the function be minimum in Step 1 to get suboptimal values.

Step 4:- Compare the every best parameter value with the best one in last generation, and also keep the optimal value.

Step 5:- if the solution is not changed upto max. no. of iterations a or changes less than value 0.05 in max. no. of iterations a, then go for next step, Otherwise, skip the next step.

Step 6:- In each iteration, cuckoos can founds the good parameter value & bad parameter value, replace the poor parameter value form an intermediate group with an optimal parameter value generated during the previous iteration. Mutate the optimal parameter value by solution obtained in 2 step, regarding the parameter values except the optimal one as sub-optimal parameter values & mutate the sub-optimal parameter values by 3 step.

Compare the solutions of current and previous optimal, if current solution is best, then indicate current solution is optimal and also update it as optimal solution, otherwise, repeat the process. If max no. of times the variation is not successful, then execute 8 step.

Step 7:- compare probability to be maximum P_k with an arbitrary value $r \in (0,1)$ if $r > P_k$, then change arbitrary $x_i^{(a+1)}$. If no change, then hold the best group of parameter values.

Step 8:- terminate condition, to meet the max no.iterations a or did not met the minimum error ε condition. If do not attained, then return to 2 step. Otherwise execute the global optimal values.

IV. Simulation Results

In this, Conventional controller is designed for position tracking of ML System. The electromagnetic coil is placed on top of the ML System. IR sensor is placed on opposite sides of the levitated object. It is easy to sense the position of levitated object. If the levitated object is near to electromagnetic coil, it will experience an attractive force. Otherwise it will fall down.

Controller is required to maintain the levitated object in free space, i.e to control the force due to electromagnetic coil, so that position tracking of ML system can be achieved. The response of ML system is undamped and oscillatory. The designed controller should be capable of improving the response requirements. The parameters of conventional controller obtained with z-n method are $k_p = 4.0$, $k_i = 0.05$ and $k_d = 0.2$. The other parameters used in simulations as well as in real time application are in table 1

Table 1 Maglev system parameters

Parameter	Value	observation
m	0.011 kg	Mass of levitated object
y_0	0.0078 m	Equilibrium Position
i_0	0.421 A	Equilibrium current
k_i	0.4678 N/A	Current amplification gain
k_1	0.1 A/V	Control voltage gain
k_2	Aprox. 33333 V/m	sensor gain

CSA is utilized to find optimal parameters of the conventional controller by minimizing the objective functions like ISE, IAE etc. [14-15]. In this paper integral square error (ISE) performance index is chosen as objective function. The search space for the CSA is chosen based on the parameters tuned using Z-N method and also used these parameters for first iteration. The remaining parameters are chosen randomly around alpha by a guess. In order to get global optimum solution, care should be taken while choosing search space.

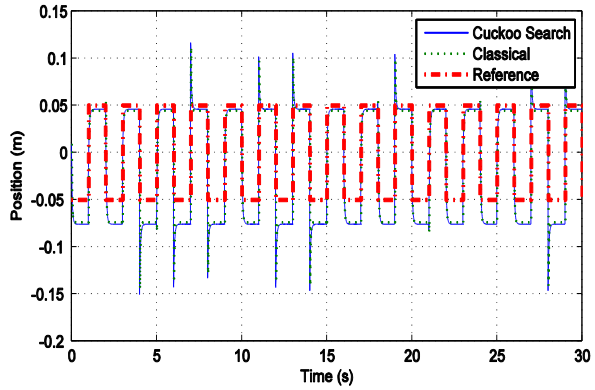

Figure 2 position tracking comparison of ML system in simulation

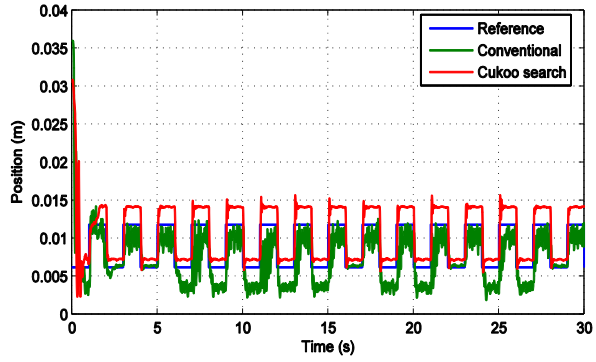

Figure 3 position tracking comparison of Real Time ML system

The comparison of position tracking response of the ML systems with PID controller using CSA and Z-N Method are in Figure 2. For the same parameters of the PID controllers has been implemented for real time ML system, which is shown in Figure 3.

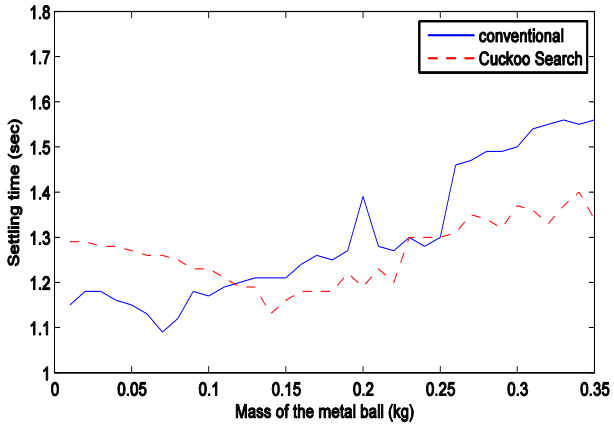

Figure 4 settling time comparison of ML system in real time

Fig. 4 shows the settling time variation of ML system for different values of mass of the levitated object. Conventional controller produces large variation in settling time as increasing the mass of the ball from minimum to maximum. As compared with conventional controller, cuckoo search based PID controller produces small variation in settling time as increasing the mass of the ball from minimum to maximum. Conventional controller needs to change the design parameters, if there is any variation in the system parameters. Cuckoo search based PID controller do not need any variation in the design parameters.

V. CONCLUSIONS

CSA based PID controller is designed for position tracking of ML system. The parameters obtained with CSA are optimized which are used in simulation as well as real time. CSA based PID controller guarantees the improvement in performance required, by minimising the integral square error of the ML system. The results are made comparison with conventional controller and CSA based PID controller. The conventional controller needs continuous updation if there is any change in the ML system parameters. CSA based PID controllers provides better performance when there is any change in ML system parameters.

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Performance of Distributed Power Flow Controller in Transmission System Based on Fuzzy Logic Controller

Rajareddy.Duvvuru, N.Rajeswaran, T.Sanjeeva Rao

Abstract*: *Many of the Power Flow Controlling Devices are mostly used in the Transmission Lines in order to monitor the real as well as reactive power-flow variations. In this work provide an innovative power flow controlling device such as Distributed Power Flow Controller, this device also belongs to the FACTS family. This device is emerged from the Unified Power Flow Controller, there is a small differentiation between both these devices that is the common dc-link. In case of DPFC there is no existence of the dc link which connects both the converters. By design a DPFC device in MATLAB/Simulink to analyze the transmission line parameters.

Keywords* : *electronics devices, Unified Power Flow Controller ,Distributed power flow controller.

I. INTRODUCTION

The increasing difficulty of the current power systems is largely due to the everyday change in the system arrangement in organize to meet the ever growing demand of electrical energy, through the development of installation of new units of generation, interconnectivity of the transmission lines, extra high voltage tie line etc. The combined controllers of FACTS and Power-Electronics are one of the most appropriate devices which are utilized in managing power-flow [1]-[2]. The series-compensated FACTS controller is known as UPFC which can be treated as one of the commanding Power Flow Controlling Devices which can be used to control the all parameters [3].

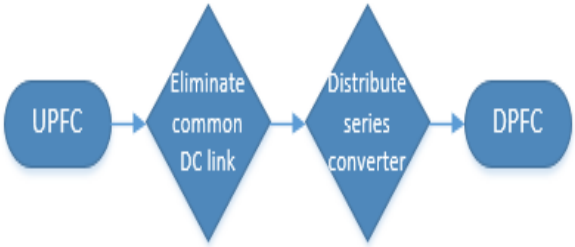

Figure 1. Conversion from UPFC-device to DPFC-device

Enlarging the Unified-PFC into the innovative controller known as Distributed-PFC is ended by apart from the common DC-link and series converter distribution as given away in Fig. 1.The new concept Distributed FACTS is employed in the series converter design. Here many number of low power rating converters are adopted as a replacement for a large 3-phase rated converter which results in low cost and increases the reliability [4].

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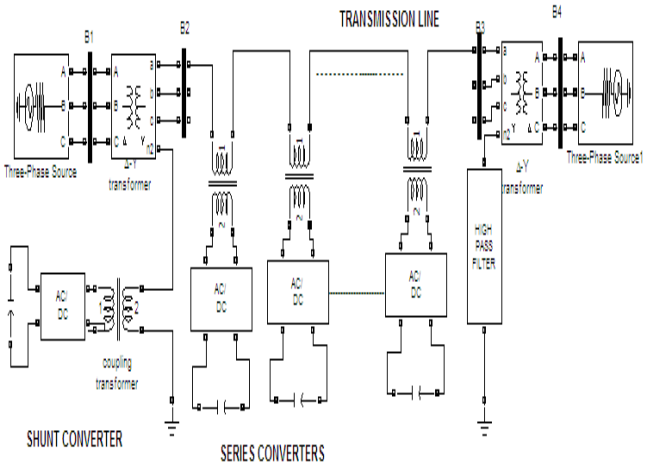


Figure 2. DPFC configuration

These are considered as the most important advantages of DPFC compared to UPFC. Figure 2 shows the configuration of Distributed-PFC consisting shunt along with series converters as in case of UPFC. In DPFC each-converter have their individual DC-capacitor that contributes necessary DC-voltage.

II. DPFC PRINCIPLE

Ac terminals of shunt-converter are connected with series converter via transmission line through which active power is interchanged. Power-theory of the non-sinusoidal components is adopted in this method. In Fourier analysis the non-sinusoidal current and voltage is articulated as summation of sinusoidal-functions in different frequencies by means of dissimilar amplitudes. This results in the true-power as shown in equation (1).

$$P=\sum_{i=1}^{\infty} V_i I_i \cos\phi_i \qquad (1)$$

Where I_i ,V_i are current as well as voltage at the ith-harmonic-frequency correspondingly, where as ϕ_i be the phase-angle among the current as well as voltage. DPFC mainly comprises of a many number of low power rating series-converters and also a shunt-converter is also utilized. Here shunt-device is operated as the Static-compensator where as the series converter acts as a Distributed-FACTS controller [5]. Using the PWM (Pulse Width Modulation) technique inject the current into the shunt converter to organize reactive-power and also the voltage is injected into the series converter through a dc link to monitor real-power variations in order to inject voltage into the series

converter. There are many advantages regarding D-FACTS controller, the price of the apparatus gets minimized and the reliability of the system is improved [6]. By using a single bulky controller with high rating, there is an availability of using number of low rated controllers so this the cost the equipment may get reduced.

Each and every Distributed-FACTS component is self employed and they are monitored tenuously by the PLC's (power-line communications) or wireless communication. Since the unit does not need support of phase to ground isolation, it is capable of adopted at all voltage levels. During single module failure, the Distributed-FACTS redundancy offers an unremitting process, thus giving higher reliability compared to other FACTS devices [7].

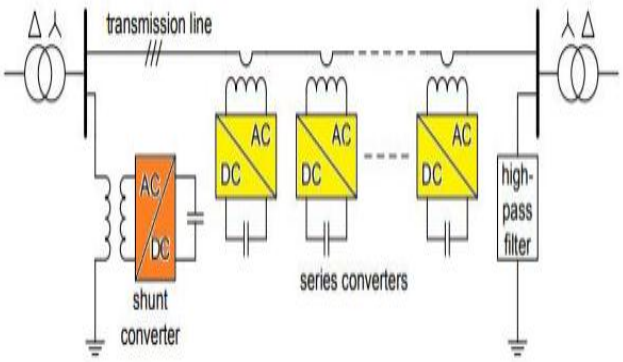


Figure 3. Block diagram of DPFC control

III. DPFC CONTROL

Fig. 3 shows the 3- types of controllers, namely series controller, shunt controller and central control. The constraints that are used in shunt in addition to series control is sustained by themselves sometimes is called a local controllers. By the side of the system's level the central control regulates the DPFC functions [8].

3.1. Central Control

Mainly in this control is adopted to produce the ref signals to other controllers. These are generated next to the fundamental-frequency. Reactive current signal and voltage reference signal is provided for the shunt converter along with the series-converters respectively. At power system level, the central-control is used to minimize the systems oscillations, and also monitors the power-flows and also balances the components which are asymmetrical.

3.2 . Series Control

This control in adopted in DPFC in order to inject the voltages into the line when required. Here the voltage is inserted into the at the 3rd harmonic-frequency. Here Vector control principle used to maintain the voltage across capacitor.

3.3 . Shunt Control

In order to transfer the real-power, 3rd harmonic-current is inserted into the three phases of the transmission line with the help of the transformer which is connected to the AC terminals of the shunt-device. This is the main objective of this control technique. And also it maintains the constant voltage-levels across the dc-capacitor [9].

IV. COMPARISON OF PI AND FUZZY CONTROLLER

Here fuzzy as well as PI controllers are utilized. The responses obtained by both the controllers are studied under this section.

4.1. Proportional Integral Controller

The controller is utilized; the DC link voltage is observed at normal intervals and is correlated with a ref value. Here an error signal can be generated which is handled in a PI controller as shown in figure below [10]-[11].

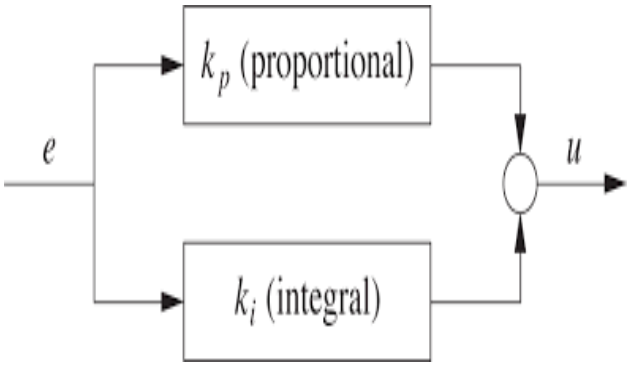


Figure 4. Block diagram of PI controller

4.2. Comparision of PI and Fuzzy Logic Controller (FLC)

The following are some the advantages of fuzzy- logic controllers when compared with the proportional integral (PI) controllers,

- perfect mathematical model is not mandatory
- Fuzzy controllers can handle the inputs which are unknown.
- Fuzzy controllers have enough capability to work with non-linearities.

Fuzzy-inference systems are applied in numerous applications namely computer-vision techniques, control-data categorization etc. Mainly the FIS are classified into two types they are as follows;

- Mamdani-techique and
- Sugeno-techique

Among both the methods, Mamdani' technique is adopted frequently when compared to sugeno method and also this method gives more accurate results when compared with PI controller.

The sampling time of this method is very low so due to this reason we are not adapting this method for real time applications. Block diagram of fuzzy-logic controller is given away in Fig.4. The control-action that is carried out by fuzzy-logic controller is determined by evaluating the linguistic rules. The different components of a fuzzy control system are fuzzification, rule base, defuzzification, and inference mechanisms.

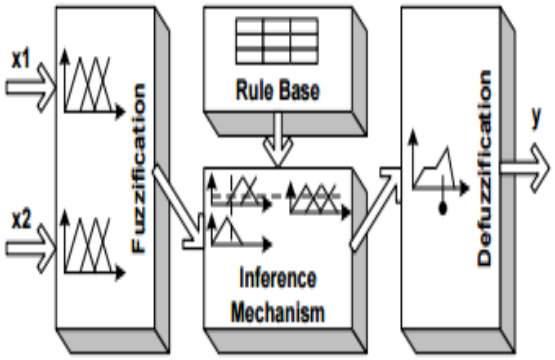


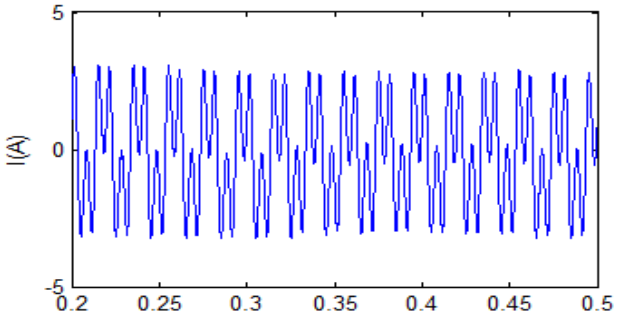
Figure 5. Block diagram of Fuzzy controller

Under fuzzification procedure the crisp-values are transformed to fuzzy-values. Where as in de-fuzzification procedure fuzzy-values are changed to crisp-values. Rule base consists of different rules which are applied to solve a problem. Inference mechanism mainly consists of two techniques such as mamdani and sugeno techniques by considering these two techniques we will solve a problem [12]-[13].

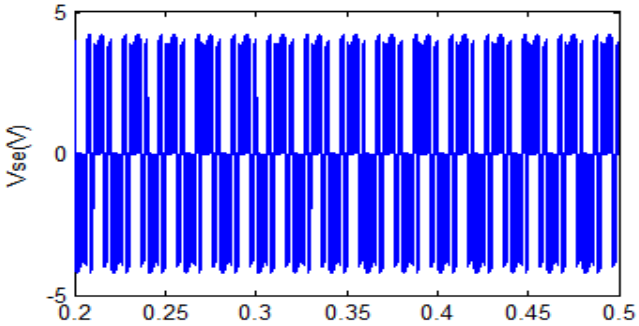
V. SIMULATION RESULTS

Simulation is carried out in MAATLAB/SIMULINK software. Here mainly we are analyzing two situations they are steady-state in addition to step-response conditions. In first case using series control we are inserting a voltage -vector with d-axis and q-axis components, namely *V*se,d,ref=0.30V and *V*se,q,ref=−0.10V. The responses of DPFC under the steady-state are shown in figures 6(a), 6(b), 6(c) where only the waveforms of one phase are shown for clarity. When a fault occurs on a power system a third harmonic current component is produced in order to eliminate the third frequency component by using a shunt converter we are introducing another third frequency component in the negative direction now both of the harmonics currents gets cancelled out then the fault can be easily rectified.

Fig 6(a) represents the 3rd harmonic current, subsequent to nullify the component of harmonic current by use of shunt converter the results are shown in fig.6(c). It is observed that fig 7.(a) step-change of a series converter ref-voltage is shows real as well as the reactive power variation and Direct Current voltage is alleviate previously and after the step changes. fig.7 (b) and 7(c) are power from the voltages and currents which are measured.



(a)



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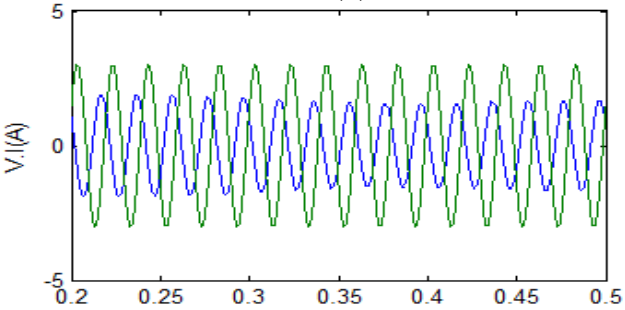
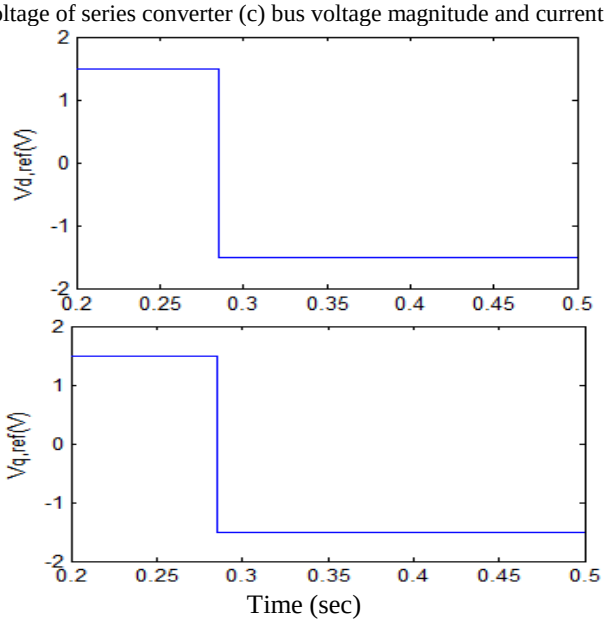
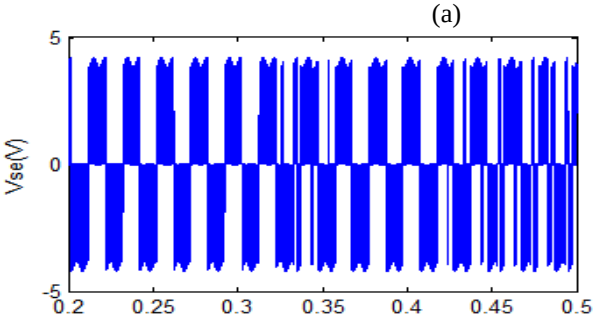


(c)

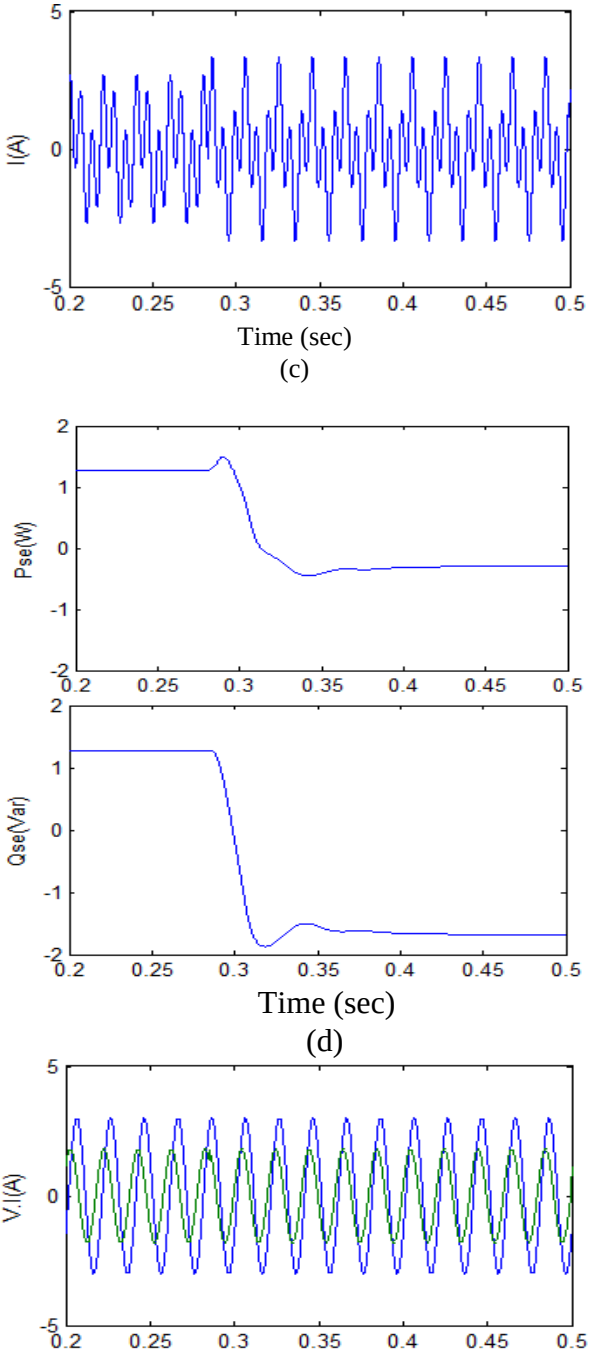
Figure 6. Steady-state operation of DPFC (a) line- current (b) voltage of series converter (c) bus voltage magnitude and current



(a)



(b)



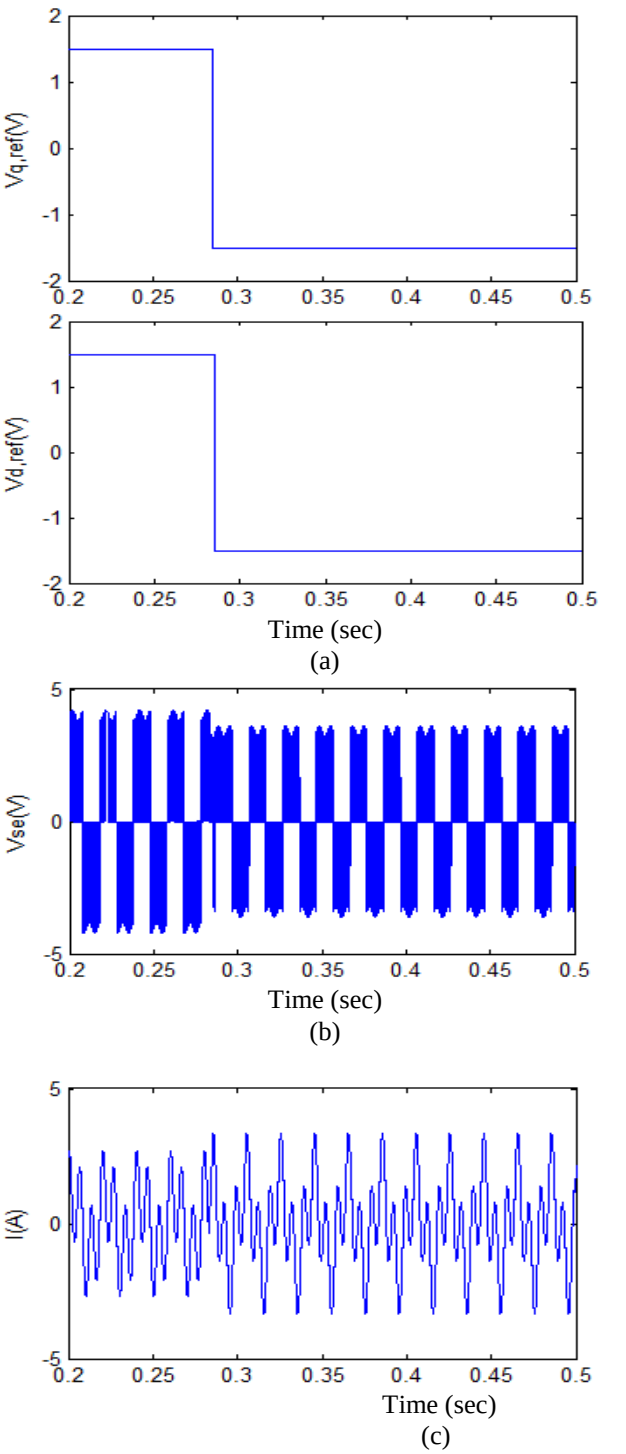


Figure 7. Step-response of DPFC: (a) ref voltages (b) series-Converter voltage (c) line-current (d) active & reactive powers (e) bus voltage and current of PI controller

The data is measured in 3 phases but only 1- phase data is progressed in computer system using MATLAB software. A LPF (low-pass filter) with 50-Hz cut-off frequency filters the measured data containing harmonic distortion in order to examine the current along with voltage at fundamental-frequency.

This filter causes a 1.5 cycle delay of calculated voltage and current to the real values thus cause of delay of measured real-power in addition to reactive-power. Fig.7.(d) shows the series-converter injecting real-power along with reactive-power at fundamental- frequency. The receiving end side waveforms are represented in fig.7 (e).

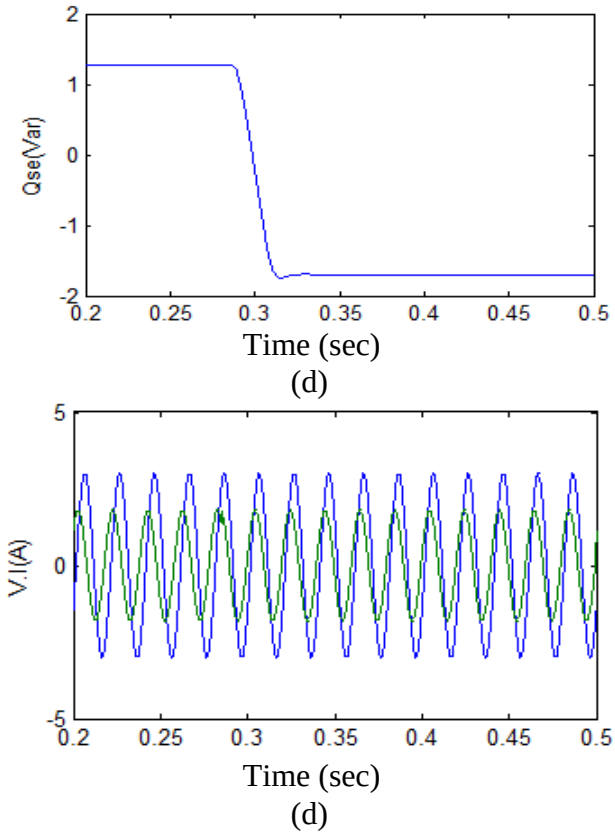


Figure 8. Step-response of the DPFC: (a) ref voltages (b) series converter voltage (c) line current (d) active & reactive powers (e) bus voltage and current of Fuzzy controller

Above fig.8 (a), 8(b), 8(c), 8(d), 8(e) demonstrate the step response of the DPFC using fuzzy logic controller. Here the delay of measured active and reactive power is reduced compared to PI controller.

VI. CONCLUSION

In this work a new PFCD from FACTS Family called DPFC was presented. Here using Fuzzy Logic Controllers instead of using Conventional Proportional Integral (PI) Controllers, these Fuzzy Controllers gives better response and we get accurate results compared with conventional PI Controllers. Fuzzy Controllers control the real-Power, Reactive-Power; bus Voltages along with bus currents. The D-FACTS concept is operated in the DPFC resulting in cost reduction and high reliability compared to UPFC.

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Flower Pollination Algorithm to Solve Dynamic Economic Loading of Units with Practical Constraints

Y V Krishna Reddy, M Damodar Reddy, A V Sudhakara Reddy

Abstract*: Dynamic economic load dispatch (DELD) aims to obtain optimum generation schedule of the committed generating units' output over a certain timing horizon , sustaining practical restrictions and power demands in each period. Valve-point effect, the ramp up/down limits, prohibited operation zones (POZs), and power losses form the DELD as a complex, non-linear liable problem. The Flower Pollination Algorithm (FPA) is therefore anticipated in this paper to solve such a complex issue. The practicality of the proposed FPA method is assessed by conducting simulations at different load patterns on standard 5-unit and 10-unit systems for a 24-hour schedule. The FPA's simulation results are related to other previously published biography techniques. These results clearly show that the skill and robustness of the proposed FPA method to solve the non - linear DELD problem has been restricted.

Keywords* : Dynamic economic load dispatch, Valve-point effect, Ramp up/down limits, Prohibited operation zones, Flower Pollination Algorithm.

I. INTRODUCTION

The system which can deals with power generation, transmission and distribution in order to supply the consumer on an economical basis known as power system. Dynamic economic load dispatch (DELD) in the power system is one of the most important issues of optimization. DELD's goal is to allocate optimal generator outputs for a given variety of load demands in order to reduce overall operating costs over a given period of time, impose equality and various inequality constraints on system operation through generator ramp-rate limits. The operating cost function of generators are obtained using input-output characteristics, finally obtain quadratic function as cost function [1]. The operating cost function consist non-convexity due to steam turbines admission valves, hence the DELD problem becomes complex due to the valve-point loading in finding optimal solution. Many classical methods to evaluate the DELD problems with valve-point loading like Lagrangian relaxation [2], dynamic programming [3] and Maclaurin series [4] but these methods does not provide global optimal solution because of non-linearity and non-convexity features in the generating units. Due to the stability limits or machine components, generating units are restricted to operate certain operating zones.Therefore, due to consideration of valve point effects and POZs in objective function, DELD becomes nonconvex optimization problem.

Recently, in [5], Chaotic Quantum GA (CQGA) is used to solve the DELD problem, taking into account the effect of wind production. DE algorithms focused on solving DELD issues [6 - 9]. Other methods of empirical search include Quantum GA (QGA)[10], Artificial Bee Colony (ABC)[11], Artificial Immune System (AIS)[12], PSO[13,14], Enhanced Cross - Entropy (ECE)[15], and Multiple TS (MTS) algorithm[16] to solve DELD problems over the past decade. Hybrid methods such as hybrid swarm - based HAS [17], hybrid AIS - SQP [18], hybrid EP - SQP method [19], hybrid SOA - SQP [20], hybrid PSO - SQP [21], and AIS [22] have been found to be effective in solving complex optimization problems such as DELD.

This paper proposes an algorithm for flower pollination (FPA) to solve restricted non - convex DELD problems. Xin - She Yang recently proposed FPA [23]. This algorithm is an optimization algorithm inspired by nature based on universe pollen transfer. FPA has shown good action in solving optimization problems in various areas, as there is only one key parameter p (switch probability) that makes the algorithm faster to reach the optimal global solution. In addition, this transfer switch between local and global pollination can ensure an escape from the minimum local solution. The results of FPA method to solve DELD problem for test systems, shown that FPA can find better results compared to other exploratory algorithms.

II. DELD PROBLEM FORMULATION

The objectives function for DED problem as follows:

$$\min TC = \sum_{t=1}^{T}\sum_{i=1}^{N} C_{it}(P_{it}) \qquad (1)$$

Where C_{it} : Fuel cost of unit i at time t (in \$/h), N: Number of generation units, P_{it} : Power output of ith unit at time t (in MW), T: Total number of hours.

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Due to involvement of valve-point the fuel cost of a generation unit defined as:

$$C_{it}(P_{it}) = a_i P_{it}^2 + b_i P_{it} + c_i + \left| e_i \sin(f_i (P_i^{min} - P_{it})) \right| \quad (2)$$

The DELD problem objective function maintains the following constraints should be minimized:

2.1. Real power balance

By considering network transmission losses, the equality constraint of the given network is written as:

$$\sum_{i=1}^{N} P_{it} = P_D(t) + P_{loss}(t) \qquad t = 1, 2, ..., T \quad (3)$$

Where $P_{loss}(t)$: Total transmission loss of the system (in MW), $P_D(t)$: Total power demand of the system at time t (MW). The power loss calculated using coefficients of the B matrix as follows:

$$P_{loss}(t) = \sum_{i=1}^{N}\sum_{j=1}^{N} P_{it} B_{ij} P_{jt} \qquad t = 1, 2, 3, ..., T \quad (4)$$

2.2. Generation limits of units:

$$P_i^{min} \le P_{it} \le P_i^{max} \qquad i = 1, ..., N, \; t = 1, 2, ..., T \quad (5)$$

Where P_i^{min} and P_i^{max} (in MW) are the minimum, maximum power outputs of ith unit.

2.3. Ramp up and ramp down constraints:

The generation unit ramp rate limits are stated as follows:

$$P_{it} - P_{it-1} \le UR_i \qquad i = 1, ..., N, \; t = 1, 2, ..., T \quad (6)$$

$$P_{it-1} - P_{it} \le DR_i \qquad i = 1, ..., N, \; t = 1, 2, ..., T \quad (7)$$

Where UR_i: Ramp up limit, DR_i: Ramp down limit of the ith generator (MW/h). Due to involvement of ramp rate limits power limits can be modified as follows:

$$\max(P_i^{min}, P_{it-1} - DR_i) \le P_{it} \le \min(P_i^{max}, P_{it-1} + UR_i)$$
$$i = 1, ..., N, \; t = 1, 2, ..., T \quad (8)$$

2.4. Prohibited operation zone limits (POZ):

Due to stability concerns or limitations of machine components generating outputs have certain delimited operation zone. The generation unit acceptable operation zone can be defined as:

$$P_{it} \in \begin{cases} P_i^{min} \le P_{it} \le P_{i,1}^{l} \\ P_{i,j-1}^{u} \le P_{it} \le P_{i,j}^{l} \qquad j = 2, 3, ...M_i \\ \qquad\qquad i = 1, ..., N \quad t = 1, 2, ..., T \\ P_{i,M_i}^{u} \le P_{it} \le P_i^{max} \end{cases} \quad (9)$$

Where $P_{i,j}^{u}$ and $P_{i,j}^{l}$ are the upper and lower limits of the jth POZs of unit i, respectively. M_i is the number of POZs of unit i.

III. FLOWER POLLINATION ALGORITHM

3.1. Introduction

In this section, new nature inspired optimization algorithm based on flower fertilization process has been proposed and implemented on DELD problem. Xin-She Yang [23] developed FPA method in 2012. There are namely two types of fertilization processes known as biotic and abiotic. Majorly (90%) the transfer of pollen occurs due to the biotic pollination by using pollinators as bats, birds, insects and other animals. Wind and diffusion help in the abiotic fertilization (10% occur) rather than using pollinators.

Cross - fertilization or self - fertilization can achieve flower fertilization. First, one is due to the pollen fertilization of a different plant flower. Second, one occurs because one flower is fertilized from pollen of the same flower or other flowers of the same plant.

For FPA, the following four rules are used:

1. To find the global fittest, biotic and cross-fertilization considered, as pollen – carrying pollinators fly following Levy flights.
2. To find the local fittest, abiotic fertilization and Self-fertilization used.
3. Generally, insects can develop flower perseverance; this probability of reproduction is proportional to the similarity of the two flowers involved.
4. The switch probability of $P \varepsilon [0,1]$, is used to control interaction of local and global fertilization, which is slightly biased toward local pollinator.

3.2. Mathematical representation of FPA

Global fittest (g_*) can be formulated using first rule, and it can be represented mathematically as Eqn. (10),

$$X_i^{t+1} = X_i^t + L(X_i^t - g_*) \quad (10)$$

Where X_i^t the solution is vector X_i at iteration t, and g_* is the current iteration best solution. L is the strength of fertilization should be greater than zero.

Levy distribution can be represent as Eqn. (11)

$$L \sim \frac{\lambda \Gamma(\lambda) * \sin(\pi\lambda/2)}{\pi} \left(\frac{1}{S^{1+\lambda}}\right) \qquad (S \gg S_0 > 0) \quad (11)$$

Where Γ (λ): Standard gamma function distribution is valid for large steps S > 0.

For the local fertilization, both Rules 2 and 3 can be signified as shown in Eqn. (12).

$$X_i^{t+1} = X_i^t + \varepsilon (X_j^t - X_k^t) \quad (12)$$

Here X_j^t and X_k^t are pollens from the different flowers of the same plant species. Here ε is drawn from a uniform distribution as [0, 1]. In both local and global searches, flower pollination can occur. If there are two similar solutions, the search may be local; while there are two different solutions, the search will be global. The two parameters in this algorithm are population size n and probability switch (p[0,1]).

From our reproductions, found that probability switch= 0.75 for solving DELD problem. The flower pollination flowchart shown if Fig. 1, and algorithm to the proposed method discussed in below.

Implementation of Flower Pollination Algorithm:

Step 1: The algorithm begins by setting the initial population size(n), the switch probability(p), the maximum number of iterations, the search variables dimension (dim), the cost of generation coefficients, the B - matrix, the upper & lower limit and the load demand for 24 hours.

Step2: Initialize the population or solutions of flower randomly.

Sol (i, :) =Lb+ (Ub-Lb).*rand (1, dim).

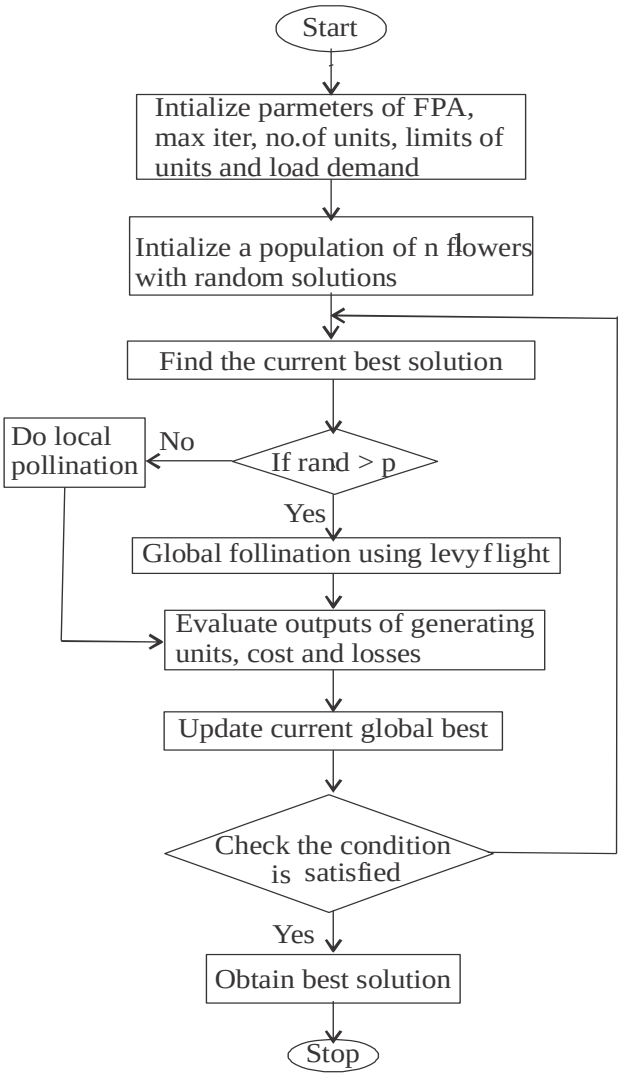

Fig. 1. Flowchart of FPA to solve ED

Step3: Find the current best solution g_* in the initial population.

[Fmin, I]=min (Fitness).

Step4: Start the iteration count i=1.

Step5: Check the limits that are simple. If random is larger than p, use equation (10) to draw a step vector that obeys a levy distribution. Use Eqn. (11) to make the global pollination.

Step6: Draw a uniform distribution in [0, 1] randomly select j & k among all solutions if random is less than p. Use equation to do local pollination (12).

Step7: Check to see if all the restrictions are met if they are not met go to step 4. Assess new solutions (unit generation outputs, costs and losses).

Step8: Update the global fittest and its position.

Step9: Run the program up to meet the tolerance (0.00001). Display the results such as generation cost, power generations, transmission losses and total power generation for 24 hours.

IV. SIMULATION RESULTS

The FPA method is examined on two test systems with five and ten number of units in this section. MATLAB programs are executed on a PC with 4 GB RAM using MATLAB R2014a to solve DELD issues. 30 Trails are considered in order to evaluate the robustness of the proposed FPA method for each system. The number of pollens in all test systems is 40. The stop criteria are defined in this paper as reaching the tolerance of 0.00001. DELD problem is solved for three different load patterns, taking into account valve-point effects, losses and POZs, resulting in a convex quadratic programming problem.

4.1. Five unit test system

From [8], the 5-unit test system data is adapted. Valve - point loading, power losses and ramp rate limitations are considered for this test system. The total time period of one day was divided into 24 intervals and three different load patterns were considered. Table 1 presents the simulation results obtained for this test system. The proposed FPA provided a minimum cost of 42267.4315 ($) production. The test results are correlated to other methods placed in literature in terms of statistical analysis for cost over 30 runs presented in Table 2. By examining the 5 unit system results shown in Table 2, it can be noticed that the results attained by FPA method better as compare with other methods cited.

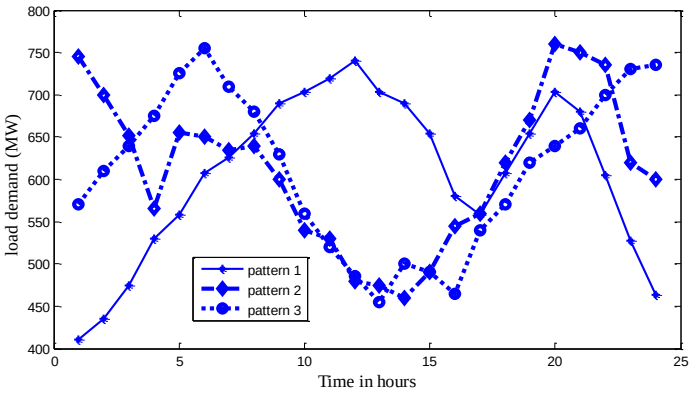

Fig. 2. Five unit test system different load patterns

From Table 2, it can be concluded that the minimum production cost of the proposed FPA is 42267.4315 ($) compared with ABC[11], AIS[12], APSO[13], HHS[17] and SOA[20] for load pattern 1.

Table 1: Best generation dispatch results obtained by FPA for 5-unit system for load pattern 1.

Hour	Pd(MW)	P1(MW)	P2(MW)	P3(MW)	P4(MW)	P5(MW)	Loss(MW)	Cost($)
1	410	10.0000	20.0000	30.0000	124.4695	229.5196	3.9891	1226.5853
2	435	34.9841	20.0000	30.0000	124.9079	229.5196	4.4116	1370.3202
3	475	10.000	20.0000	100.3506	209.8158	139.7598	4.9262	1442.5565
4	530	64.2428	94.2424	112.6730	124.9073	139.7588	5.8243	1600.8789
5	558	75.0000	104.9922	30.6560	124.9105	229.5198	7.0786	1664.8894
6	608	43.9028	20.0000	112.6735	209.8158	229.5196	7.9117	1792.0057
7	626	73.5278	98.5398	112.6735	209.8158	139.7598	8.3167	1783.7718
8	654	83.0004	113.0004	112.6737	124.9079	229.5196	9.1019	1851.3362
9	690	59.0631	89.0631	112.6735	209.8158	229.5196	10.1350	2022.8492
10	704	66.2719	96.2719	112.6735	209.8158	229.5196	10.5527	2004.3117
11	720	75.0000	104.0359	112.6735	209.8158	229.5196	11.0448	2037.9302
12	740	84.8391	114.8391	112.6735	209.8158	229.5196	11.6870	2061.3013
13	704	66.2719	96.2719	112.6735	209.8158	229.5196	10.5527	2004.3117
14	690	59.0631	89.0631	112.6735	209.8158	229.5196	10.1350	2022.8492
15	654	82.9997	112.9997	112.6721	124.9114	229.5188	9.1019	1901.3767
16	580	15.2638	20.0000	112.6735	209.8158	229.5196	7.2726	1644.1766
17	558	74.9999	104.9770	30.6684	124.9108	229.5222	7.0785	1564.8966
18	608	43.9028	20.0000	112.6735	209.8158	229.5196	7.9117	1792.0057
19	654	82.9992	112.9992	112.6736	124.9083	229.5216	9.1019	1901.3508
20	704	66.2719	96.2719	112.6735	209.8158	229.5196	10.5527	2004.3117
21	680	53.9179	83.9179	112.6735	209.8158	229.5196	9446	2029.4987
22	605	40.8304	20.0000	112.6735	209.8158	229.5196	7.8393	1781.0725
23	527	45.7974	20.0000	112.6735	124.9079	229.5196	5.8984	1449.7683
24	463	74.5609	98.5397	30.0000	124.9079	139.7598	4.7683	1313.1536
			TOTAL COST				**42267.4315**	**($)**

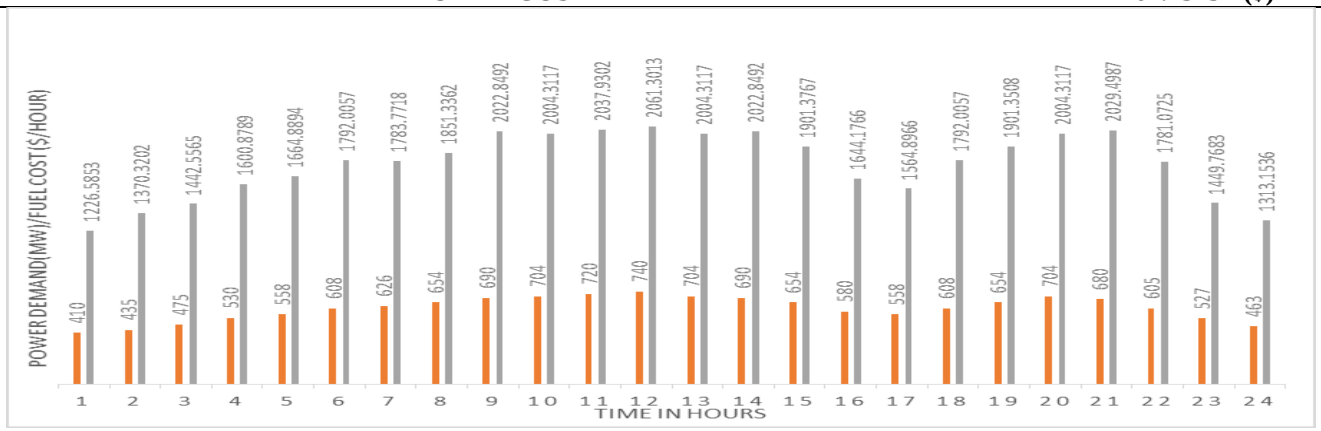

Fig. 3. Five unit test system power demands and fuel cost for load pattern 1

Figure 3 shows the fuel cost variation for each and every time interval for a day based on the power demand. The maximum load pattern 1 demand is 740 MW and 2061.3013 ($ /hr) is the corresponding cost.

Table 2: Comparison results among various stochastic methods for 5-unit system for load pattern 1

Method	Minimum Cost ($)	Average Cost ($)	Maximum Cost ($)
ABC [11]	44045.83	44064.73	44218.64
AIS [12]	44385.4300	44758.8363	45553.7707
APSO [13]	44678	NA	NA
HHS [17]	43154.3554	NA	NA
SOA [20]	42588.4156	43273.4454	43808.0937
Proposed FPA	**42267.4315**	42275.7569	42293.3243

The statistical analysis for five unit test system for different load patterns are presented in Table 3 among 30 trails run. The minimum cost for load pattern 2 using the proposed FPA method is $42915.1525, for load pattern is $42717.9027.

Table 3: Comparison results of different load patterns for 5-unit test system

Load demand	Method	Minimum Cost ($)	Average Cost ($)	Maximum Cost ($)
Pattern 1	DE [8]	43213	43813	44247
	Proposed FPA	**42267.4315**	42275.7569	42293.3243
Pattern 2	DE [8]	43979	44546	45233
	Proposed FPA	**42915.1525**	42945.0824	42983.3371
Pattern 3	DE [8]	43739	44214	45372
	Proposed FPA	**42717.9027**	42728.2132	42758.7727

4.2. Ten unit test system

From [8], the data of the 10-unit test system is adapted. Valve - point loading, power losses and ramp rate limitations are considered for this test system. The total one - day time period was divided into 24 intervals, three different load patterns were considered and shown in the appendix in Figure 4. Table 4 presents the simulation results obtained for this test system. The proposed FPA provided a minimum cost of production of $1012349.2247. The proposed FPA provided a minimum cost of $1012349.2247 production. The test results are correlated to other methods placed in literature in terms of statistical analysis for cost over 30 runs presented in Table 5. By examining the 10 unit system results shown in Table 5, it can be noticed that the results attained by FPA method better as compare with other methods cited.

Table 4: Best generation dispatch results obtained by FPA for 10-unit test system for load pattern 1

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	Loss (MW)	Cost($)
1	150.0333	223.1169	171.7123	60.0000	73.1597	121.0261	129.6296	47.0000	20.0000	55.0000	14.6778	28620.8369
2	150.0993	135.1259	290.0770	60.1439	73.0211	122.8566	129.8053	86.1248	20.7641	55.0000	13.0181	30187.8034
3	150.0078	135.0000	297.1600	60.0054	222.1206	121.7187	129.8262	85.3606	20.0007	55.0000	18.2000	33432.9605
4	227.1931	307.1931	307.1990	62.5111	73.0082	128.1277	129.2217	120.0000	20.0038	55.0000	23.4539	37087.6650
5	303.2744	309.4884	295.8476	60.0195	122.7348	124.7666	129.8558	85.3320	20.5312	55.0000	26.8503	38404.2380
6	378.9547	395.8740	294.3982	60.9235	122.5616	121.5999	129.5894	85.4462	20.0000	55.0000	36.3474	41858.0376
7	380.4368	396.2324	301.1119	61.7686	223.9833	128.2965	130.0000	47.0000	20.0000	55.0000	41.8294	43592.8558
8	457.0792	396.8075	297.8649	120.6495	172.8327	122.4954	129.7238	47.2047	20.0084	55.0000	43.6661	45238.2430
9	456.5485	396.7590	300.8005	180.6963	222.8868	122.6716	129.6433	85.3484	20.0933	55.0000	46.4477	48764.2962
10	456.5298	396.7996	298.3935	299.9931	222.6081	122.4399	129.6272	120.0000	20.0024	55.0000	49.3935	52517.4395
11	456.7202	396.8433	336.2075	299.9965	222.5984	160.0000	129.6150	120.0000	20.0000	55.0000	50.9808	54575.3748
12	456.4970	459.9998	323.1328	299.9991	222.5999	160.0000	129.5906	119.9999	520574	55.0000	58.8765	56917.2625
13	456.9717	396.7667	298.4696	300.0000	222.1247	122.3566	129.8594	119.8510	20.0006	55.0000	49.4003	52545.2045
14	457.0334	396.9486	298.2654	180.7097	222.7213	124.8619	129.5493	85.4412	20.0000	55.0000	46.5306	48778.0748
15	379.8491	398.1279	322.2766	120.5122	222.2603	124.1038	129.5686	47.0123	20.0000	55.0000	42.7108	45424.1052
16	303.1416	309.7555	290.4831	60.0000	171.7888	121.9631	129.6746	119.4771	20.5667	55.0000	27.8505	40288.7611
17	301.3125	308.5684	297.7633	64.0363	121.3416	122.7987	129.2731	86.4424	20.0859	55.0000	26.6223	38532.6777
18	380.1562	309.7154	295.9273	60.0000	172.2523	122.2806	129.9608	83.6779	51.8342	55.0000	32.8046	41973.3752
19	456.7122	396.7115	297.6904	119.8792	122.9525	132.7995	129.9980	85.4925	20.0001	55.0000	41.235	45370.1946
20	456.5247	396.8086	297.9243	299.8575	222.4979	123.2010	129.5873	119.9866	20.0241	55.0000	49.4123	52525.6180
21	456.5121	396.9205	300.6491	181.2940	223.2572	122.2321	129.2994	85.2736	20.0168	55.0000	46.4548	48783.7852

22	380.1720	309.5459	312.0429	60.1373	224.2376	123.9126	129.6078	47.1002	21.1242	55.0000	34.8804	41882.2823
23	226.9360	222.2605	297.0883	60.3776	172.5195	123.0598	129.4657	47.1838	20.0662	55.0000	21.9575	34999.1380
24	150.0000	223.5795	175.0823	60.0000	220.5447	123.2751	129.1883	47.0000	20.0317	55.0000	19.5780	31982.7982
Total Cost											**1012349.2247**	

It can be concluded from Table 5 that the proposed FPA will provide a minimum cost of production of $ 1012349.2247 compared to MDE[9], ABC[11], AIS[12], ECE[13], HHS[17] and Hybrid methods[18 - 21] for load pattern 1.

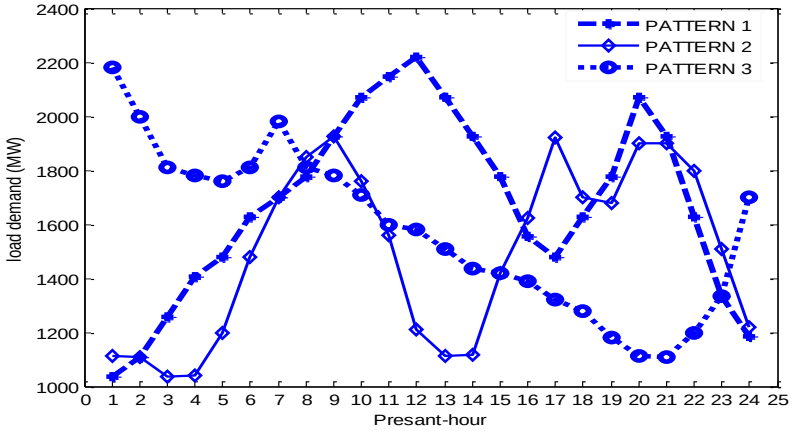

Fig. 4. Ten unit test system different load patterns

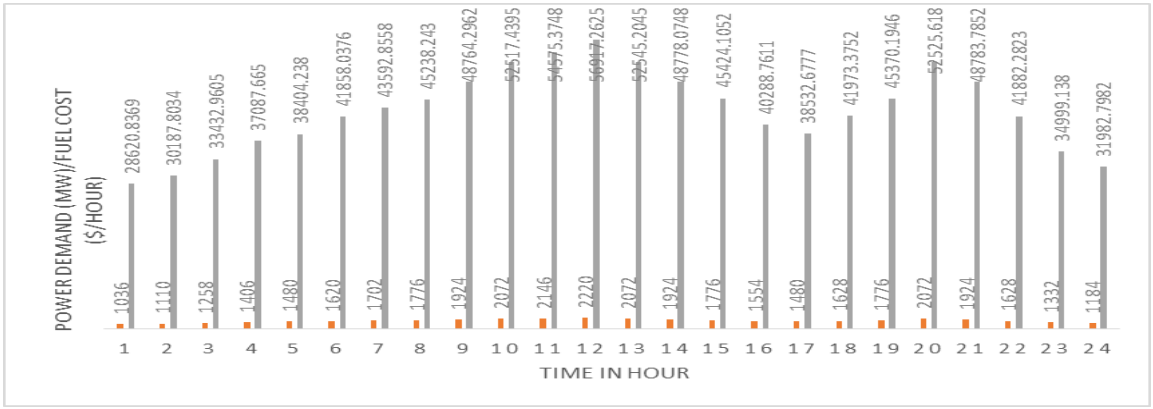

Fig. 5. Ten unit test system power demands and fuel cost for load pattern 1

Figure 5 shows the fuel cost variation for each and every time interval for a day based on the power demand. The maximum load pattern 1 demand is 2220 MW and 56917.2625 ($/hr) is the corresponding cost.

Table 5: Statistical comparison results among various methods for 10-unit system for load pattern 1

Method	Minimum Cost($)	Average Cost($)	Maximum Cost($)
MDE [9]	1034612	1033630	NA
ABC [11]	1043381	1044963	1046805
AIS [12]	1045715	1047050	1048431
ECE [15]	1022271.5793	1023334.9297	NA
HHS [17]	1019091.108	NA	NA
AIS-SQP [18]	1029900	NA	NA
EP-SQP [19]	1035748	NA	NA
SOA-SQP [20]	1021460.0101	1023840.8543	1026852.4248
PSO-SQP [21]	1027334	1028546	1033983
Proposed FPA	**1012349.2247**	1013015.8265	1013652.8705

The statistical analysis for TEN unit test system for different load patterns are presented in Table 6 among 30 trails run. The minimum cost for load pattern 2 using the proposed FPA method is $934099.7231, for load pattern 3 is $977986.4409.

Table 6: Comparison results of different load patterns for 5-unit test system

Load demand	Method	Minimum Cost ($)	Average Cost ($)	Maximum Cost ($)
Pattern 1	PSO [14]	1049167	1051725	NA
	ECE [15]	1043989.1544	1044470.0849	NA
	Proposed FPA	**1012349.2247**	1013015.8265	1013652.8705
Pattern 2	PSO [14]	957274	957732	NA
	ECE [15]	946114.2730	946782.1896	NA
	Proposed FPA	**934099.7231**	934331.0927	934501.7023
Pattern 3	PSO [14]	995177	995529	NA
	ECE [15]	988921.0673	989054.0580	NA
	Proposed FPA	**977986.4409**	978622.5485	979015.0226

V. CONCLUSION

This paper uses the Flower Pollination Algorithm (FPA) to solve the DELD problem, taking into account the effects of the valve - point and ramp - rate limits. Five and ten-unit test systems for different load patterns for 24-hour time interval demonstrated the feasibility of the proposed method. The test results show that the optimal dispatch solution obtained through the proposed FPA method is superior to other methods presented in the literature to determine the optimal solution to solve the problem of DELD. The proposed approach outperforms the methods used by MDE, ABC, ECE, PSO and Hybrid to solve DELD problems with better performance in terms of solution quality.

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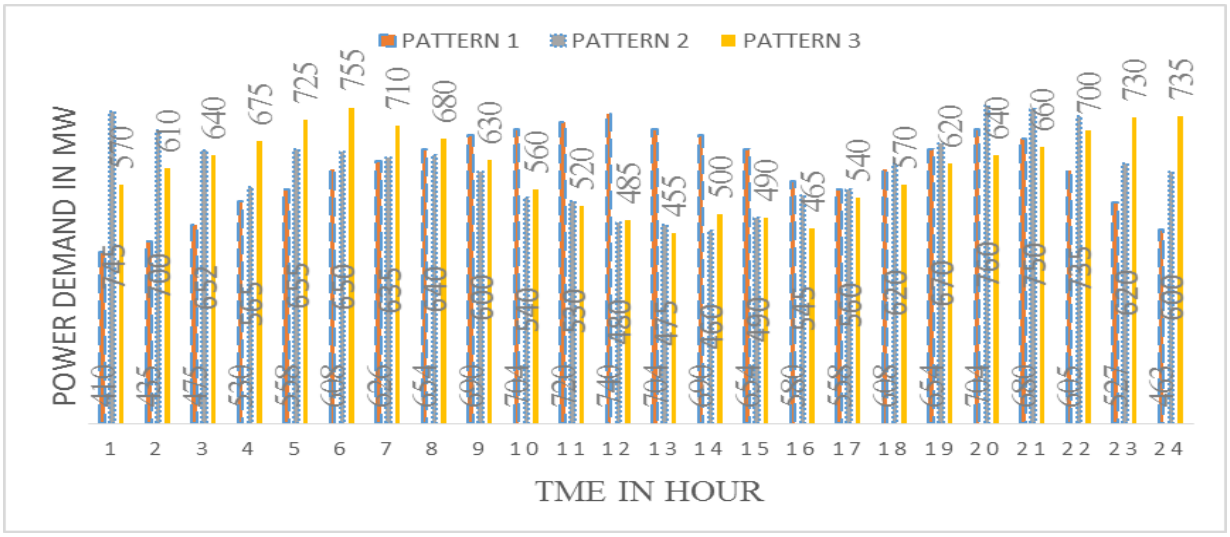
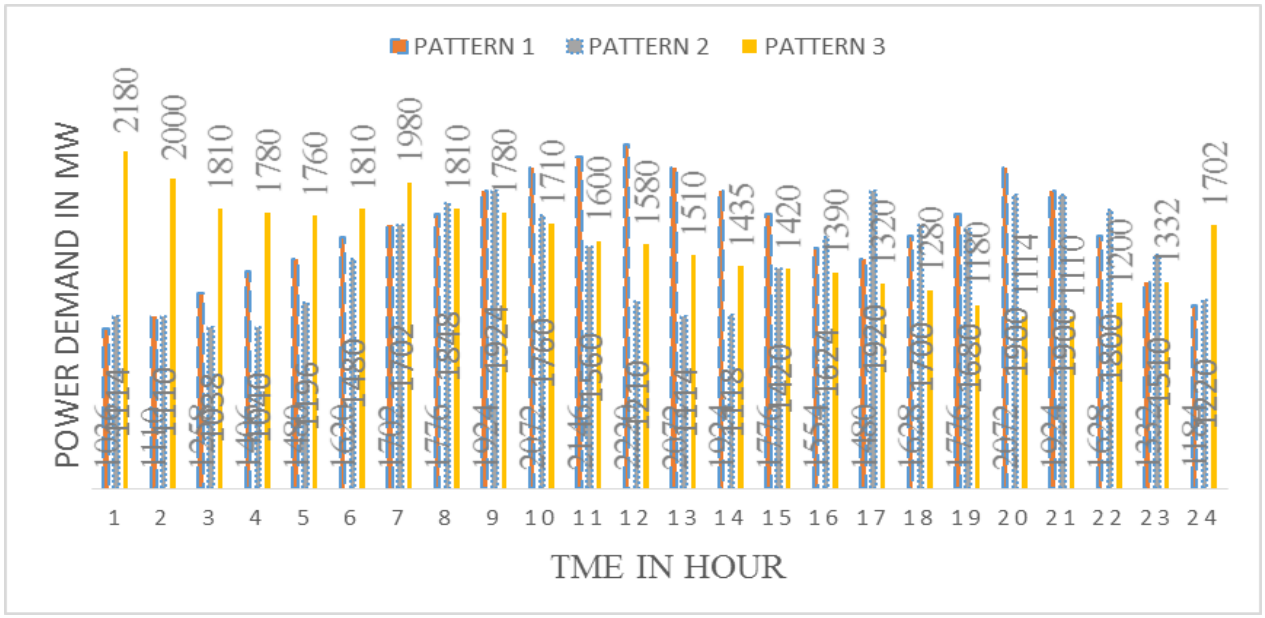
APPENDIX

APPENDIX A.1: POWER DEMAND PATTERNS FOR FIVE UNIT TEST SYSTEM



APPENDIX A.2: POWER DEMAND PATTERNS FOR TEN UNIT TEST SYSTEM



AUTHORS PROFILE



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Voltage Control and Power Loss Reduction in Distribution Networks using Distributed Generation

Sabarinath.G, T.Gowri Manohar, A.V.Sudhakara Reddy

Abstract*: Distributed generation (DG) units can provide many benefits when they are incorporated along the distribution network/system. These benefits are more if DG units are connected at suitable nodes with appropriate rating otherwise, they may cause to increased power loss and poor voltage profile. In this work, optimal allocation (both location and size) problem is solved by considering power loss minimization as an objective function. An analytical method "index vector method (IVM)" is applied to find DG location. A new optimization algorithm "Whale Optimization Algorithm (WOA)" is employed to determine the DG rating. Two popularly known test systems "IEEE 33 & IEEE 69"bus systems are used to evaluate the efficacy of IVM and WOA.

***Keywords:* Distributed generation, Distribution system, Index vector method, Power loss reduction, Whale optimization algorithm.**

I. INTRODUCTION

Distribution network/system is an integral part of power system that joins high voltage sub-transmission system to the low voltage consumers. With ever increasing demand for electrical energy, distribution network needs continuous expansion to meet the increasing load demand. According to Indian records 20% of total power generation is wasting at distribution level. Distributed Generation (DG) is the main and one of the alternatives to meet ever increasing load demand and decrease power loss at distribution level. Integration of DG units into the distribution network can provide numerous environmental, technical and economic benefits to the consumers as well as distribution companies. Many studies proved that the above said benefits can be achieved only if the DG units are placed at optimal locations with optimal size otherwise DG leads to negative impacts. DGs are categorized as follows [1]:

Type-1 DG: These DGs can inject only P (active power) into the system.

Type-2 DG: These DGs can inject only Q (reactive power) into the system.

Type-3 DG: These can inject P in to the system and consume Q from the system.

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Type-4 DG: These can inject P as well as Qin to the system.

So in this work optimal sitting and sizing problem in distribution network is solved by taking power loss reduction as main objective function. This paper is organized as follows: section one gives the introduction about distribution network, DG and also presents literature survey. Section two presents the analytical method called index vector method used to identify the optimal DG locations. Section three explains and models the whale optimization algorithm used to find the optimal rating of DG unit. Section four presents the simulation results and finally section five gives the final conclusions.

II. INDEX VECTOR METHOD

In this work, optimal DG locations (bus or node) in a given distribution network are found by using index vector method [1]. Index vector values at each bus excluding reference bus of a system are found by using equation (1). The normalized voltages calculated by the given equation (2) at each and every bus of a network are also considered to select the optimal DG locations. The bus with the highest index value and normalized voltage less than 1.01 will be on top priority to place DG. The index vector of a given system can be calculated as follows:

$$\text{Index Vector}(n)=\frac{1}{V(n)^2}+\frac{I_q(k)}{I_p(k)}+\frac{Q_{eff}(n)}{Q_{total}} \quad (1)$$

Normalized voltages are determined as follows:

$$\text{Normalized voltage, } V_{nor}(n)=\frac{V(n)}{0.95} \quad (2)$$

Where

Index vector (n) = index value at bus 'n'

V(n) = voltage magnitude of bus 'n'

Ip(k) = Real component of current flowing through branch 'k'

Iq(k) = Imaginary component of current flowing through branch 'k'

Qeff(n) = Effective reactive load at bus 'n'

Qtotal = Sum of reactive loads of system

III. WHALE OPTIMIZATION ALGORITHM

Whale optimization algorithm (WOA) [2] is a new bio inspired, population based optimization technique developed in 2016 by the scientists namely S. Mirjalili and Lewis. Whales are the biggest mammals in the planet and they will not move fast enough to follow and catch a school fish during hunting. Therefore, they exhibit a unique hunting method called "bubble net hunting technique" to catch a school of fish or pray. In this method, humpback whales generate air bubbles around the prey or a school of fish along the circular or spiral shaped path. As it can be viewed in "Fig. 1" [3], the radius of the bubble net continuously decreases towards the water surface. The humpback whales forces or directs a school of fish towards the surface of the water and attacks them when they are close to the surface of water. Therefore, this unique technique simplifies the hunting process. The bubble net hunting technique has been simulated in WOA.

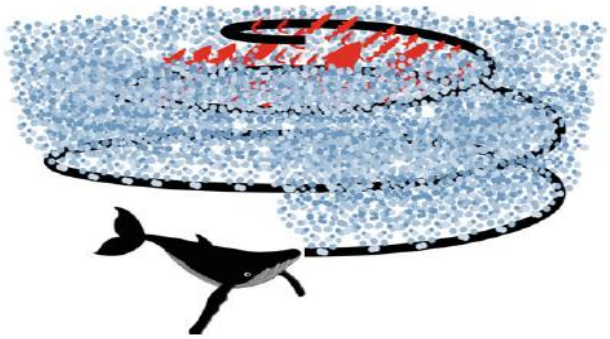

Fig.1. Bubble net feeding technique

The hunting behavior of humpback whales can be explained and modeled in three sections as follows:

A. Encircling Prey

Humpback whales can predict the location of prey and encircle them. At starting, humpback whales assume the current best candidate solution as the location of prey and the remaining whales update their position towards the best solution. This behavior is modeled as follows:

$$\vec{D}=\left|\vec{C}.\vec{X}^{*}(t)-\vec{X}(t)\right| \quad (3)$$

$$\vec{X}(t+1)=\vec{X}^{*}(t)-\vec{A}.\vec{D} \quad (4)$$

The values of vectors '$\vec{A}$' and '$\vec{C}$' are determined using equations (36) and (37)

$$\vec{A}=2.\vec{a}.\vec{r}-\vec{a} \quad (5)$$

$$\vec{C}=2.\vec{r} \quad (6)$$

Where't' denotes the current iteration '$\vec{A}$' and '$\vec{C}$' represents coefficient vectors X $\vec{}$* is position vector of the prey or best solution '$\vec{X}$' is current position. Where '$\vec{a}$' value linearly decreases from 2 to 0 over the succeeding iterations and '$\vec{r}$' is a random vector in [0,1].

B. Bubble net attacking method

In this phase, humpback whales (search agents) moves closer to the prey (best solution agent). The bubble net attacking technique can be mathematically modeled using the following two approaches:

1) Shrinking encircling mechanism

This SEM presented in "Fig.2" is achieved by decreasing the value of '$\vec{a}$' in expression (5) and hence the value of '$\vec{A}$' also decreases by '$\vec{a}$'. Now, the next position of a search agent (whale) can be assigned anywhere in between the original position of the search agent and the position of the existing best agent by assigning random values for '$\vec{A}$' in [−1,1].

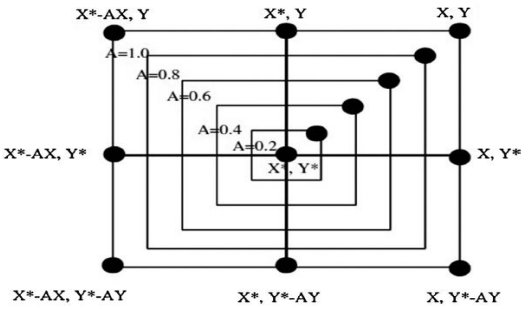

Fig.2. Shrinking encircling mechanism

2) Spiral updating position

In this phase presented in "Fig.3", the distance between the (X, Y) (whale position) and (X*, Y*) (prey position) is calculated and then a spiral equation is formed using expression (7).

$$\vec{X}(t+1)=D'.e^{bl}.\cos(2\pi l)+\vec{X}^{*} \quad (7)$$

Where 'D'=$\left|\vec{X}^{*}-\vec{X}(t)\right|$' represents the distance between the (X, Y) and (X*, Y*) and variable 'l' is a random number between -1 and 1.

During hunting process, humpback whales moves in spiral shaped as well as shrinking circle path simultaneously and hence we consider 50% probability between both shrinking circling and spiral model. Now the updated position is determined using the below equation (8).

$$\vec{X}(t+1)=\begin{cases}\vec{X}^{*}(t)-\vec{A}.\vec{D} & \text{if } P<0.5\\ D'.e^{bl}.\cos(2\pi l)+\vec{X}^{*} & \text{if } p^{3}0.5\end{cases} \quad (8)$$

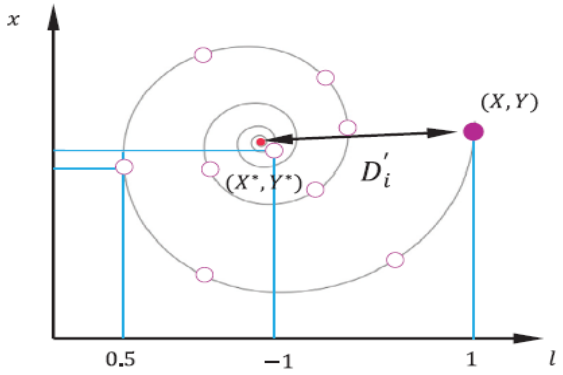

Fig.3. Spiral updating position mechanism

C. Search for Prey

To make the algorithm global optimizer when less than one or greater than one the search agent (whale) is updates its position according to a randomly selected search agent instead of the best search agent.

$$\vec{D} = |\vec{C}.\vec{X}\text{rand} - \vec{X}| \quad (9)$$

$$\vec{X}(t+1) = \vec{X}\text{rand} - \vec{A}.\vec{D} \quad (10)$$

IV. RESULTS AND ANALYSIS

Two popularly used test systems in the literature are used to test and evaluate the efficacy of proposed techniques.

Test system#1: A popularly known IEEE 33-bus system is considered as test system 1. The data including branch and load data are taken from [1]. It consists of one feeder, 33 nodes/buses, 32 lines/braches and operates at 12.66 KV. The sum of real and reactive loads of system is 3.715 MW and 2.3 MVAr, respectively. Without any compensation, the real and reactive losses are 210.99 KW and 143.03 KVAr. Index vector values of this test system are graphically presented in "Fig.4". As it can be viewed from "Fig.4", the bus 30 is having the highest index value and its normalized voltage in "Fig.5 is also less than 1.01 and hence it is selected as candidate node/bus to connect DG.

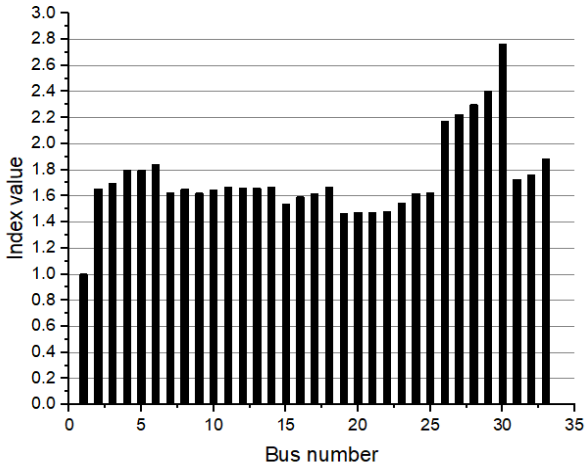

Fig.4. Index vector profile for IEEE 33-bus system

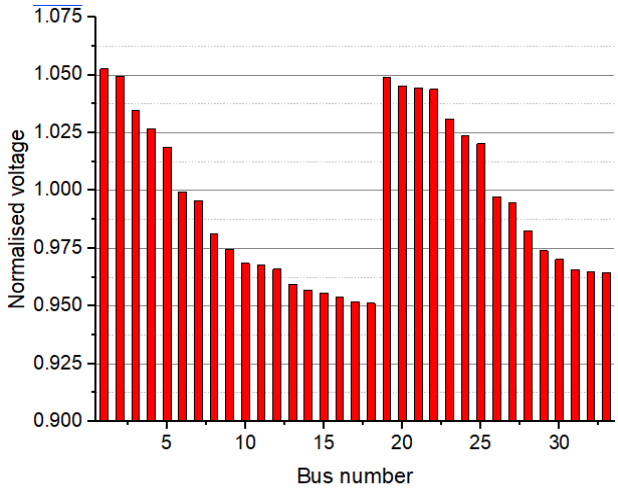

Fig.5. Normalised voltage profile of IEEE 33-bus system

The optimized results of IEEE 33-bus system with the proposed WOA algorithm are recorded in "Table-I". The results include DG size in kilowatts, real power loss (Ploss), reactive power loss (Qloss), minimum voltage level (Vmin) and total voltage deviation (Vdevi). From the results it is clear that the power losses after the placement of type-4 DG is very less when compared to other types of DGs. Power losses are very less with type-4 DG because it injects active power as well as reactive power at connected bus. The actual reduction in real power loss after the placement of type-1, 2, 3 and 4 DGs are 40.67%, 28.25%, 7.18% and 65.12%, respectively. The minimum voltage level at bus 18 is greatly improved with type-4 DG when compared to other DG types. The reduction in total voltage deviation is also superior with type-4 DG unit. Figure 6 shows the graphical representation of voltage profile of IEEE 33-bus system with and without DG.

Table-I: Results of IEEE 33-bus system

	Without DG	With DG			
		Type-1	Type-2	Type-3	Type-4
DG location	NA	30	30	30	30
DG size	NA	1542.67 KW	1257.99 KVAr	631.83 KVA	1976.20 KVA
P_{loss}(KW)	210.99	125.16	151.37	195.84	73.59
Q_{loss}(KVAr)	143.03	89.28	103.81	134.00	55.68
Vmin (p.u)	0.9038	0.92723	0.91648	0.9086	0.93941
Vdevi	1.8051	1.1137	1.4263	1.6637	0.74551

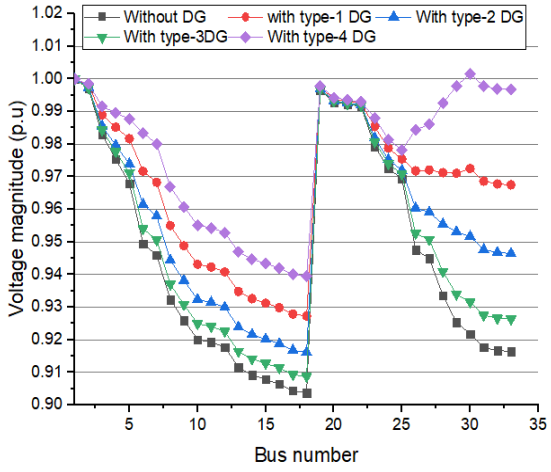

Fig.6. Voltageprofile of IEEE 33-bus system

"Fig.7" visualizes the convergence curves of a WOA when applied for test system 1. From the convergence curves it is clear that the proposed WOA can converge in very less number of iterations.

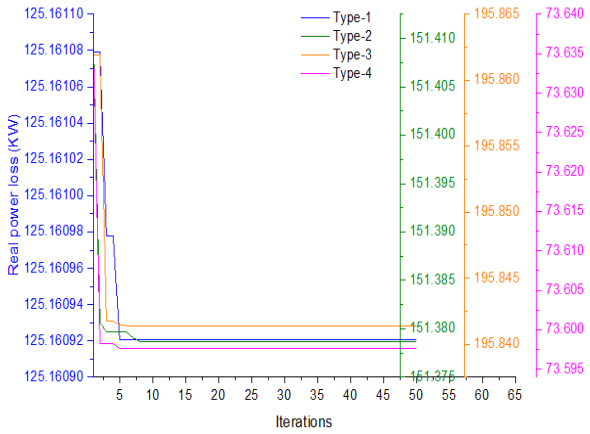

Fig.7. Convergence characteristics of WOA for IEEE 33-bus system

Test system#2: IEEE 69-bus system is taken as second test system. The system data including line/branch data and load/bus data is obtained from [1]. It consists of 69 nodes/buses, 68 branches/lines and operates with 12.66 KV. Total network loads are 3802.19 KW and 2694.6 KVAr. "Fig. 8" and "Fig. 9" represents index vector profile and normalized voltage profile of a IEEE 69-bus system. From the index vector profile it is very clear that bus 61 is having highest index value and from normalized voltage profiles its normalized voltage is also less than 1.01. Hence, bus 61 is selected to place DG units.

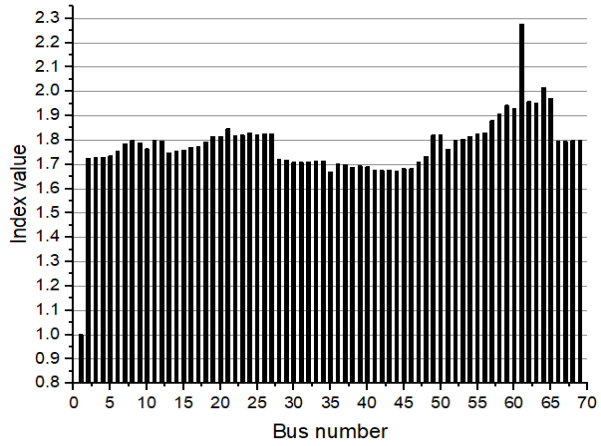

Fig.8. Index vector profile for IEEE 69-bus system

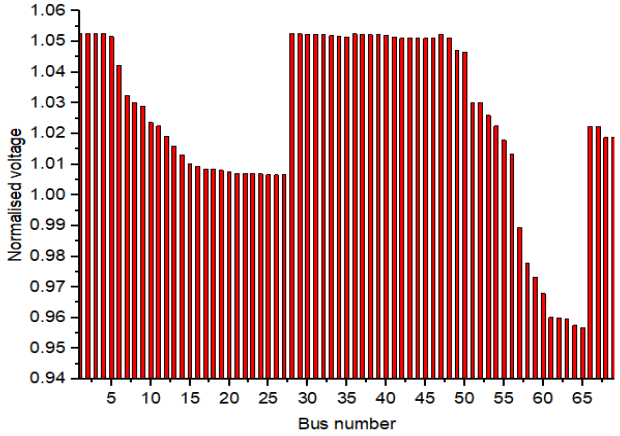

Fig.9. Normalized voltage for IEEE 69-bus system

The optimized results of IEEE 69-bus system with the proposed WOA algorithm are recorded in "Table-II". The results include DG size in kilowatts, real power loss (Ploss), reactive power loss (Qloss), minimum voltage level (Vmin) and total voltage deviation (Vdevi). From the results it is clear that the power losses after the placement of type-4 DG is very less when compared to other types of DGs. Power losses are very less with type-4 DG because it injects active power as well as reactive power at connected bus. The actual reduction in real power loss after the placement of type-1, 2,3 and 4 DGs are 63.01%, 32.42%, 12.43% and 89.70%, respectively. The minimum voltage level at bus 65 is greatly improved with type-4 DG when compared to other DG types. The reduction in total voltage deviation is also superior with type-4 DG unit. "Fig. 10" shows the graphical representation of voltage profile of IEEE 69-bus system with and without DG.

Table-II: Results of IEEE 69-bus system

	Without DG	With DG			
		Type-1	Type-2	Type-3	Type-4
DG location	NA	61	61	61	61
DG size	NA	1872.70 KW	1329.99 KVAr	813.41 KVA	2223.86 KVA
P_{loss}(KW)	225	83.22	152.04	197.63	23.16
Q_{loss}(KVAr)	102.17	40.52	70.49	90.28	14.37
Vmin (p.u)	0.90918	0.96831	0.93072	0.92598	0.97247
Vdevi	1.8388	0.8822	1.5093	1.6147	0.5867

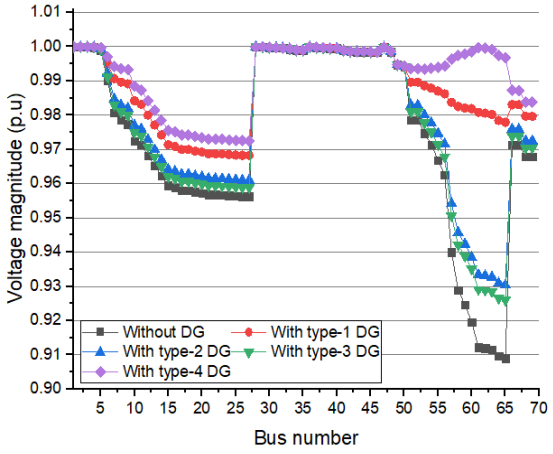

Fig.10. Voltage profile of IEEE 69-bus system

"Fig. 11" visualizes the convergence curves of a WOA when applied for test system 2. From the convergence curves it is clear that the proposed WOA can converge in very less number of iterations.

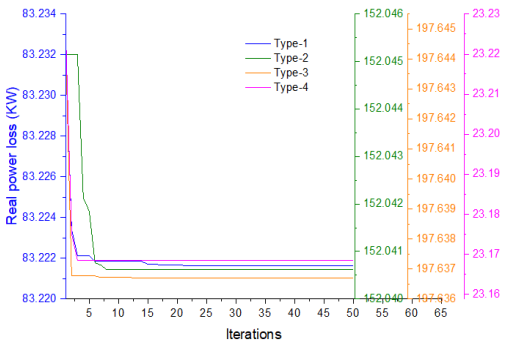

Fig.11. Convergence characteristics of WOA for IEEE 69-bus system

V. CONCLUSION

Power loss reduction and voltage control are considered as main objectives in this work. This objectives are reached by optimal placement and sizing of different types of DG units. Optimal DG locations are found by using analytical method called index vector method (IVM) and optimal rating are found by optimization technique called 'whale optimization algorithm' (WOA). The proposed IVM and WOA are tested on two popularly used test systems namely IEEE 33 & 69 bus systems. Finally, it is observed from the results that type-4 DG performs well as compared to other types of DGs in view of power loss reduction and voltage profile improvement.

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A Hybrid Diesel Wind PV Based Energy Generation System

A. V. Sudhakara Reddy, Balla Shiva Kumar, Ch. Narendra Kumar

Abstract*: Imperativeness increase of network to compelled districts is connected with specific and modest. Enabled examination abuse age manageable power.Test displays execution an unbiased miniaturized scale matrix topology relying upon a lone. Miniaturized scale matrix structure is empowered with various maintainable power sources to be explicit breeze and sun orientated PV group. Regardless, vitality amassing structure in like manner saves the trustworthiness. Upside blurred trading key oversee. Realized supply. Breeze daylight essentially based hotshots resources identified with association.Appliedon associate with rouse quick vitality steadiness underneath exact conditions.Nearby the system compromise, the VSC moreover can possibly slight the vitality extraordinary inconveniences, for example, consonant streams, load altering and voltage principle. By utilizing cushioned method of reasoning controller in this system to diminish the deviations inside the waveforms. A broad gathering copy is shown uncover all.

Keywords* : eyewitness, manage exceptional, independent micro grid, voltage tenet.

I. INTRODUCTION

Most extreme reasonable for a wild revision because of trapezoidal returned EMF. On the off peril that the winding streams are in like manner made semi rectangular wave, by then a low wave torque is made and the contraption works effectively. This component isn't made semi rectangular streams. What's more, the essentialness thickness of the PMBLDC machine is unreasonable which makes it little in size, in this way incredible inclination for post mounting utility. Unflinching outstanding appraisal of a breeze diesel-battery based absolutely system is represented, wherein wind vitality trade structure trustworthiness is gotten thinking about the breeze fluctuations and component trouble. Furthermore, the reliability research of the entire structure is likewise performed by method for taking diesel, wind and battery. The control of a PMSG (Permanent Magnet Synchronous Generator) basically based WECS (Wind Energy Conversion System) related with an inverter with battery going around as structure is advertised. The vitality created by methods for WECS is used to control the SOC of battery. In the more a piece of the structures depicted in the composition, variable pace wind power trade system attempts to isolate the most extreme serious power from the breeze. Wind vitality is detached vitality at the action mastermind, so it is valuable to remove the best quality and to develop the adequacy and utilizing WECS. It Dreams starting capital charge, yet. Various systems figuring like incline climbing, the mechanical sensor considerably less MPPT estimation contemporary sensor less computation lifts. Figuring related side interest repeat, directing top notch issues consolidating aircon. Various estimations represented inside composition. A moved estimation reliant onlooker represented. Spectators applied isolate symphonious portions sign a short time later the evacuated significant is also applied in this oversee figuring. This assignment execution dwindled wind-sunshine based -essentially unprejudiced little scale grid structure.

A version enduring those factories being developed. breeze sunlight based basically based PV structures are ceaselessly toiled at their most extreme serious power factor using help converters and the DG is worked inside a predefined quality assortment to improve the ability join assets resources vitality development potential great ability. sensor less recollect utilized a lazy absolutely estimation sunlight based situated structure. In the moving toward years, all living arrangements could have its extremely possess uninterruptible manageable power source structures that may can likely figure in statute methods Of hobby, as an example, network related mode and islanded mode. This strategy might be sound for gathering a simple, relentless change among those modes with the guide of abuse. Landing district and resynchronization algorithmic core value could be something tangled. Each approach of progress power cycle is respected inside the Figure. There are two strategies for exercises as respected in observe underneath, fair-minded and system related. At the point when the capacity is shut far away from the utility grid, the system goes to the islanded mode and once the limit is to be had from the application network, the structure can synchronize and may be related with the application cross section. Yield oversee from the electrical cell is accessible for interfacing hybrid electrical vehicle (PHEV) system. Bidirectional Power Device (BPD) controls two parameters, dynamic present and dynamic/responsive control. In autonomous mode, BPC supervises two parameters, AC repeat and voltage.

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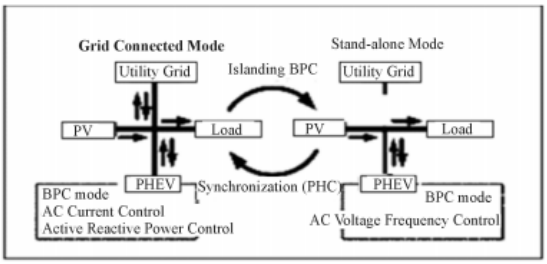

Fig. 1. Mode of operation

The going with segment explains working general of those modes. There are progressive alterations with the country of atmosphere and speed of wind. Dependent upon these conditions, wind and grand bodies work. These systems must be adoptable. This deduces these systems should change of employable parameters in accordance with the movements in climatic circumstances. These parameters are hugely fanciful. These parameters can't be common even with the guide of the chairmen inside the structure and cannot predict the speed of wind and light hours Conditions for photograph voltaic cell develops decisively. The yield of those frameworks differs forever and administrator ought to be horribly careful within the lattice. In any case, there are various unique troubles which can be difficult to be illuminated.

II. LITERATURE SURVEY

A. R. Sebastian

Gives the Wind diesel cross breed frameworks is remote frameworks that be a piece of diesel generators with wind turbine turbines to diminish the fuel utilization. Noteworthy fuel speculation properties are most likely doable if the machine is in structure for strolling with the diesel turbines not running (Wind Only mode). This becomes the control multifaceted nature and requires extra gadget. Directly simultaneously as the breeze oversee isn't open, the diesel generator need to stock the basic capacity to the device. To lessen the measure of start forestall cycles in the diesel processes a speedy lived noteworthiness collecting machine is sizeable. Batteries are essential in wind diesel cream structures in view of the reality they might be the basic inclination for mid-term criticalness aggregating. This paper shows up at the gigantic alternatives for the case of batteries as at the present time vitality gathering. The battery fundamentally based totally significance putting away device utilizes a three-establishment interface related with the remote instrument that takes after the main power references.

Proposes a stand-apart independent crossover control age device, utilizing instigated control procedures, supported by methods for method for 4 quality property: wind control, sun masterminded vitality, gathering battery, and diesel motor generator, and which isn't constantly connected with a business oversee structure. Astonishing exertion changed into situated into the improvement of dynamic responsive vitality and advance off oversee controls. Contrasting power resources May be interconnected any place on a relative electrical connection, terrifying adaptable structure headway. It is anticipated that this blend control age machine, into which regular hugeness is merged, will include to worldwide natural assurance separated islands and in common zones without a reliance on modern business venture oversee frameworks.

III. PROBLEM FORMULATION

Also, an oversee depend is expected related endeavor rehash moderating charming issues combining cooling things. Different key control figuring's are spoken to inside the structure. An induced control calculation contemplating composite passerby is spoken to. Composite observers are utilized to seclude consonant factors from any flag and after that the expelled essential is in like manner utilized on this control depend. This undertaking offers utilization decreased -sun sorted out totally independent little scale network structure plants hesitance suffering those plants being developed. breeze sun fundamentally based structures normally toiled most extreme incredible utilizing help worked internal predefined control improve general execution utilized set up resources vitality development limitation top notch exchange limit. A mechanical sensor less MPPT calculation is utilized for WECS and an enduring conductance based MPPT depend is utilized for sun oriented based absolutely PV device.

IV. HYBRID SYSTEM

If you Between relationship of as a base two wellsprings of Renewable ages like breeze control, picture voltaic quality, electric controlled portable and littler scale turbine generator to give ability to close by load or most likely interfacing with organize/scaled down scale structure frameworks Hybrid Energy Systems. By virtue of qualities of daylight based absolutely vitality imperativeness, quality age group moreover breeze relating relentless top notch of joined vitality age which is much better while appeared differently in relation to the vitality made by an individual stock. An across the board required bunch. As of past due, DC systems are resurging a final product of the headway and relationship of limitless DC control resources and the favored situation for DC stacks in business undertaking, mechanical and individual applications. To include with the remarkable appropriated turbines DC small scale network has been proposed. Regardless, AC sources should be altered over related with system required customary hundreds. At the factor when vitality can be completely given with the guide of the boundless power sources. HV extensive detachment transmission is not the slightest bit again indispensable. Cooling Micro networks are proposed to rouse the relationship of limitless quality assets to AC systems. In any case, photovoltaic (PV) board's DC yield vitality must be changed over utilizing supporters interface with system. System, required for novel household working environments offer particular. A portion of half AC/DC littler scale system is proposed In this paper to diminish various methodologies of turnaround alterations in a man or lady framework rouse inexhaustible what's more, assets hundreds quality. Plans greatest limitless debilitate move among structures, save up steady enthusiasm underneath part commercial center leisure activity conditions when the

hybrid system works system moved equipment advancements used make predetermination stacks increasingly wonderful. In light of the manner in which that daylight basically based fanciful, better invasion in sort's framework should manufacture specific frail frameworks live particular structures right gathering capacity. Planning 2 limitless assets into a perfect blend, the effect of the variable thought of sun powered based and wind things could be in the fundamental settled and the general system ends up being routinely strong and moderate to run. Every wellspring of intensity makes diverse quality pointers, for example Photovoltaic portable produces DC and wind produces AC. Adaption is must be required between them. This adaption is alluded to as coupling. Coupling should be feasible in two specific habits: AC or DC. They might be utilized as a touch of each on-network, off-cross section and additionally fit as a fiddle. In AC-coupling and DC-coupling the amount of components are for all intents and purposes same yet the important differentiation is dump weight is used in DC simultaneously as WTG inverter in AC-coupling.. Noteworthy is the way that the WTG inverter a terrible parcel of the time is made With a breaking chopper, basically a DC-DC supplanting noxious present day-day and voltages directly into a resistor making warmth, to comfortable the inverter as opposed to a unload load.

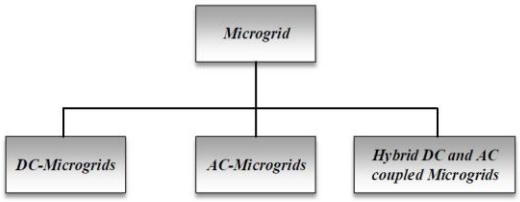

Fig. 2. Three types of grids

Voltage and repeat substitute, and music are full-size power astounding issues for every network related and keep on being singular systems with additional impact inside the occasion of weak cross section. This can bere fathomed to a decent estimated degree by means of having real shape, pushed brief response oversee work environments, and advancement of the blend systems.

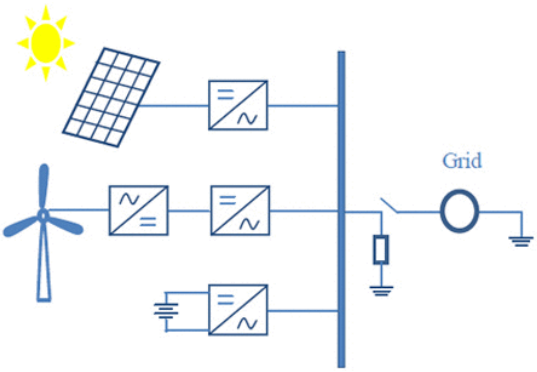

Fig. 3. Hybrid gadget with AC Micro network

Small scale framework is another thought in charge age. The Micro network thought changed into a gathering of hundreds and littler scale resources functioning as a lone controllable system that offers every quality and warmth. A couple of models ought to portray the fragments of a Micro system.

V. MODELING SYSTEM

Sun oriented orientated principally fair little scale grid with the battery vitality amassing to keep up the nearby masses. The all out system topology is showed up in Fig. 4. A by method for RG is applied breeze plants picked intentionally in light of the going with turbines decrease upkeep close with.

By methods for RG is applied customary counselor and AVR is depleted at this point the voltage and rehash of the structure are directed. Pushed methods for a breze. Regarded Fig in. 4, the relationship lift is most proper a wild change because of trapezoidal again EMF.

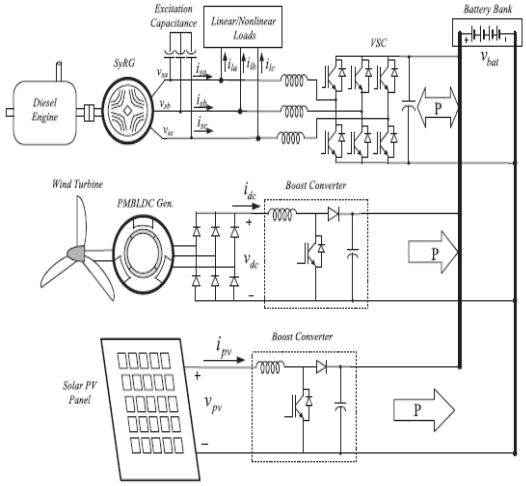

Fig.4 proposed unmarried VSC and the brushless age fundamentally based free little scale cross section structure

If the winding streams are in like manner made semi rectangular wave, by then a low-swell torque is brought and the gadget works easily. This angle isn't made semi rectangular streams the essentialness thickness contraption little long, hereafter phenomenal open door for distribute mounting programming. The proposed topology additionally conveys sun arranged PV structure, which is likewise connected with the dc association of the VSC for power stream to the forced air system side wherein weights are to be had. As discussed sooner than, to keep up the power leveling and steadfast best of the store, the battery vitality accumulating machine is required. In this way, additionally presented association structure severa assets, gadget as made improve as well as eco-benevolence or as upgrade the free of extraction imperativeness helpful. As well as DG rule aircon supply inside the structure, so the system and the stack stop repeat is perceived with the action of the DG since it were. A customary repeat of the structure suggests the consistent speed of the generator (as the generator is by RG). It is communicated that with consistent speed movement of the diesel engine, the fuel use doesn't exchange bounty from its motivating force at complete weight, along those strains as making it as engine diesel eco-agreeableness terrible at lighter weights. as the diesel vehicles compositions may sensible super viability among eighty–a hundred% stacking. Here, the control technique is delivered for the DG to works of art it regularly inside a foreordained

stacking assortment as respected in Fig. Five. The as well as rating full as weight rating isn't as well as required there is maintainable power supply property and the battery essentialness accumulating framework is out there.

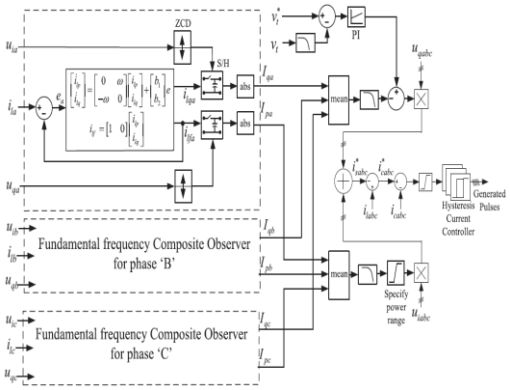

Fig. 5. VSC for strategy Control

As well as WECS comprises for as generator PMBLDC, 3-arrange rectifier diode partner diode or as converter lift. It is inductor as well as utilized as well as to made of the dc present day in every way that really matters suffering which shows as semi square waveform of current revealing in genuine time conditioner viewpoint that is good for the movement of PMBLDCG as examined beforehand. The development of the WECS is advanced with the guide of getting out the need of any mechanical sensor for MPPT. A MPPT figuring is used which calls for simply identifying of VDC and IDC. This MPPT computation is proportionate to issue and watch that is used for most extreme exceptional power extraction in sun based absolutely PV system.

VI. SIMULATION RESULTS

For Sensor Mechanical MPPT. A MPPT estimation for used may requires essentially identifying as VDC and IDC. As well as MPPT computation of comparable to issue and watch that is used for greatest exceptional vitality extraction in sun based PV system.

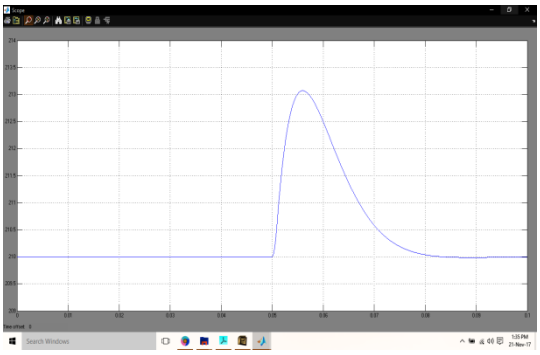

Fig. 6(a). VDC

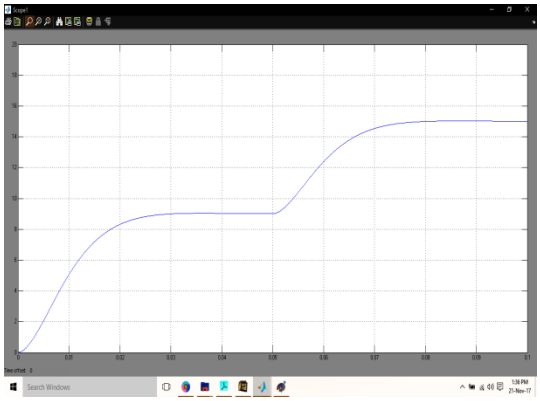

Fig. 6(b) IDC

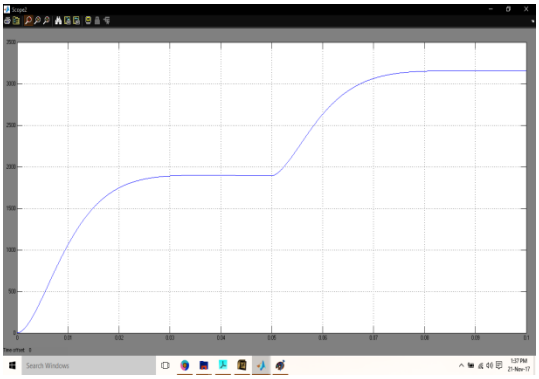

Fig. 6(c) PDC

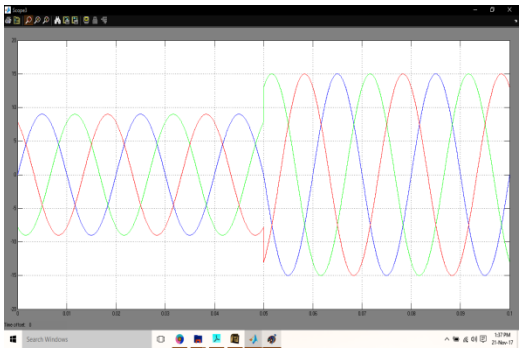

Fig. 6(d) Ipm-bldc

Fig. 6. As Performance for varying wind under WECS speed

As relating to execution as for MPPT count underneath thing wind movement is appeared in Fig. 6. The impacts with steady wind speed are appeared in Fig. 6 until t= zero.05s. The breeze pace is adjusted from 7 to 12 m/s at t = zero.05 s. The dynamic conduct of the structure is appeared during such assortment in wind speed. From those outcomes, it is noticeable that with an assortment inside the breeze speed, the vitality yield of the WECS increases and in addition it might be unmistakable that the PMBLDCG present day has similarly expanded.

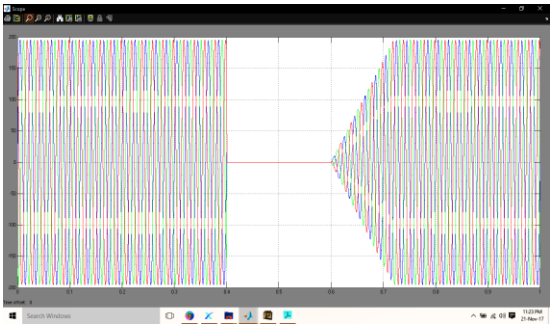

Fig. 7(a) Vsabc

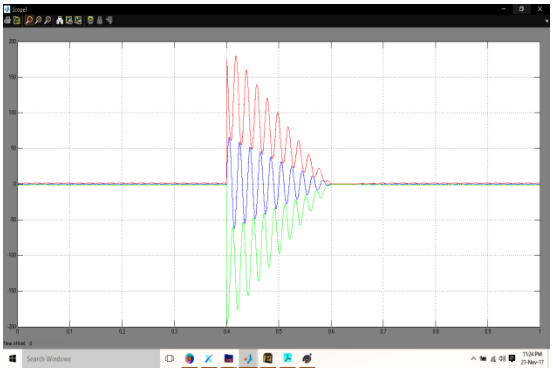

Fig. 7(b) Isabc

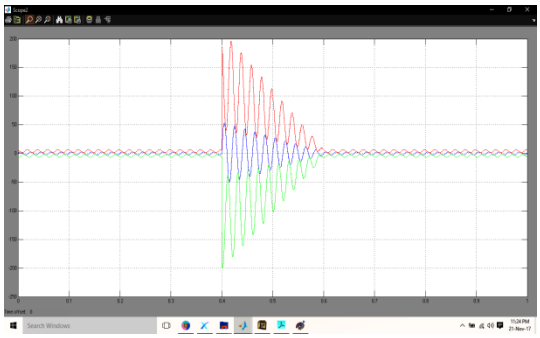

Fig. 7(c) Ilabc

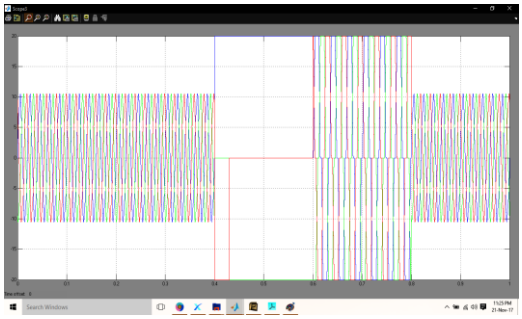

Fig. 7(d) Icabc

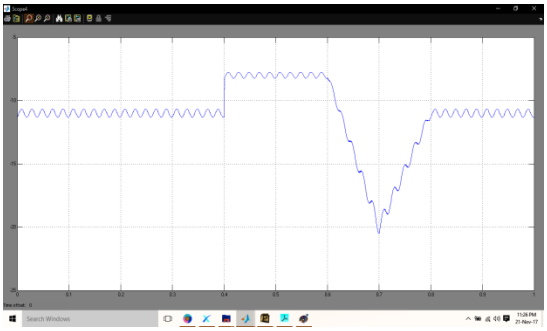

Fig. 7(e) Ibat

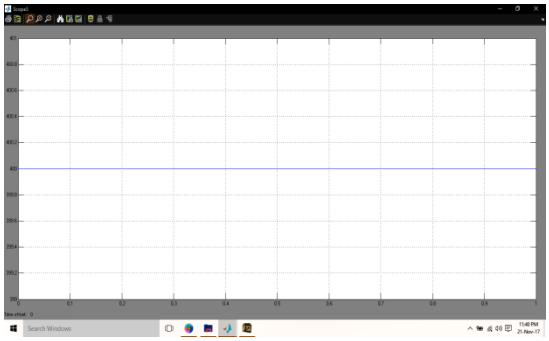

Fig. 7(f) Vbat

Fig. 7. Performance faulted under condition System

The territory gives as succinct cognizance be ways as structure shall keep on underneath some trouble circumstances. The blemish events are made and separated utilizing reenactment apparatus. First case is taken where the trouble is made reporting in real time conditioner shipping. Current through the converter is controlled inside the control check number. As the streams are no Sinusoidal, a hard present day factor of constringent is applied to comfortable the gadgets and the system. On the off danger that the trading contraptions have their extremely possess guarantee structure (like desideration for IGBTs), at that factor a roundabout present day control might be applied, which requires simply supply streams. Nevertheless, the ones protections are hook capable (shutdown the structure), so it's miles more astute to restrict the cutting edge without requesting the interest. That is the thought process a quick present day control merging compensator streams for used. as outcomes it appeared an Fig. 7. As showed up in Fig. 7, the responsive as for at most extreme part gave the guide of the converter and with the deficiency reporting in real time conditioner line, the open vitality possesses inconvenience way breakdown. Regardless, while the need is cleared, the generator gets once more. Another piece of breathing space on that structure as well as it's far as framework fundamentally system based or from now on at generator prominently adds at that issue contemporary, with have as monster brisk out score appeared differently in relation to the semiconductor contraptions.

VII. CONCLUSION

Hybrid vitality structures (HES) can convey circumstance pleasant and monetarily adroit essentialness courses of action with higher unfaltering charming and vitality five star. As opposed to standard vitality, impartial sun based principally based breeze diesel based absolutely HES can supply no longer too awful convey of electrical power in faraway regions. In these days, HES is a money related truth to bring down the dependence network systems. As well as diesel driven control generator at normally given the remote HES of the event of electrical unavailability in the unavailability vitality for economical quality. Additionally, can HES significantly lessen as fuel use or outpouring appeared differently in relation to the customary vitality structures. Regardless, a considerations boggling vitality the official's methodology is required to

guarantee suitable quality phenomenal sources or streamline as quality. The compact report interest as locked in on that investigation will a mean to collect a vitality the board strategy and control structures for stay lone sun essentially based breeze diesel half of breed essentialness frameworks (SWDHES). The proposed little scale network topology with a singular voltage source converter and brushless generators has been practiced underneath unmistakable running conditions. An included movement of oversee estimations is moreover endeavored for structure's voltage and repeat control, cure of force agreeable issues, oversee balance inside the total system under novel disrupting influences stretching out from full-size weight territory to maintainable vitality source supply vulnerability. Some thought of battery rate release oversees and flaw investigation is additionally talked about. Matlab/simulink impacts have affirmed the appropriateness of this topology for rustic/segregated districts in light of the fact that the topology is simple and expense compelling.

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A review of Fingerprint Recognition Based Automatic Attendance System

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Abstract: Our paper aims at designing a student attendance system which could effectively manage attendance of students at institutes like NIT Rourkela. Attendance is marked after student identification. For student identification, a fingerprint recognition-based identification system is used. Finger prints are considered to be the best and fastest method for biometric identification. They are secure to use, unique for every person and do not change in one's lifetime. Fingerprint recognition is a mature field to- day, but still identifying individual from a set of enrolled fingerprints is a time taking process. It was our responsibility to improve the fingerprint identification system for implementation on large databases e.g. of an institute or a country etc. In this paper, many new algorithms have been used e.g. gender estimation, key based one to many matching, removing boundary minutiae. Using these new algorithms, we have developed an identification system which is faster in implementation than any other available today in the market. Although we are using this fingerprint identification system for student identification purpose in our paper, the matching results are so good that it could perform very well on large databases like that of a country like India (MNICPaper).

This system was implemented in Matlab10, Intel Core2Duo processor and comparison of our one too many identification was done with existing identification technique i.e. one to one identification on same plat form. Our matching technique run sinO (n+N) time as compared to the existing O(Nn2). The finger print identification system was tested on FVC2004 and Verifinger databases.

Keywords: Attendance Management Systems, MATLAB, Fingerprint Recognition, Matching Techniques

I. INTRODUCTION

Designing a student attendance management system based on fingerprint recognition and faster one to many identification that manages records for attendance in institutes like NIT Rourkela**.** Every organization whether it be an educational institution or business organization, it has to maintain a proper record of attendance of students or employees for effective functioning of organization. Designing a better attendance management system for students so that records be maintained with ease and accuracy was an important key behind motivating this paper. This would improve accuracy of attendance records because it will remove all the hassles of roll calling and will save valuable time of the students as well as teachers. Image processing and finger print recognition are very advanced today in terms of technology. It was our responsibility to improve fingerprint identification system. We decreased matching time by partitioning the database to one-tenth and improved matching using key based one too many matching.

Biometric Identification Systems are widely used for unique identification of humans mainly for verification and identification. Biometrics is used as a form of identity access management and access control. So use of biometrics in student attendance management system is a secure approach. There are many types of biometric systems like fingerprint recognition, face recognition, voice recognition, iris recognition, palm recognition etc. In this paper, we used fingerprint recognition system. A fingerprint is the pattern of ridges and valleys on the surface of a fingertip. The endpoints and crossing points of ridges are called minutiae. It is a widely accepted assumption that the minutiae pattern of each finger is unique and does not change during one's life. Ridge endings are the points where the ridge curve terminates, and bifurcations are where a ridge splits from a single path to two paths at a Y-junction. Figure1 illustrates an example of a ridge ending and a bifurcation. In this example, the black pixels correspond to the ridges, and the white pixels correspond to the valleys.

When human finger print experts determine if two fingerprints are from the same finger, the matching degree between two minutiae pattern is one of the most important factors. Thanks to the similarity to the way of human fingerprint experts and compactness of templates, the minutiae-based matching method is the most widely studied matching method.

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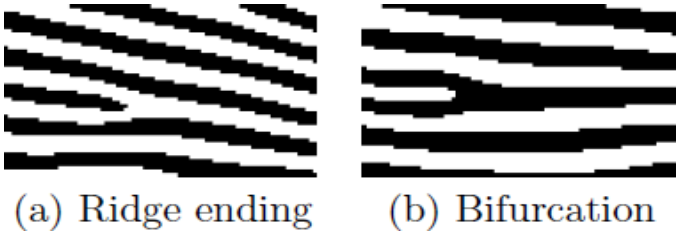


Fig 1: Example of a ridge ending and a bifurcation

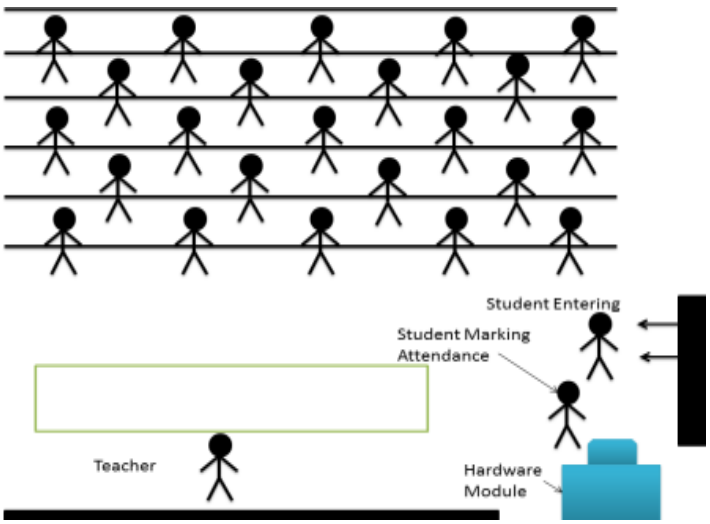
Fingerprints are considered to be the best and fastest method for biometric identification. They are secure to use, unique for every person and do not change in one's lifetime. Besides these, implementation of fingerprint recognition system is cheap, easy and accurate up to satisfiability. Fingerprint recognition has been widely used in both forensic and civilian applications. Compared with other biometrics features, fingerprint-based biometrics is the most proven technique and has the largest market shares. Not only it is faster than other techniques but also the energy consumption by such systems is too less.

II. USING FINGERPRINT RECOGNITION SYSTEM ATTENDANCE MANAGEMENT

Managing attendance records of students of an institute is a tedious task. It consumes time and paper both. To make all the attendance related work automatic and on-line, we have designed an attendance management system which could be implemented in NIT Rourkela. It uses a fingerprint identification system developed in this paper. This finger print identification system uses existing as well as new techniques in fingerprint recognition and matching. A new one to many matching algorithm for large databases has been introduced in this identification system. This paper has been organized into introduces with our paper, explains the proposed design of attendance management system. Explains the fingerprint identification system used in this paper, explains enhancement techniques, explains feature extraction methods, explains our database partitioning approach work. Explains matching technique, explains experimental work done and performance analysis, includes conclusions and introduces proposed future work.

III. ATTENDANCE MANAGEMENT FRAMEWORK

Manual attendance taking and report generation has its limitations. It is well enough for 30-60 students but when it comes to taking attendance of students large in number, it is difficult. For taking attendance for a lecture, a conference, etc. roll calling and manual attendance system is a failure. Time waste over responses of students, waste of paper etc. are the disadvantages of manual attendance system.



Moreover, the attendance report is also not generated on time. Attendance report which is circulated over NITR webmail is two months old. To overcome these non-optimal situations, it is necessary that we should use an automatic on-ine attendance management system. So we present an implementable attendance management framework. Student attendance system framework is divided into three parts: Hardware/Software Design, Attendance Management Approach and On-line Report Generation. Each of these is explained below.

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Hardware - Software Level Design

Required hardware used should be easy to maintain, implement and easily available. Proposed hardware consists following parts:
(1)Fingerprint Scanner, (2) LCD/Display Module (optional), (3) Computer, (4) LAN connection

Table 1: Estimated Budget

Device Name	Cost of One Unit	No. of Units Required	Total Unit Budget
Scanner	500	100	50000
PC	21000	100	2100000
Total			21,50,000

Fingerprint scanner will be used to input fingerprint of teachers/students into the computer software. LCD display will be displaying rolls of those whose attendance is marked. Computer Software will be interfacing fingerprint scanner and LCD and will be connected to the network. It will input fingerprint, will process it and extract features for matching. After matching, it will update database attendance records of the students.



Fig 2: Hardware present in classrooms

Estimated Budget Estimated cost of the hardware for implementation of this system is shown in the table 2.1. Total number of classrooms in NIT Rourkela is around 100. So number of units required will be 100.

This part explains how students and teachers will use this attendance management system. Following points will make sure that attendance is marked correctly, without any problem:

(1) All the hardware will be inside classroom. So outside interference will be absent.
(2) To remove unauthorized access and unwanted attempt to corrupt the hardware by students, all the hardware except fingerprint scanner could be put inside a small cabin. As an alternate solution, we can install CCTV cameras to prevent unprivileged activities.
(3) When teacher enters the classroom, the attendance marking will start. Computer software will start the process after inputting fingerprint of teacher. It will find the SubjectID, and Current Semester using the ID of the teacher or could be set manually on the software. If teacher doesn't enter classroom, attendance marking will not start.
(4) After sometime, say20minutes of thisprocess, no attendance will be given because of late entrance. This time period can be increased or decreased as per requirements.

Database for attendance would be a table having following fields as a combination for primary field: (1)Day, (2)Roll, (3)Subject and following non-primary fields: (1)Attendance, (2)Semester. Using this table, all the attendance can be managed for a student. For on-line report generation, a simple website can be hosted on NITRourkela servers, which will access this table for showing attendance of students. The sql queries will be used for report generation. Following query will give total numbers of classes held in subject.

Network and Database Management

This attendance system will be spread over a wide network from classrooms via intranet to internet. Using this network, attendance reports will be made available over internet and e-mail. A monthly report will be sent to each student via email and website will show the updated attendance.

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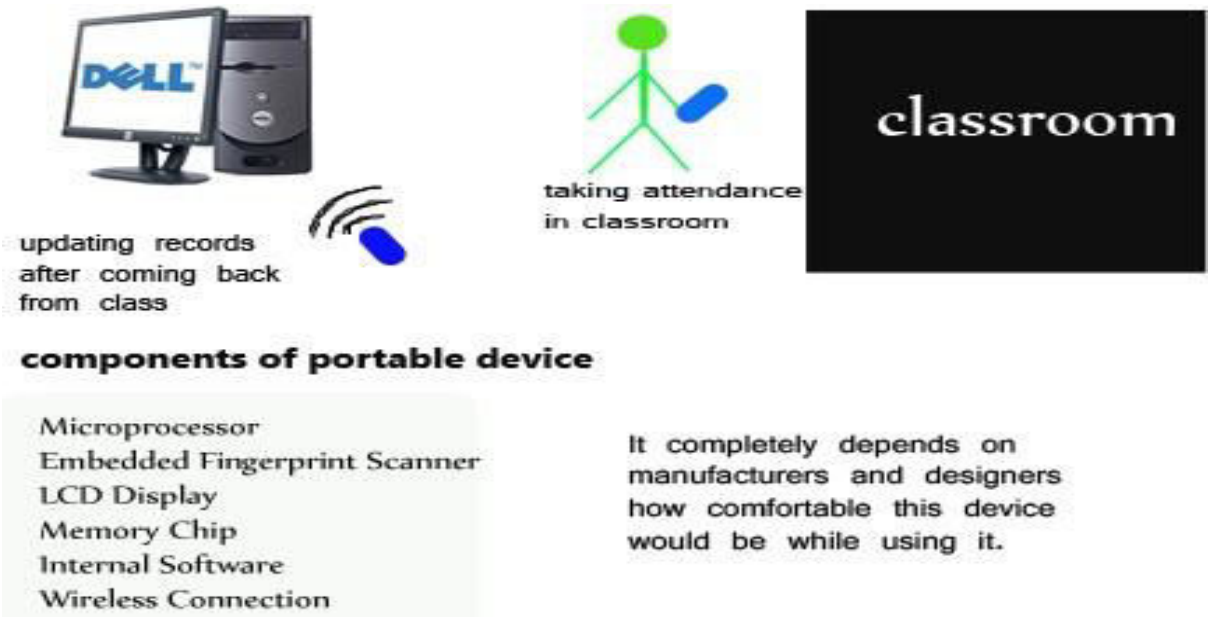

Fig 3: Classroom Scenario

Entity relationship diagram for database of students and attendance records.
In ER diagram, primary fields are Roll, Date, SubjectID and TeacherID. Four tables are Student, Attendance, Subject and Teacher.

Using wireless network instead LAN and bringing portability
We are using LAN for communication among servers and hardwares in the classrooms. We can instead use wireless LAN with portable devices. Portable device will have an embedded fingerprint scanner, wireless connection, a microprocessor loaded with a software, memory and a display terminal, see figure2.5. Size of device could be small like a mobile phone depending upon how well the device is manufactured.

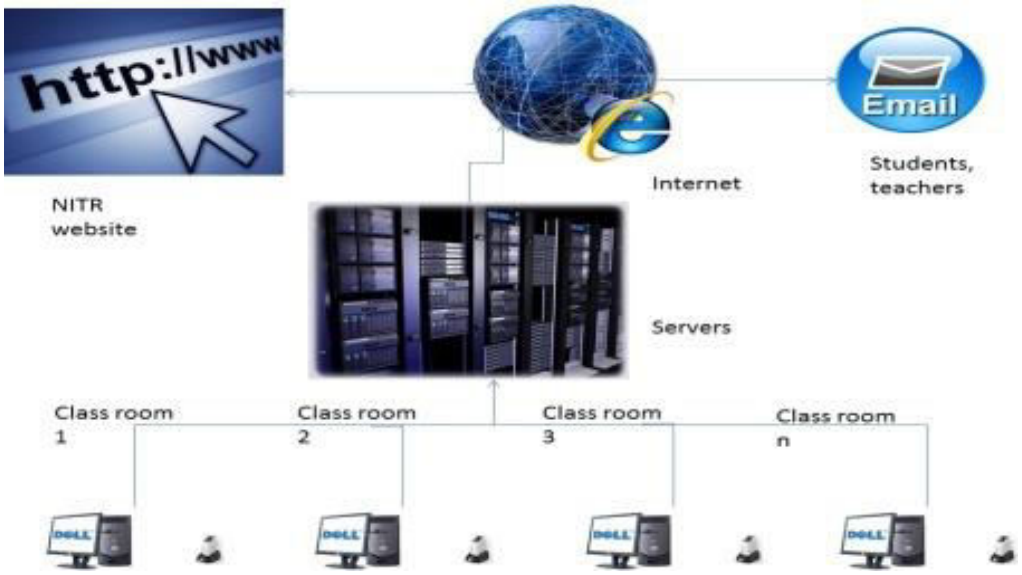

Fig 4: Components of Portable device

This device should have a wireless connection. Using this wireless connection, attendance taken would be updated automatically when device is in network of the nodes which are storing the attendance records. Database of enrolled fingerprints will be in this portable device. Size of enrolled database was 12.1 MB when 150 finger- prints were enrolled in this paper. So for 10000 students, at least 807MB or more space would be required for storing enrolled database. For this purpose, a removable memory chip could be used. We cannot use wireless LAN here because

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fetching data using wireless LAN will not be possible because of less range of wireless devices. So enrolled data would be on chip itself. Attendance results will be updated when portable device will be in the range of nodes which are storing attendance reports. We may update all the records online via the mobile network provided by different companies.Today3G network provides sufficient through put which can be used for updating attendance records automatically without going near nodes. In such case, the need of database inside memory chip will not be mandatory. It will be fetched by using 3G mobile network from central database repository. The design of such a portable device is the task of embedded system engineers.

The device may either behaving touch screen input/display or buttons with lcd display. A software specially designed for the device will be running on it. Teachers will verify his/her fingerprint on the device before giving it to students for marking attendance. After verifying the teacher's identity, software will ask for course and other required information about the class which he or she is going to teach. Software will ask teacher the time after which device will not mark any attendance. This time can vary depending on the teacher's mood but our suggested value is 25 minutes.

There are various other kind of student attendance management systems available like RFID based student attendance system and GSM-GPRS based student attendance system. These systems have their own pros and cons. Our system is better because first it saves time that could be used for teaching. Second is portability. Portability has its own advantage because the device could be taken to any class wherever it is scheduled. While GSM-GPRS based systems use position of class for attendance marking which is not dynamic and if schedule or location of the class changes, wrong attendance might be marked. Problem with RFID based systems is that students have to carry RFID cards and also the RFID detectors are needed to be installed. Nonetheless, students may give proxies easily using friend's RFIDcard. These problems are not in our system. We used fingerprints as recognition criteria so proxies cannot be given. If portable devices are used, attendance marking will be done at any place and anytime. So our student attendance system is far better to be implemented at NITR.

Matching

Matching means finding most appropriate similar fingerprint to query fingerprint. Fingerprints are matched by matching set of minutiae extracted. Minutiae sets never match completely, so we compute match score of where q_j and p_i are the coordinates of jth minutiae of database minutiae set and i^{th} minutiae of query minutiae set respectively. Using these $<\delta x, \delta y, \alpha_k>$ values ,whole query minutiae set is aligned. This aligned minutiae set is used to compute pairing score. Two minutiae are said to be paired only when they lie in same bounding box and have same orientation. Pairing score is(number of paired minutiae)/(total number of minutiae).The i,j,k values which have highest pairing score are finally used to align minutiae set.Existing Matching Techniques

Most popular matching technique of today is the simple mindedn^2 matching where n is number of minutiae. In this matching each minutiae of query fingerprint is matched with n minutiae of sample fingerprint giving total number of n^2 comparisons. This matching is very orthodox and gives headache when identification is done on large databases.

One to Many matching

Few algorithms are proposed by many researchers around the world which are better than normal n2 matching. But all of them are one to one verification or one to one identification matching types.

IV. CONCLUSION

In this paper, we have presented a fingerprint-based attendance management system.

The developed system is an embedded system that is part of a fingerprint recognition/authentication system based on minutiae points. The system extract the local characteristic of a fingerprint which is minutiae points in template based. Templates are matched during both registration and verification processes. For improved quality control during the registration or verification process, a matching score was used to determine the success of the operation. The matching score was specified so that only sets of minutiae data that exceed the score will be accepted and data below the score will be rejected. Therefore, Fingerprint Recognition using Minutia Score Matching method was used for matching the minutia points before attendance is recorded.

The developed system is very helpful in saving valuable time of students and lecturers, paper and generating report at required time. The system can record the clock in and clock out time of students and workers in a very convenient manner using their fingerprint to prevent impersonation and reduce level of absence. Also, it reduces most of the administrative jobs and minimizes human errors, avoids proxy punching, eliminates time-related disputes and helps to update and maintain attendance records.

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Multilevel Inverter Based UPQC for Power Quality Improvement

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Abstract:*The main aim of this project is multilevel inverter associated UPQC for power quality enhancement. UPQC having 2 controllers namely series controller&another one is shunt controller. These controllers are associated with the DC link capacitor. Dc voltage is produced by PV source. In this project multilevel inverters are used in series&shunt controller for producing accurate sinusoidal wave shape. The series controller is connected at grid side for grid power quality improvement. In this project grid side voltage sag/swell reduced by series controller. The shunt controller regulate the reactive power compensation as well as reduced the load current harmonics. These controllers are regulated by expending synchronous reference frame theory (SRF). The advantages of proposed system is high efficiency&enrichment of quality power. The simulated results of proposed system is verified by MATLAB/Simulink environment.*

Key word: PV, UPQC, Power quality, harmonics, Synchronous reference frame theory,

I. INTRODUCTION

In recent days usage of renewable energy source are very popular & there is also enhancing emphasis on unpolluted energy generation via connection of rooftop-PV structures in small scale apartments and as well as profitable buildings [1]. Due todiscontinuousnature-of PV, an improved penetration of such frameworks, mostly in weak-circulation networksleads-to power quality issues i.e., voltage swell & voltage sag, which ultimatelyinsecurity in grid [2]. These issues also lead-to frequent false tripping of power electronic frameworks, damaging & false triggering of electronic structures &increases heating of capacitor banks etc [3]. In the Power quality issue on together load side& at grid side is main problem are faced between in modern distribution systems. The three stage multi-functional solar energytransformation network, which compensate-into load side power-quality issue was proposes in [4]. The single-phase solar PV inverter along within activepowerfiltering ability as well-known proposed as [5]. The main researched works are done into integrate at cleaned energy generations among the shuntactive filters. While shuntactive filters is capable as together load voltage-regulation,&has been coming into the cause ofinjects into reactive powers. In shunt-active filter are not regulates in PCC voltages as known in maintained in grid current unit power factor into equal time, as well as the stringent-voltage quality-requirements formelectronic load, in the used in series-active filter have propose form used into little apartment&profitable building[6]. The solar-photovoltaic systems are integrate into the dynamic voltages at restorer are proposed in [7]. Comparing at shunt &series-active power filters, at unify power quality-conditioner (UPQC), when it is have been together series or shunt compensator may be performed into load voltage regulations on maintaining at grid current sinusoidal at aunity power factor into same time. Integrating PV array as well as UPQC, giving to the two benefit in thecleaned energy generations into universals active. This integration on PVarray within unify power quality-conditioner have been reported in [8]. Compared between conventional grid connected inverters, in the PV integrated unify power quality-conditioner was many benefit into such improves in power quality in the grid, protecting critical loads for gridside conflictseparately in increases in the faults rides among the capability to converter throughout transients. With the increasestress on distribution generations& micro grids, here on renewable interested intounify power quality-conditioner systems [9]. Mention signal-generations are main tasks into control of the PV-UPQC. References signal generation technique may broad dividing astime domains at frequencies as domain technique. Time-domain method is common uses in between inthe lower computational requirement into real time implementation. Which are common using methods includes inreactive-power theories, synchronous-reference frames theory (DQ theory). The majorissue in use inthe synchronous referenced with frames theory base on technique as due to loadsdisturbed conditions, at double harmoniccomponent are presented at the D-axis currents. Because of this, lowpass filter at low cut off frequency is uses into filterout double harmonic-component. In the project is, a moves average filter (MAF) at uses in filter at the D axis

current to obtaining fundamental loads active currents. And giving as optimal-attenuation inwithin reduces the bandwidth in the controls [10]. Later, MAF is apply into improving performance of DC-link controls are known into grid synchronization used to phase locked loop. In the project, is the design & performance analysis of a three phase PV-UPQC are presented. Here the single phase inverter is replaced by cascaded multilevel inverter (CMLI-UPQC) for reducing the harmonics&improve the wave shape of inverter. These major benefits of the proposing system as following,

- Integrated into the clean energy generation&power quality improvements.
- Simulated into voltages or currents quality improves.
- The performing into load current compensate because of uses into MAF as DQ controls in CMLI-UPQC.

These improvements are the proposed systems are analyzing extensively below at two dynamic & stable state condition using into Matlab/Simulink softwares.

II. EXISTING SYSTEM

Fig.1 indicates the existing system configuration with 2 level inverters. The framework PV-UPQC has series controller&shunt controller& DC link capacitor it is connected with PV source. The shunt controller associated with load side for reduction of load current harmonics & reactive power compensation & here filters are used for smoothing the ac wave. The series controller associated with grid side for improvement of gird power quality i.e., voltage sag/swell. The main drawback of this system is high harmonics are produced because of 2 level inverters.

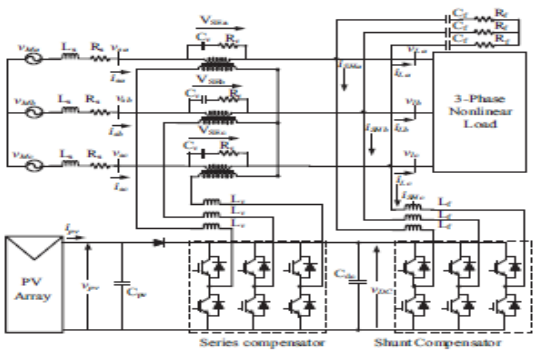

Fig. 1. Configuration PV-UPQC with 2 level inverter

III. PROPOSED SYSTEM

Because of 2 level inverter getting higher THD. So this is the major drawback of existing framework. In the proposed system the 2 level inverter is replaced by multilevel inverter namely CMLI-UPQC. The main benefit of cascaded multilevel inverter is to generate the accurate sinusoidal shape of the ac wave. In this framework series&shunt controllers are replaced by multilevel inverter via dc associated capacitor. The function series CMLI-1 is to compensate power quality problems at gird side i.e. voltage sag/swell. This controller is operated by synchronous reference theory by taking feedback as grid side voltages as discussed in control strategy. The function of shunt CMLI-2 is to compensate the load current harmonics produced by nonlinear or unbalanced load. It is regulated by synchronous referenced frame theory as discussed in below segment.

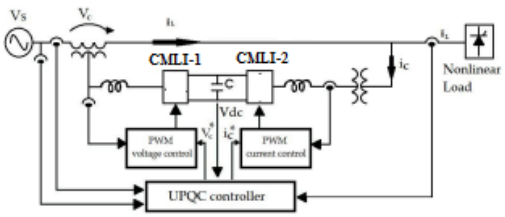

Fig 2 ProjectedSystem of CMLI –UPQC

Cascaded Multilevel Inverter

The below figure.3 indicates the cascaded multilevel inverter. This inverter consists of dc link capacitors & each dc link capacitor associated with on full bridge inverter connected in cascaded with h shape.

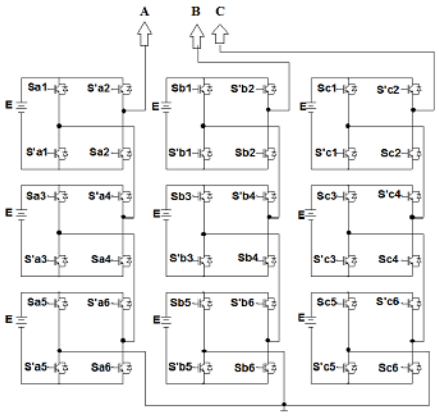

Fig 3 Three phase H Bridge cascaded Multilevel Inverter

Every single inverter employed a dc-interface voltage to sortanaltered voltage at yield terminals. The entire yield voltage is acquired by total of every individual yield voltage is picked up by the cumulative of the separate yield voltage

IV. PROPOSED CONTROL STRATEGY

A. Control of Shunt Compensator

The control block diagram of shunt compensator is indicates in fig.4. As per synchronous reference frame theory the load side currents taken as feedback signals i_{La}, i_{Lb}, i_{Lc} are transformation in to dqo. Assumed that active component is taken as reference signal this signal known as i_{Ld} is passes through the moving average filter for harmonic elimination. The final signal $I_{lf}$is addition with i_{Loss} & subtracted with I_{pvg}. Here i_{Loss} is getting form PV source by employing P&O MPPT algorithm. The final signal is Id. The dq0 is transformation in to Currents as reference signals these reference singles pass through the hysteresis current controller. In this controller reference currents are compared with measured load currents for producing pulses. These pulses are given to the shunt controller for operating.Here to take out DC portion without dividing the dynamic execution, a MAF isapplied to separateDCdivider.

The exchange furthest reaches of moving commonplace filters are assumed at,

$$MAF(s) = \frac{1 - e^{-T_w^S}}{T_w^S} \ldots.1$$

Where T_w are the windows lengths in the moved into typical filters.T_w is timespan.

In equivalent current part owing to PV group is known as,

$$I_{pvg} = \frac{2}{3}\frac{P_{pv}}{V_s} \ldots..2$$

Where P_{pv} is the PV exhibit power&Vs issize of the PCC voltages. The references framework currentsset as

$$I_{sd}^* = I_{Ldf} + I_{loss} - I_{pvg} \quad \ldots\ldots\ldots\ldots..3$$

I^*_{sdis} changed over to abc territory reference structure streams.

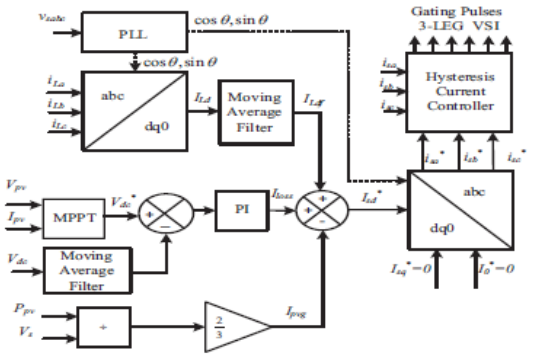

Fig. 4 Control Structure of Shunt Compensator

B. Control of Series Compensator

The control block diagram of series controller is indicates in fig.5

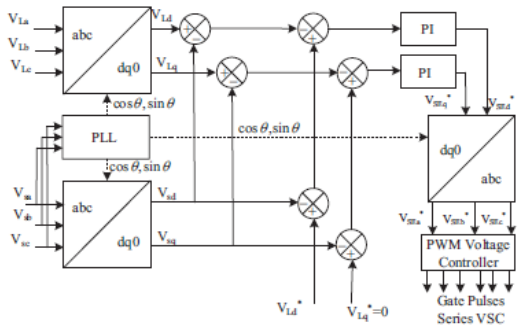

Fig. 5 Control Structure of Series Compensator

V. SIMULATION RESULT

In figure.6 indicates the MATLAB/SIMULINK diagram of projected CMLI-UPQC framework. Fig.7 indicate cascaded multilevel inverter subsystem

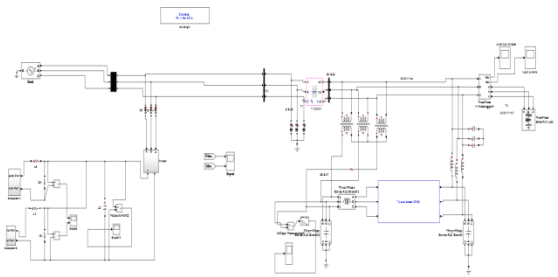

Fig.6 MATLAB/SIMULINK diagram of projected CMLI-UPQC system.

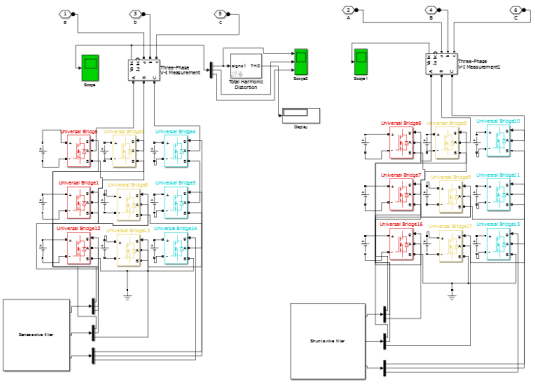

Fig.7 CMLI subsystem

Fig.8 indicate the single phase grid voltages V_a, V_b, V_c, fig.8 indicates the three phase gird voltage, fig. 10 indicate the multilevel inverter output voltage,&fig.11 shows the output voltage & fig 12. Shows the THD % voltage wave form&the table indicates the results THD % voltage sag, voltage swell, line to line voltage&output voltage

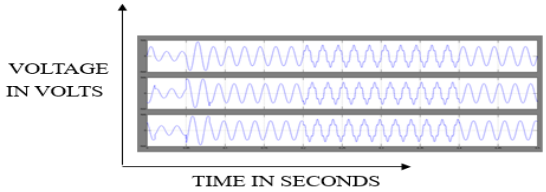

Fig.8 Grid voltages

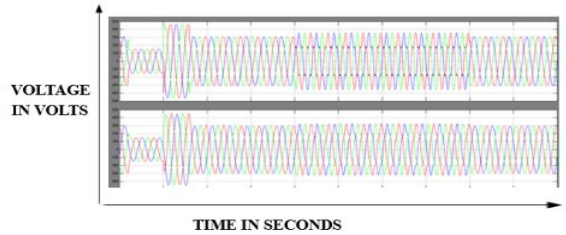

Fig.9 Three phase grid voltage

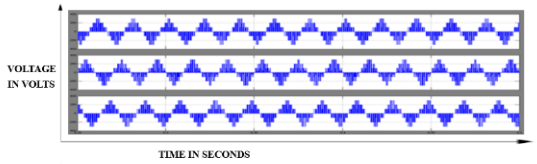

Fig.10 Multilevel inverter output voltage

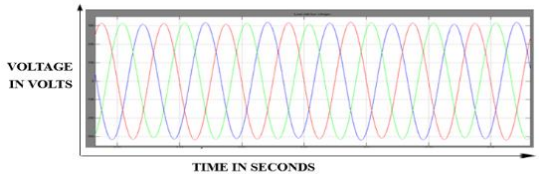

Fig 11. Output voltage

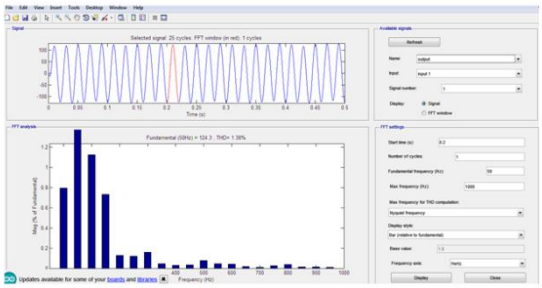

Fig 12. THD% Wave form

RESULTS(THD):

THD VALUES	WITHOUT UPQC			WITH UPQC
	SAG	SWELL	LINE TO LINE	OUTPUT
VA	20.62%	14.51%	8.71%	1.36%
VB				
VC				

CONCLUSION

In the proposed PV-UPQC framework multilevel inverters are used in series&shunt controllers. The series controller is connected at grid side for grid power quality i.e., voltage sag/swell. The shunt controller reduced the load current harmonics. This may located the PV unify power qualityconditioner arehigh-quality resolution meant in recent circulation structure among incorporating circulated generation for enhancement of powerquality. The series&shunt controllers are regulated by synchronous reference frame theory. The simulated results are studied&verified by MATLAB/Simulink environment.

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CAPACITOR ADDED DYNAMIC VOLTAGE RESTORER FOR SUPERCONDUCTING MAGNETIC ENERGY STORAGE-EMULATOR/BATTERY FOR BETTER PERFORMANCE

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Abstract— In this paper we are add the capacitor add Dynamic Voltage Restorer (DVR) for life of the battery and performance increase in the system. We can reduce the distortions in the grid . This study examines the use of superconducting magnetic and battery hybrid energy storage to compensate grid voltage fluctuations. The superconducting magnetic energy storage system (SMES) has been emulated by a high current inductor to investigate a system employing both SMES and battery energy storage simulation. The design of the simulation is described in detail, which consists of a series-connected three phase voltage source inverter used to regulate AC voltage, and two bidirectional DC/DC converters used to control energy storage system charge and discharge. 'DC bus level signaling' and 'voltage droop control' have been used to automatically control power from the magnetic energy storage system during short-duration, high power voltage sags, while the battery is used to provide power during longer-term, low power under-voltages. Energy storage system hybridisation is shown to be advantageous by reducing battery peak power demand compared with a battery-only system, and by improving long term voltage support capability compared with a SMES-only system. Consequently, the SMES/battery hybrid DVR can support both short term high-power voltage sags and long term undervoltages with significantly reduced superconducting material cost compared with a SMES-based system.

Index Terms-- Dynamic Voltage Restorer (DVR), Energy Storage Integration, Sag, Superconducting Magnetic Energy Storage, Battery, capacitor.

I. INTRODUCTION

THE improvement of power quality is an important objective for electrical utilities and industrial and commercial consumers. Highly intermittent distributed generation, rapidly changing loads, and direct-off-line power electronic systems all contribute to reduced power quality causing equipment downtime, overload and failure leading to lost revenue [1]. Voltage disturbance is a common problem and under voltage conditions have been seen to occur more frequently than overvoltage conditions [2]. Short-term under-voltage sags are defined in IEEE Std. 1159-1995 [3] as a decrease to between 0.1 and 0.9 p.u. (per unit) r.m.s voltage for durations of 0.5 cycles to 1 min. They occur more frequently than long term under-voltages with significant costs to industry [4]. Long-term under-voltage events are defined as a measured voltage less than 0.8-0.9 p.u. r.m.s voltage, lasting longer than one minute [3] and can lead to load shedding and potentially to voltage collapse [5]. The study below presents a means by which both short-term and long-term voltage fluctuations can be mitigated at the load using short-term magnetic energy storage and long-term battery energy storage.

II. POWER QUALITY

The power quality definition, standards, causes and effects of harmonic distortion in a power system.

2.1 DEFINITION OF ELECTRIC POWER QUALITY

In recent years, there has been an increased emphasis and concern for the quality of power delivered to factories, commercial establishments, and residences. This is due to the increasing usage of harmonic-creating non linear loads such as adjustable-speed drives, switched mode power supplies, arc furnaces, electronic fluorescent lamp ballasts etc.[1]. Power quality loosely defined, as the study of powering and grounding electronic systems so as to maintain the integrity of the power supplied to the system. IEEE Standard 1159 defines power quality as [2]: The concept of powering and grounding sensitive equipment in a manner that is suitable for the operation of that equipment. In the IEEE 100 Authoritative Dictionary of IEEE Standard Terms, Power quality is defined as ([1], p. 855): The concept of powering and grounding electronic equipment in a manner that is suitable to the

operation of that equipment and compatible with the premise wiring system and other connected equipment. Good power quality, however, is not easy to define because what is good power quality to a refrigerator motor may not be good enough for today‟s personal computers and other sensitive loads.

2.2 DESCRIPTIONS OF SOME POOR POWER QUALITY EVENTS

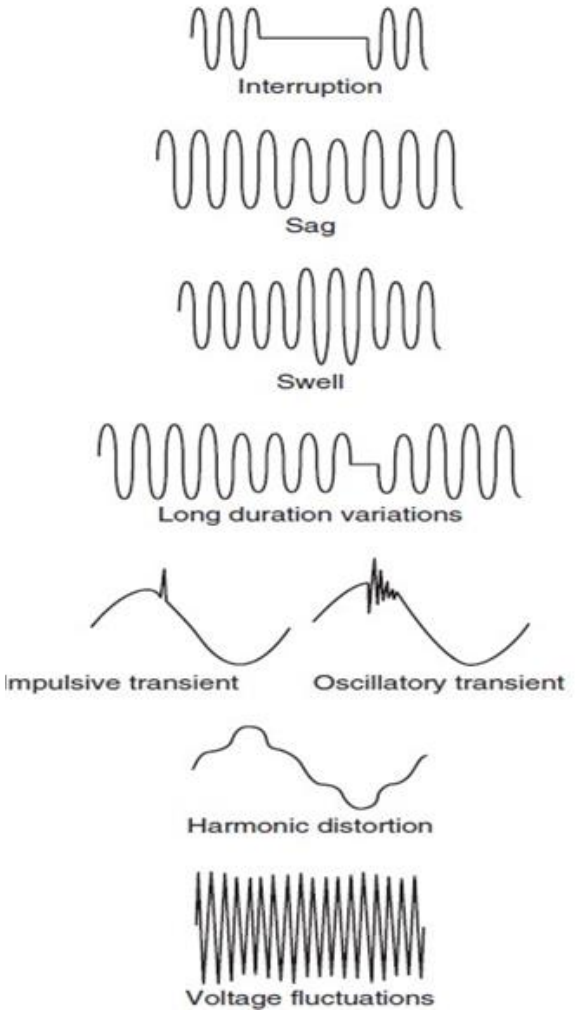

Fig. 1 Typical power disturbances.

The following are some examples and descriptions of poor power quality events

■ A voltage sag/dip is a brief decrease in the r.m.s line-voltage of 10 to 90 percent of the nominal line-voltage. The duration of a sag is 0.5 cycle to 1 minute. Common sources of sags are the starting of large induction motors and utility faults.

■ A voltage swell is a brief increase in the r.m.s line-voltage of 110 to 180 percent of the nominal line-voltage for duration of 0.5 cycle to 1 minute. Sources of voltage swells are line faults and incorrect tap settings in tap changers in substations.

■ An impulsive transient is a brief, unidirectional variation in voltage, current, or both on a power line. The most common causes of impulsive transients are lightning strikes, switching of inductive loads, or switching in the power distribution system. These transients can result in equipment shutdown or damage, if the disturbance level is high enough. The effects of transients can be mitigated by the use of transient voltage suppressors such as Zener diodes and MOVs (metal-oxide varistors).

■ An oscillatory transient is a brief, bidirectional variation in voltage, current, or both on a power line. These can occur due to the switching of power factor correction capacitors, or transformer ferroresonance.

■ An interruption is defined as a reduction in line-voltage or current to less than 10 percent of the nominal, not exceeding 60 seconds in length. Another common power-quality event is “notching,” which can be created by rectifiers that have finite line inductance.

■ Voltage fluctuations are relatively small (less than 5 percent) variations in the r.m.s line-voltage. These variations can be caused by cyclo converters, arc furnaces, and other systems that draw current not in synchronization with the line frequency. Such fluctuations can result in variations in the lighting intensity due to an effect known as “flicker” which is visible to the end user.

■ A voltage “imbalance” is a variation in the amplitudes of three-phase voltages, relative to one another.

III. HARMONICS AS POWER QUALITY PROBLEM

Harmonic disturbances come generally from equipment with a non-linear voltage/current characteristic. Nowadays a large part of industrial, commercial and domestic loads is non-linear, making the distortion level on the low-voltage supply network a serious concern. As time goes on, more and more equipment is being used that creates harmonics in power systems. Conversely, more and more equipment is being used that is susceptible to malfunction due to harmonics. Computers, communication equipment, and other power systems are all susceptible to malfunction or loss of efficiency due to the effects of harmonics. For instance, in electric motors, harmonic current causes AC losses in the core and copper windings. This can result in core heating, winding heating, torque pulsations, and loss of efficiency in these motors. Harmonics can also result in an increase in audible noise from motors and

transformers and can excite mechanical resonances in electric motors and their loads.

Harmonic voltages and currents can also cause false tripping of ground fault circuit interrupters (GFCIs). These devices are used extensively in residences for local protection near appliances. False triggering of GFCIs is a nuisance to the end user. Instrument and relay transformer accuracy can be affected by harmonics, which can also cause nuisance tripping of circuit breakers. Harmonics can affect metering as well, and may prompt both negative and positive errors. High-frequency switching circuits such as switching power supplies, power factor correction circuits, and adjustable-speed drives create high-frequency components that are not at multiples of line frequency. Harmonic distortion can be considered as a sort of pollution of the electric system which can cause problems if the sum of the harmonic currents exceeds certain limits.

3.1 Individual Harmonic Distortion (IHD)

It is the ratio between RMS value of individual harmonic and the rms value of the fundamental component of a wave form.

$$IHD_n = \frac{I_n}{I_1} \times 100 \quad (1.1)$$

where I_n is the amplitude of current harmonic „n" and I_1 is the amplitude of fundamental current .

3.2 Total Harmonic Distortion(THD)

The ratio of r.m.s. value of the sum of all the harmonic components up to a specified order to the r.m.s. value of the fundamental component is called total harmonic distortion and can be represented as

$$THD = 100 \sqrt{\sum_{n=2}^{\infty} \frac{I_n^2}{I_1^2}} \quad (1.2)$$

I_1, I_2, I_3, I_4,..... I_n, are r.m.s. values of harmonics 1,2,3,4,….n. Normally „n" is limited to 50. If risk of resonance is less at higher orders then „n" is limited to 25.This parameter is used in low voltage, medium-voltage or high-voltage systems. Conventionally, current distortion parameters are suffixed with „I", e.g. 35 % THDI, and voltage distortion figures with „V", e.g. 4 % THDV .

IV. DYNAMIC VOLTAGE RESTORER

Voltage sags of short duration may not cause much harm other than cause a slight flickering of lights to a domestic and non-sensitive loads whereas, the temporary sag is bound to have a greater impact on the industrial customers with sensitive loads. Voltage sags lasting only 4 to 5 cycles may cause wide range of sensitive equipment consumer to dropout. It ultimately leads to wastage of resources (both material and human) as well as financial losses.

The latest trends in the power market and the declining profits have made it important for the power utilities to recognize the significance of high power quality. This is possible only by ensuring that uninterrupted flow of power is maintained at proper voltage levels. Electric utilities are looking forward to appropriate solutions to ensure high quality power supply to their consumers. The DVR is one of the important solutions in the present scenario.

A DVR is a device that injects a dynamically controlled voltage in series to the bus voltage by means of a booster transformer. It is normally installed in a distribution system between the supply and the critical load feeder, Jindal (2008). Its primary function is to rapidly boost up the load-side voltage in the event of a disturbance in order to avoid any power

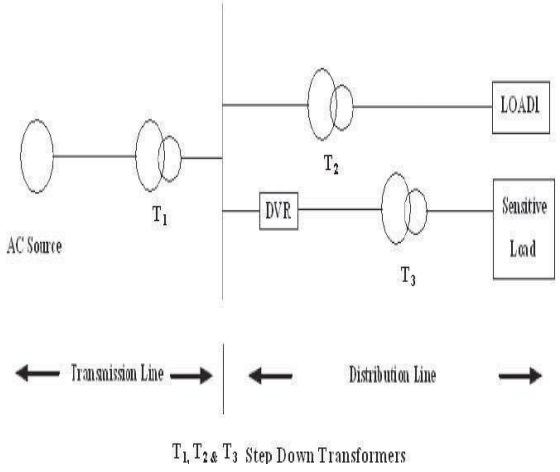

Figure 2 Location of DVR

disruption to that load Sng et al (2004). There are various circuit topologies and control schemes that can be used to implement a DVR. In addition to voltage sags and swells compensation, DVR can also added other features such as: line voltage harmonics compensation, reduction of transients in voltage and fault current limitations. The Figure 2.1shows the location of the DVR

4.1 Injection / Booster Transformer

The Injection / Booster transformer is a specially designed transformer that attempts to limit the coupling of noise and transient energy from the primary side to the secondary side, Kularatna (1998). It has the following functions: x connects the DVR to the distribution network via the HV-windings x

transforms and couples the injected compensating voltages generated by the voltage source converters to the incoming supply voltage x isolating the load from the system (VSC and control mechanism)

V. METHODOLOGY AND CONTROL DESIGN

The SMES has been emulated by a 15mH, 100A inductor. During a voltage error a three-phase inverter is used to generate the compensation voltage at the primary of the injection transformers (T1-T3) so that the load voltage remains close to nominal. DC/DC converters are used to interface the battery and SMES-emulator to the DC bus. An auxiliary supply (Aux. Supply) is used to support the DC bus during standby operation and charge the energy storage devices. The auxiliary supply is disconnected and the energy storage devices provide the necessary power for the inverter to support the load during a voltage error.

A. DVR Control

The objective of the DVR control system is to minimise supply voltage variations at the load terminals. This is achieved by generating a compensating voltage at the series injection transformer terminals. The phasor diagram in Fig. 2(a) shows various DVR voltage control techniques. 'In phase compensation' causes the compensating voltage to be in phase with the incoming supply voltage and has been shown to result in the lowest DVR power ratin. 'Pre-sag compensation' preserves the phase of the incoming supply at the time a sag occurs which can be beneficial in protecting loads that are sensitive to phase disturbances. 'Energy optimal' control is used to minimise DVR energy storage requirement by injecting a voltage in quadrature to the load current. 'In phase compensation' and 'Pre-sag compensation' have been considered in this study. The control scheme was implemented in the synchronous reference frame as shown in Fig. 2(b) by converting three phase AC quantities to equivalent two phase quantities:

$$\begin{bmatrix} V_{s\alpha} \\ V_{s\beta} \end{bmatrix} = \frac{2}{3}\begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix}\begin{bmatrix} V_{sa} \\ V_{sb} \\ V_{sc} \end{bmatrix} \quad (1)$$

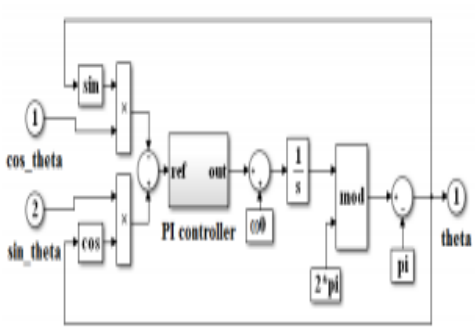

Figure3. Simulink implementation of PLL algorithm where ω0 is the fundamental output frequency in rad/s.

$$\begin{bmatrix} V_{sd} \\ V_{sq} \end{bmatrix} = \begin{bmatrix} \cos\theta_{pll} & \sin\theta_{pll} \\ -\sin\theta_{pll} & \cos\theta_{pll} \end{bmatrix}\begin{bmatrix} V_{s\alpha} \\ V_{s\beta} \end{bmatrix} \quad (2)$$

where Vsa,b,c, Vsa,b, Vsd,q are the supply voltages and θpll is the estimated supply phase angle.

A phase-locked loop (PLL) was used to determine the phase angle θpll of the incoming supply based on an algorithm which is robust in the presence of harmonics, non-symmetry and transients. Fig. 3 shows a Simulink implementation of the PLL algorithm. This algorithm minimises the sine of the phase error term causing the control system to be non-linear. For this reason, the PI controller gains were tuned empirically. The PLL algorithm requires the cosine and sine of the incoming supply angle as inputs which can be obtained geometrically using the orthogonal reference frame voltages from (1) as:

$$\cos(\theta) = \frac{V_{s\alpha}}{\sqrt{{V_{s\alpha}}^2 + {V_{s\beta}}^2}} \quad (3)$$

$$\sin(\theta) = \frac{V_{s\beta}}{\sqrt{{V_{s\alpha}}^2 + {V_{s\beta}}^2}} \quad (4)$$

The PLL controller can be tuned to preserve the phase of the incoming supply before a sag event with phase jump or, alternatively, the PLL can be made to track the phase of the incoming supply during a sag with phase-jump. Consequently, by changing the PLL gains the system can be controlled to provide 'in phase' or 'pre-sag' compensation. Fig. 4 illustrates the results of tuning the PI controller in this way,

To detect the presence of a voltage error, the following inequality was used

$$\sqrt{\left(V^*_d - V_{s,d}\right)^2 + \left(V^*_q - V_{s,q}\right)^2} \geq V_{threshold} \quad (5)$$

where Vs,d,q is the measured load voltage and V*d,q is the desired nominal voltage in the synchronous reference frame. Inequality (5) was also used to trigger the disconnection of the DC bus auxilliary power supply (see Fig. 1).

The compensation voltage Vrefd,q is determined, based on the error between the desired nominal voltage and the supply voltage:

$$V_{refd,q} = V^*_{d,q} - V_{d,q} \qquad (6)$$

The PWM phase reference voltages Vrefa,b,c were generated by transforming the required compensation voltage to the rotating three phase reference frame:

$$\begin{bmatrix} V_{ref\alpha} \\ V_{ref\beta} \end{bmatrix} = \begin{bmatrix} \cos\theta_{pll} & -\sin\theta_{pll} \\ \sin\theta_{pll} & \cos\theta_{pll} \end{bmatrix} \begin{bmatrix} V_{refd} \\ V_{refq} \end{bmatrix} \qquad (7)$$

$$\begin{bmatrix} V_{refa} \\ V_{refb} \\ V_{refc} \end{bmatrix} = k\frac{3}{2} \begin{bmatrix} 2/3 & 0 \\ -1/3 & 1/\sqrt{3} \\ -1/3 & -1/\sqrt{3} \end{bmatrix} \begin{bmatrix} V_{ref\alpha} \\ V_{ref\beta} \end{bmatrix} \qquad (8)$$

The injection voltages, Vref_a,b,c, were multiplied by a feedforward constant, k to compensate for losses within the power stage.

Sine-wave pulse width modulation (SPWM) or space vector modulation (SVM) were considered for generating the inverter output voltage. SVM is advantageous due to better utilisation of the DC bus voltage and which allows deeper sag compensation. However, SPWM allows the possibility to mitigiate unbalanced faults so this technique was implemented in this study.

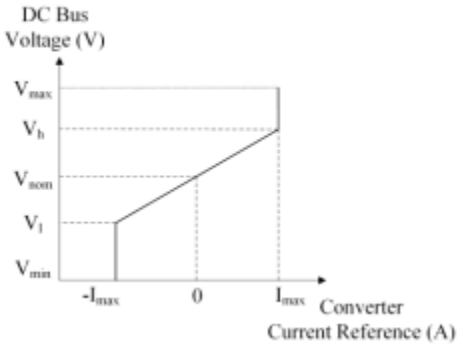

Figure4. Energy storage systems active current droop control.

B. Energy Storage top-Level Control

The objective of the top-level energy storage control strategy was to control the charge/discharge of each energy storage device. A current vs. voltage active droop characteristic was chosen as this strategy has been shown to provide good stability and active power sharing. The converter reference currents are based solely on the level of the DC bus voltage which is advantageous as high-bandwidth communication between the three different converters is not necessary. The charge or discharge priority of an energy storage device can be adjusted raising or lowering its nominal DC bus voltage using a technique known as "DC bus signaling". The system was configured to prioritise the SMES-emulator to charge/discharge before the battery. By always prioritising the short term energy storage, battery power cycling is reduced which can improve battery lifetime .

The current droop characteristic for each device is shown in Fig. 5, and is made up of three regions of operation. When the DC voltage is above voltage level Vh(x) (where x refers to energy storage system 1 or 2) or below below Vl(x),, the converter current is limited to Imax(x) or -Imax(x). In between Vh(x) and Vl(x), current is controlled based on the linear current vs. voltage relationship:

$$I_x = (V_{nom} - V_{bus})k_x \qquad (9)$$

where kx is a droop coefficient (A/V) and Ix is the energy storage converter reference current.

C. SMES-Emulator System

To reduce costs and be able to evaluate a SMES-battery hybrid DVR control platform, the SMES device was emulated by using a 15mH iron-core inductor in this study. The SMES converter was based on the asymmetric H-bridge configuration shown in Fig. 6. This converter was rated at up to 220A continuous current using forced air cooling. During charge, Q2 is held ON and Q1 is modulated whereas during discharge Q1 is held off and Q2 is modulated. The relationship between DC bus current, inductor current and duty ratio, is given by (12) and (13) for charge and discharge, respectively [16].

$$I_{csmes} = I_{smes} D_1 \qquad (10)$$

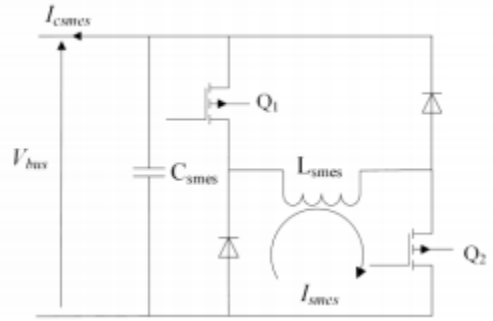

Figure 5. SMES DC/DC converter

$$-I_{csmes} = I_{smes}(1 - D_2) \qquad (11)$$

For active current droop control according to (9), the desired converter output current Icsmes is given by (12).

$$I_{csmes} = (V_{bus} - V_{nom\_smes})k_{smes} \quad (12)$$

where ksmes is the gradient of the droop controller and Vnom_smes is the nominal voltage of the droop controller.

D. Battery System

A bidirectional synchronous-buck converter rated at 40A output current with hysteresis current control was used to control battery current. This topology has been previously reported for use with interfacing an ultra-capacitor energy storage system to the DC bus in DVR application [13]. However, the proposed system differs from previous studies [13] in that a variable-frequency hysteresis current control has been used. This is advantageous as it features cycle-by-cycle current limiting, making it tolerant to short circuit faults. Also, the proposed technique is shown below to be globally stable over the operating range whereas typical current mode control techniques described previously [13] require slope compensation to ensure global stability [28]. Further advantages include good dynamic current-tracking capability, and robust performance despite variation and uncertainty in operating conditions [29].

Assuming lossless, ideal components, the inductor current in Fig. 7 is given by (13). Figure 6. SMES DC/DC converter. Figure X1. Measured

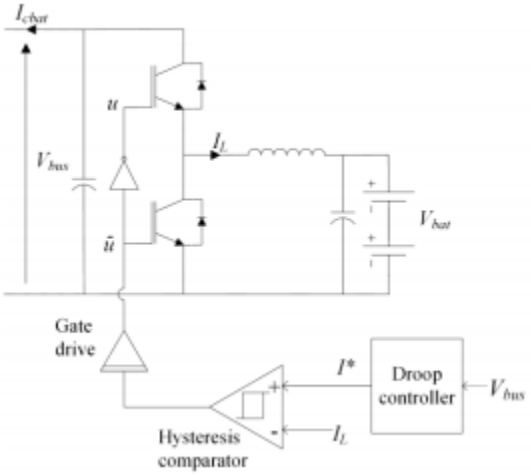

Figure 6. Battery DC/DC converter.

VI. SIMULATION RESULTS

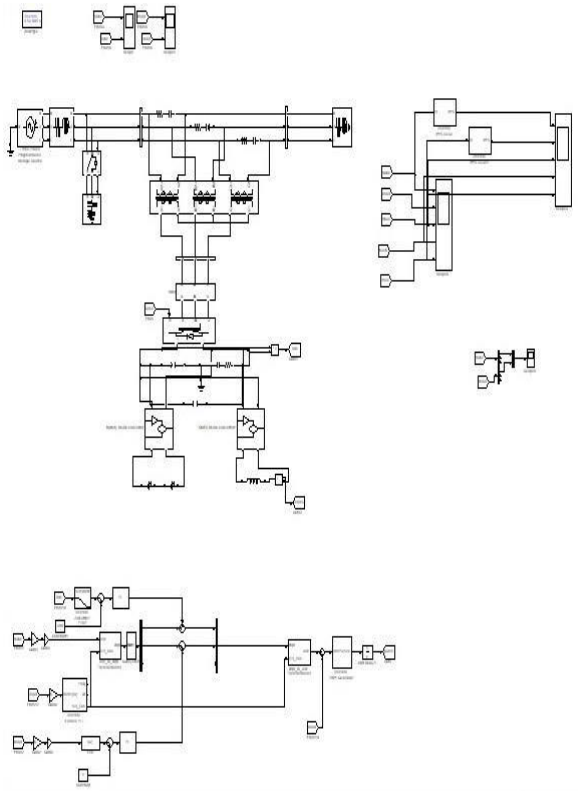

Fig.7 simulink diagram capacitor added dvr hybrid model

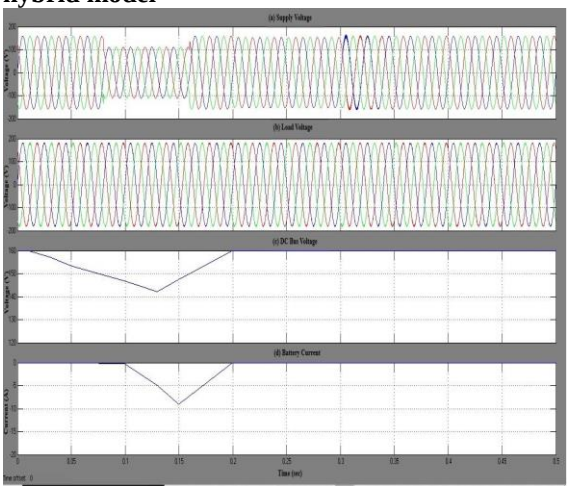

Figure 8. Capacitor added DVR Battery System Experimental results: 0.1s Three phase sag to 35% of nominal voltage. (a) Supply voltages (b) Load voltages (c) DC Link Voltage (d)Battery Current.

The SMES-emulator was then removed from the system and the test was repeated. The system response to the same three phase sag with only battery energy storage is shown in Fig. 8. As the DC bus voltage falls below 140Vdc (the battery system nominal voltage) the battery is discharged to support the DC bus. The peak battery current is

9.85A in this case and the DVR system can be seen to effectively mitigate the voltage sag. By adding capacitor the battery peak current was reduced to 9.85A.

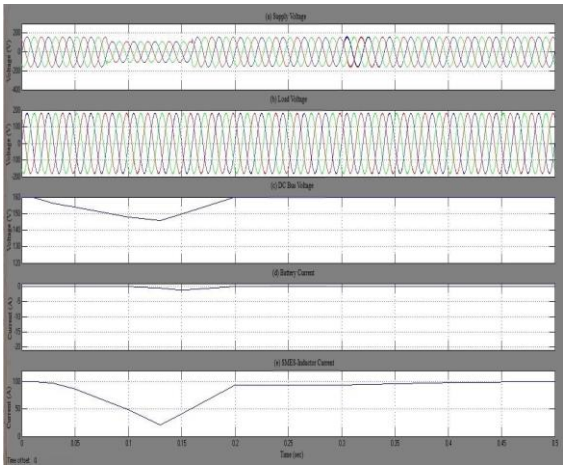

Figure9. capacitor added DVR Hybrid System Experimental results: 0.1s Three phase sag to 35% of nominal voltage. (a) Supply voltages (b) Load voltages (c) DC Link Voltage (d) Battery Current (e) SMES-inductor current.

Initially a three-phase voltage sag to 35% of nominal voltage, lasting 100ms was used to demonstrate the response of the DVR and energy storage systems. From Fig. 9 it can be seen that the hybrid DVR system mitigates the voltage sag effectively during the sag event. The battery is discharged momentarily at -1.2A at the end of the sag when the inductor energy has been depleted.

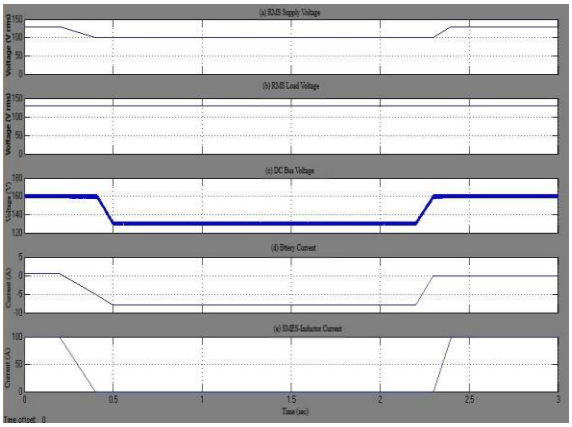

Figure 10. Capacitor added DVR Hybrid System Experimental results: Long-term three phase under voltage (a) RMS supply phase-voltage. (b) RMS load phase voltage (c) DC Bus Voltage (d) Battery Current (e) SMES-inductor current.

By use of the SMES-emulator hybrid system, the peak battery current response during a three-phase sag to 35% of nominal was reduced to 1.2A from 9.85A compared with the battery-only system. This reduction in battery peak current can have significant benefits in terms of improved battery life, which is negatively affected by discharge current magnitude .

From Fig. 10, it can be seen that the long-term under voltage performance of the system has been improved by the introduction of battery energy storage. One of the main shortcomings limiting the usage of SMES systems is the high cost of the superconducting material. By integrating a battery, the hybrid DVR can be of significantly reduced cost compared with a SMES only DVR and still be capable of compensating a variety of short-term sags and long-term under-voltages. In order to estimate the potential scale of the cost reduction, the prototype system used in this study has been considered. The SMES-inductor was emulated to give L= 15mH at 100A DC. The energy capacity of an equivalent SMES can be calculated

VII. CONCLUSION

The performance a novel hybrid capacitor added DVR system topology has been assessed experimentally and shown to effectively provide voltage compensation for short-term sags and long-term under-voltages. A prototype system has been developed which demonstrates an effective method of interfacing SMES and battery energy storage systems to support a three phase load. The system has been shown to autonomously prioritise the use of the short-term energy storage system to support the load during deep, short-term voltage sags and a battery for lower depth, long-term under-voltages. This can have benefits in terms of improved voltage support capability and reduced costs compared with a SMES-based system. Additional benefits include the capacitor dicharges during voltage sag before battery discharge. Then reduced battery power rating requirement and an expected improvement in battery life compared with a battery-only system due to reduced battery power cycling and peak discharge power.

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Code based Door Locking System

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Abstract – The need of safety can be achieved by making locks which can be electrical or mechanical with one or a few keys, but for locking a big area many locks are required. As everyone knows old fashioned locks are heavy weight and fragile also depending on the tools therefore electronic locks are given more value than those of mechanical locks. Nowadays every device's operation is based on digital technology. For example, technology based identity devices are used for automatic door unlocking or locking. These locking systems are used to control the movement of door and are functional without requiring a key to lock or unlock the door. These locking systems are controlled by a keypad and are installed at the side hedge of the door. The main objective of this project is to give safety at every common places like home, public places. In this user would give a known password. The information will be stored in database. When the correct passcode will be entered, the microcontroller will give instruction to servo motor. Servo motor will perform the action on door unlocking. Thus, what we want is digital technology to construct an integrated and well customized safety system at a price which is reasonable.

Keywords – Arduino UNO, GSM module, Membrane Keypad, Servomotor, LCD, Buzzer,

I. INTRODUCTION

Password Based Door Lock System is designed using ARDUINO UNO where in once the correct code or password is entered, the door is opened and the concerned person is allowed access to the secured area. Password Based Door Lock System using Arduino UNO is a simple project where a secure password will act as a door unlocking system. Old fashioned lock systems use mechanical locking and these can be replaced by new advanced techniques of locking systems. These methods are a combination of mechanical and electronic devices and are highly intelligent. One of the distinct features of these intelligent lock systems is their simplicity and high efficiency. Such an automated lock system consists of electronic control assembly, which controls the output load through a password. The example of this output load can be a motor or a lamp or any other mechanical/electrical load.

Here, we made an electronic code lock system using Arduino UNO, which provides control to the actuating the load. It is a simple embedded system with takes input from the keyboard and the output being actuated accordingly.

This system demonstrates a Password based Door Lock System using Arduino UNO, wherein once the correct code or password is entered, the door is opened and the concerned person is allowed access to the secured area. If another person arrives, it will ask to enter the password again. If the password is wrong, then door would remain locked, denying access to the person.

Main idea behind this project is of a door-latch opening using a password entered through keypad. As well as turning on the Buzzer when passcode is entered wrong for multiple times. User can modify this password anytime he/she wishes using a keypad. The main component in the circuit is Arduino UNO which is basically used to send a text message to owner of the house about the breach of security.4*4 keypad is used to enter the password. The entered password is compared with the known password. If it is correct password, the system opens the door by servo motor and displays the status of door on LCD. If the password is wrong then door remains closed and displays "WRONG PASSWORD" on LCD.

II. MATERIALS AND METHODS

A. *Arduino UNO*

This microcontroller is based on the ATmega328P. There are total of 20 pins (0-19) out of which 6 are analog inputs, 14 are digital input output pins(6 pins provide PWM voltage) which can also be used as general purpose pins, a ceramic resonator of frequency 16 MHz, an USB connection, a power jack and a reset button. It has an operating voltage of 5V. It cotains everything needed to support a microcontroller.

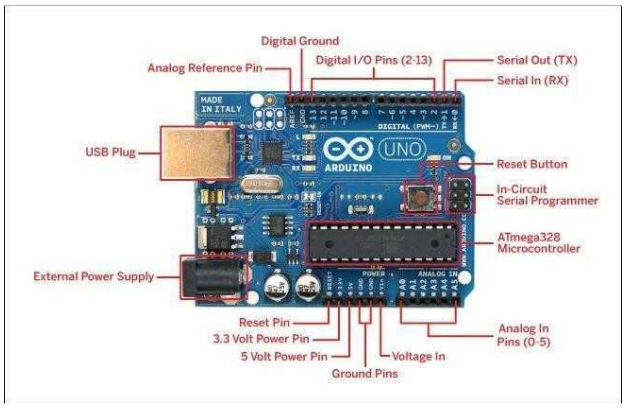

Figure1Arduino Uno

B. *LCD*

Liquid Crystal Display, which we are using in our project is 16*2 LCD. This display consists of 16 columns and 2 rows. This is programmed using the library <LiquidCrystal.h>



Figure 2 16*2 LCD

C. *Membrane Keypad*

In our project we will be using 4X4 matrix membrane keypad. This 16 button keypad will provide user interface component for Arduino project. This is programmed using the library <Keypad.h>



Figure 3 4*4 Keypad

D. *Servo Motor*

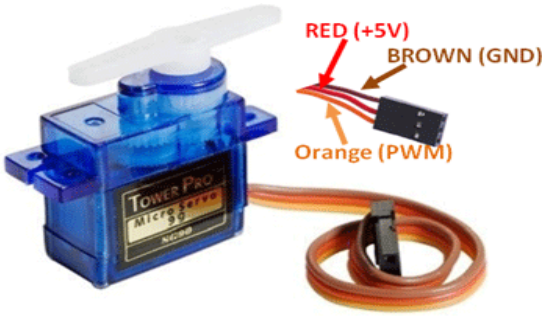

Figure 4 Servo Motor

E. *Buzzer*

In our project the buzzer is used for beep sound indicating the entry of wrong password.

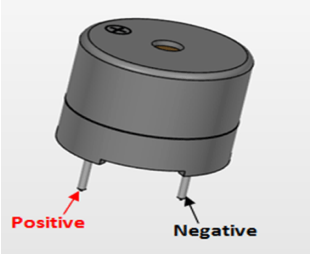

Figure 5 Buzzer

F. *Potentiometer*

In our project we have used a potentiometer of 10Kohm resistance in order to adjust the contrast of the Liquid crystal display

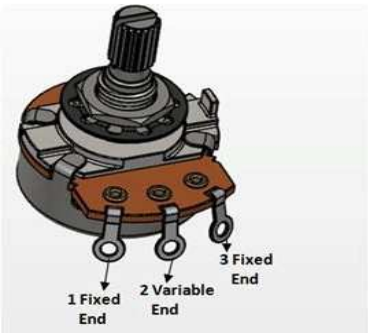

Figure 6 Potentiometer

G. *GSM Module*

A GSM module is a device which can be either a mobile phone or a modem device which can be used to create a computer or any other processor to communicate over a network. A GSM module needs a SIM card to be operated and operates over a network range subscribed by the network operator.



Figure 7 SIM 800L GSM Module

III. **METHODOLOGY**

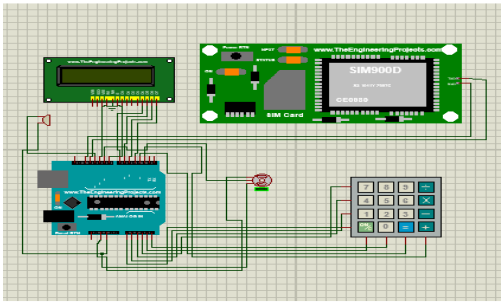

Figure 8 Circuit Diagram

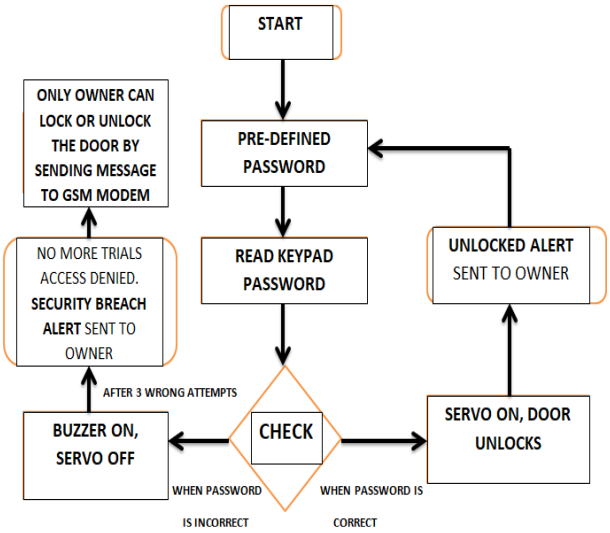

Figure 9 Flowchart

The above flowchart gives a brief idea as to how the project works. Initially the password is known. When the device is turned on, it resets the servo angle to lock the door. Now the user is prompted to enter the password. The user enters the passcode through a keypad which is read by the Arduino. Now the entered password is checked with the known password. If the password matches, then the servo motor deflects and the door unlocks for 10 seconds else the buzzer beeps indicating the invalidity of the password.

Owner do gets the information too about the locking and unlocking of door through SMS sent to his smart phone by GSM modem.

After 3 wrong attempts, the system automatically gets locked showing “NO MORE TRIALS ACCESS DENIED”. Now, the password won’t be entered through keypad but only the owner who knows some pre-defined code will be able to unlock or lock the door through SMS sent by his phone to the sim which is connected in GSM modem.

IV. **RESULTS**

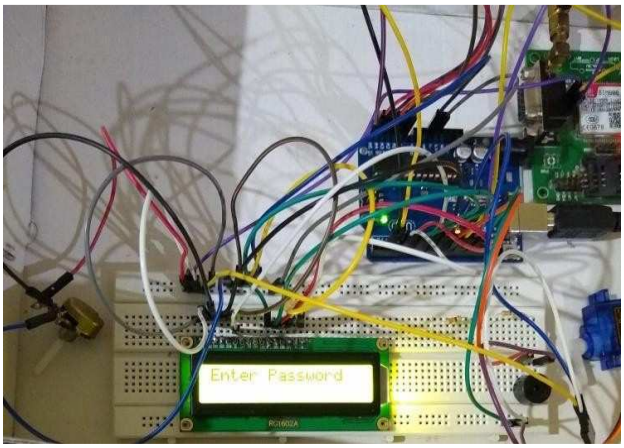

Figure 10 Showing user to enter the password

In the above figure, Fig-10 the LCD displays the user “ENTER PASSWORD”. The entered password is displayed as characters on the LCD.

In the figure, Fig-11, the user has entered the correct password and the LCD shows “ACCESS GRANTED” on the LCD.
The servo motor deflects thus unlocking the door.

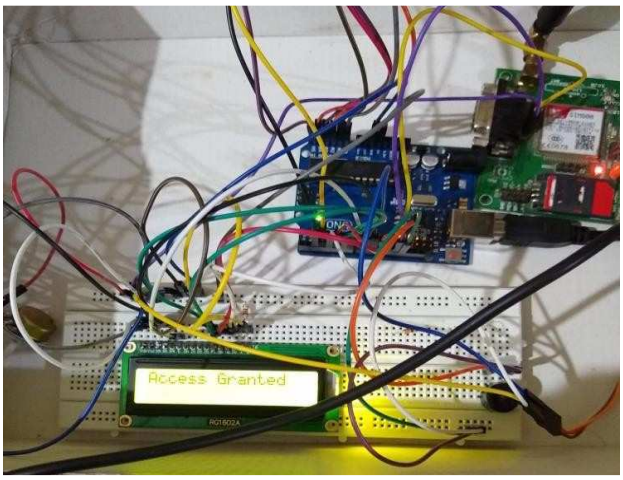

Figure 11 Access is granted and the door unlocks

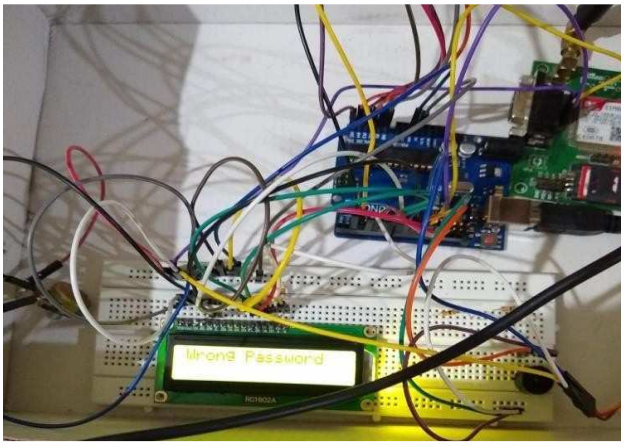

Figure 12 Showing user wrong password when the password entered does not match with the pre- defined password

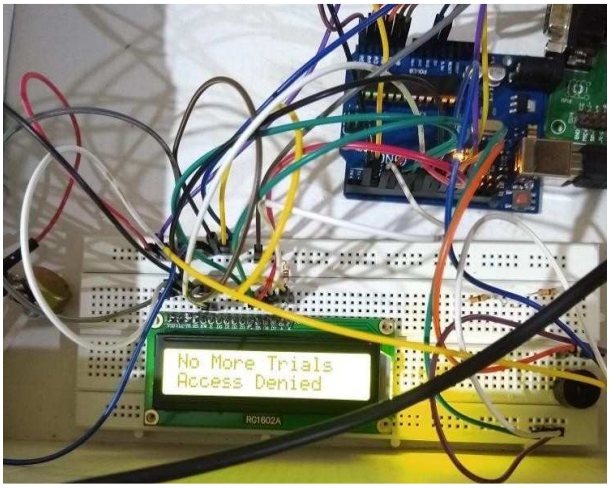

Figure 13 After 3 wrong attempts, system gets locked

When the system gets locked, password cannot be entered through keypad. Now only owner has the power to unlock or lock the door with the password he knows.

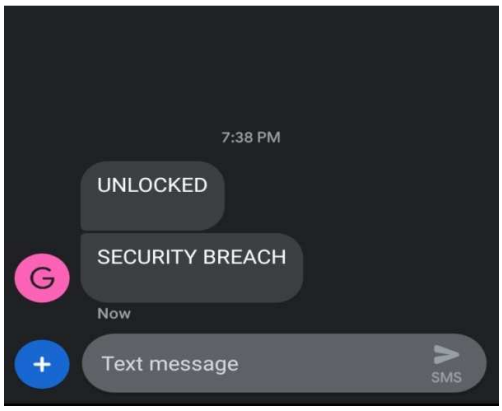

Figure 14 Owner getting information when the door is unlocked and on three wrong attempts

V. FUTURE SCOPE

The security level can be increased by adding a biometric fingerprint scanner. We can interface sensors like Fire, LPG, PIR motion detector to microcontroller in case of any accident so that door will open automatically**.** We can interface camera to the micro controller so that it could capture the picture of the thief who is trying to breach the security. This simple circuit can be used at places like home to ensure better safety. With a slight modification, this project can also be used to control the switching of loads through password. It can also be used at organizations to ensure authorized access to highly secured places.

VI. CONCLUSION

This project is productive in providing enough security as long as the password is not shared. In future this "code based Door Lock System" can be provided maximum security by the above enhancements in order to completely satisfy user's needs. Hence, a common man can afford to buy such locking system in minimal cost to keep his valuables safely without any worries.

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Light Automatic Door Opening System

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Abstract - This project shows the design of the automatic sliding door operator and power supply for module circuit. Automatic sliding door operator performs for opening or closing the door automatically. Automatic door is an automated movable barrier installed in the entry of a room or building to restrict access, provide ease of opening a door or provide visual privacy. Automatic doors are specially designed to reduce congestion and increase access and can make the door use easier. Sensors are detected when people approach the doors and trigger them to slide open. When someone enters in front of the sensors inside or outside the room, control module in door operator receives the signal and controls through the motor which drives the door sliding.

Keywords -.PIC 16F887 Microcontroller, DC Motor, H-Bridge (L298), Sensors, Sliding Door.

I. INTRODUCTION

Nowadays, Security has always been a major concern for all of us and there are many Hi tech and IoT based security and surveillance system are available in the market. Intruder or Burglar Alarm is one of the classic and popular projects among the Electronics students and hobbyists. We have also built many Burglar Alarms based on various technologies:

- Laser Security Alarm Circuit
- IR Based Security Alarm
- Burglar Alarm using PIR
- GSM Based Security System

Today we are adding one more Security Alarm in our list which is based on Ultrasonic Sensor. This Arduino Controlled Door alarm can be installed near the door to detect the presence of anybody at the door. Whenever somebody comes in the range of Ultrasonic sensor, buzzer starts beeping. You can adjust the sensor detection range according to your door. This system can also serve the purpose of Motion Detector.

II. REQUIRED COMPONENTS

- Breadboard
- Ultrasonic Sensor
- Buzzer
- Arduino Mega (any model)
- Jumper Wires
- USB cable for Arduino or 12v, 1A adapter.

Ultrasonic Sensor Module:

Ultrasonic sensor HC-SR04 is used here to detect the presences of any person at the door. The sensor module consists of ultrasonic transmitter, receiver and the control circuit. Ultrasonic Sensor consists of two circular eyes out of which one is used to transmit the ultrasonic wave and the other to receive it.

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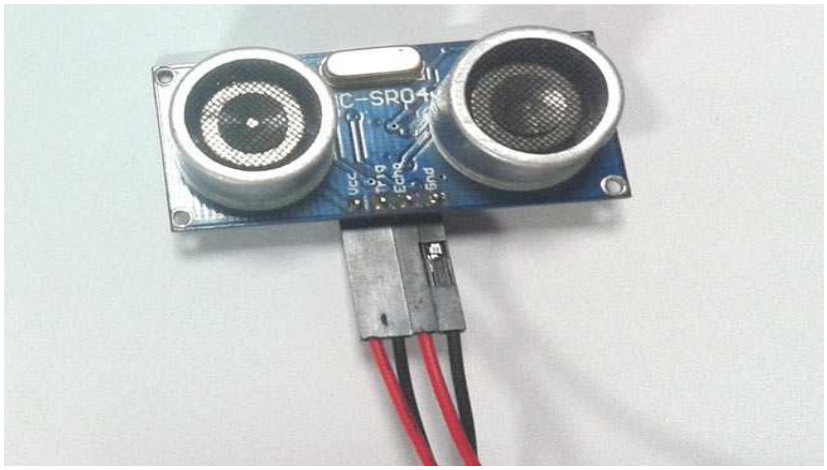
We can calculate the distance of the object based on the time taken by ultrasonic wave to return back to the sensor. Since the time and speed of sound is known we can calculate the distance by the following formulae.

Distance = (Time x Speed of Sound) / 2

The value is divided by two since the wave travels forward and backward covering the same distance. But in this project we have used NewPing.h library, and this library takes care of this calculation and we just need to use some key words, explanation is given in programing section below.

Check the below project to measure the distance of any object and to properly understand the Ultrasonic sensor working:



- Arduino Based Distance Measurement using Ultrasonic Sensor
- Distance Measurement using HC-SR04 and AVR Microcontroller

III. RESULTS AND DISCUSSION

In this project, LDR's are working as light detectors. Before we go into detail, we will have to understand how the LDR's work. LDR (Light Dependent Resistor) also known as photo resistor is the light sensitive device. Its resistance decrease when the light falls on it and that's why it is frequently used in Dark or Light Detector Circuit. Check the various circuits based on LDR here.

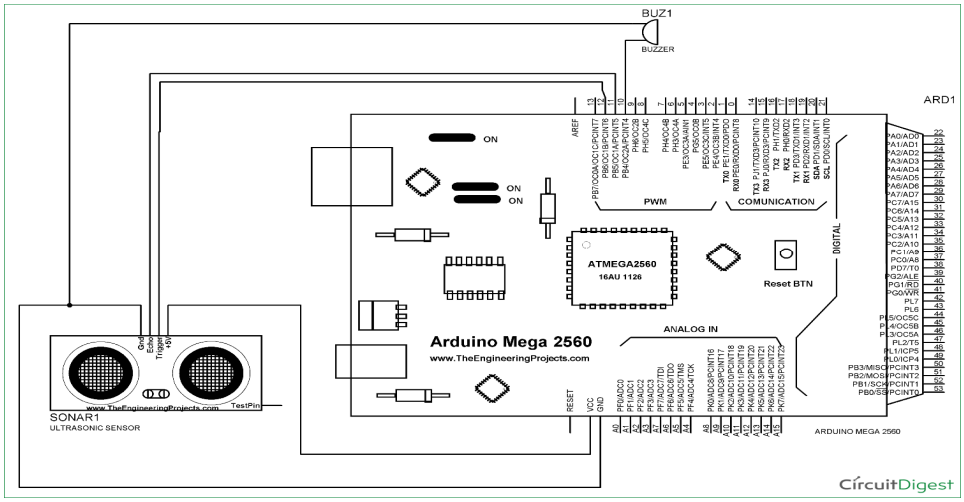


Fig. 1. Circuit Diagram And Explanation

Circuit connections for this Ultrasonic Alarm are very simple. Trigger pin of ultrasonic sensor is connected to pin no. 12 of Arduino and Echo pin of sensor is connected to pin no 11 of Arduino. Vcc of sensor is connected to 5V pin of Arduino and GND of sensor is connected to GND of Arduino. One pin of buzzer is connected to GND of Arduino and the other pin is connected to 8th pin of Arduino.

IV. RESULTS AND DISCUSSION

To make the prototype, you will have to follow the below steps:



Fig. 2. Working Model

Working Explanation:

Working this Arduino Door Alarm is very easy. Whenever anyone comes in the path/range of Ultrasonic Sensor, microcontroller detects the distance of object from the sensor and if the object is in the defined range, it sends the High signal to the buzzer and buzzer starts beeping.

The working principle of this circuit is, when light falls on the light dependent resistor, then its resistance will be decreased, which results in an increase of the voltage at pin2 of the 555 IC. This 555 IC is inbuilt with a comparator, which associates between the i/p voltage from pin2 of the IC and 1/3rd of the power supply voltage. When i/p falls below 1/3rd then o/p is fixed to high otherwise it is fixed to the lower.

The proposed circuit is built with ATmega microcontroller, DS1307 IC, LDR, LCD, PIR sensor, Array of LED. This circuit is very useful in our day to day life like highways, real time street lights, the parking areas, restaurants and hotels.

V. CONCLUSION

The test the circuit by putting any thing in front of sensor within the range, check the Video for demonstration. This function of Ultrasonic Sensor can also be used to build Obstacle Avoiding Robot.

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Arduino-based Rain Water Alarm

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Abstract - The project is to designed detect vehicle movement on highways to switch ON only a block of street lights ahead of the vehicle, and to switch OFF the behind lights to save energy. During night all the lights on the highway remain ON for the vehicles, but lots of energy is wasted when there is no vehicle his movement. This proposed system provides a solution for energy saving. This is achieved by sensing an approaching vehicle and switches ON a block of street lights ahead of the vehicle. As the vehicle passes by the behind lights switch OFF automatically. So when there are no vehicles on the highway, then all the lights remain OFF. Sensors used on either sides of the road send logic commands to microcontroller to switch ON/OFF the LEDs. Intensity control is also possible by Pulse Width Modulation (PWM) generated by the microcontroller. Thus this way of dynamically changing intensity ON/OFF helps in saving a lot of energy.

Keywords -. Microcontroller, Sensor, Street Light.

I. INTRODUCTION

Raindrop sensor is basically a board on which nickel is coated in the form of lines. It works on the principal of resistance. Rain Sensor module allows to measure moisture via analog output pins and it provides a digital output when a threshold of moisture exceeds. The module is based on the LM393 op amp. It includes the electronics module and a printed circuit board that "collects" the rain drops. As rain drops are collected on the circuit board, they create paths of parallel resistance that are measured via the op amp.

II. PRINCIPLE OF OPERATION

The sensor is a resistive dipole that shows less resistance when wet and more resistance when dry. When there is no rain drop on board it increases the Resistance so we gets high voltage according to V=IR.

When rain drop present it reduces the resistance because water is a conductor of electricity and presence of water connects nickel lines in parallel so reduces resistance and reduces voltage drop across it.

Specifications

- Adopts high quality of RF-04 double sided material.
- Area: 5cm x 4cm nickel plate on side,
- Anti-oxidation, anti-conductivity, with long use time;
- Comparator output signal clean waveform is good, driving ability, over 15mA;
- Potentiometer adjust the sensitivity;
- Working voltage 5V;
- Output format: Digital switching output (0 and 1) and analog voltage output AO;
- With bolt holes for easy installation;
- Small board PCB size: 3.2cm x 1.4cm;
- Uses a wide voltage LM393 comparator

III. RESULTS AND DISCUSSION

Rain Sensor Module

Pin	Description
Vcc	+5 Volts Power Source
GND	Ground or negative power source
D0	Digital Output. Goes low when moisture exceeds set threshold.
A0	Analog Output – Zero to five volts. The lower the voltage, the greater the moisture
POWER LED	Indicates that power is applied

OUTPUT LED Illuminates when moisture has exceeded threshold set by sensitivity adjustment.
Sensitivity Adjustment Clockwise is more sensitive. Counterclockwise is less sensitive.

Connecting with Arduino

Arduino Rain Sensor – Circuit Diagram

Source Code

Arduino Code

```
const int sensorMin = 0;
const int sensorMax = 1024;
void setup()
{
  Serial.begin(9600);
}
void loop()
{
  int sensorReading = analogRead(A0);
  int range = map(sensorReading, sensorMin, sensorMax, 0, 3);
  switch (range)
    {
      case 0:
        Serial.println("RAINING");
        break;
      case 1:
        Serial.println("RAIN WARNING");
        break;
      case 2:
        Serial.println("NOT RAINING");
        break;
    }
  delay(1000);
}
```

Code Explanation

Initialize the lowest and highest sensor readings with type as an integer and variable name.

```
const int sensorMin = 0; // sensor minimum
const int sensorMax = 1024; // sensor maximum
```

The setup() routine runs once when we reset it or power the board. Here we are initializing serial communication at 9600 baud rate.

```
void setup()
{
  Serial.begin(9600);
}
```

The loop function runs over and over again forever. Firstly this code reads the analog signal at A0 pin from Rain sensor and maps those measured value with initialized values.

```
void loop()
{
  int sensorReading = analogRead(A0);
  int range = map(sensorReading, sensorMin, sensorMax, 0, 3);
```

Checks the measured value with pre-stored condition and displays the weather condition like RAINING, RAIN WARNING & NOT RAINING.

```
  switch (range)
  {
    case 0: // Sensor getting completely wet
      Serial.println("RAINING");
```

```
    break;
   case 1: // Sensor getting partially wet
    Serial.println("RAIN WARNING");
    break;

   case 2: // Sensor dry
    Serial.println("NOT RAINING");
    break;
 }
 delay(1000);
}
```

Working

Make connections according to the above circuit diagram.

- Connect VCC pin of sensor to 5V power supply of Arduino,
- Connect GND pin of sensor to GND of Arduino and
- Connect Analog output pin of sensor to A0 pin of Arduino.

Upload the above code into Arduino IDE and test the result on Serial Monitor by soaking the rain sensor into water.

IV. CONCLUSION

In Proposed The serial monitor displays the below result based on the amount water drop on the rain sensor module.If the Rain Sensor Board is completely soaked; “case 0” will be activated and “RAINING” will be sent to the serial monitor.If the Sensor Board has water droplets on it; “case 1” will be activated and “RAIN WARNING” will be sent to the serial monitor. If the Sensor Board is dry; “case 2″ will be activated and “NOT RAINING ” will be sent to the serial monitor.

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Smart Traffic Control System using Sensors

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Abstract - Recent studies show that all over the world, there has been a rapid increase in vehicle numbers. The latest statistics show that there are approximately 1 million licensed vehicles in the year 2014. As a result traffic problems has increased in the last few years and the present traffic light controllers have limitations because it uses the predefined hardware that does not have the flexibility of modification on real time basis. Due to the fixed time intervals of green, orange and red signals the waiting time is more. To make this traffic light controlling more efficient we exploit the emergence of new technique called as "Smart Traffic Control System". This makes use of sensors along with embedded technology .The timings of the red and green lights will be smartly decided based on the traffic on adjacent roads. As compared to fixed mode traffic light controller this new system is more efficient and flexible. It also has an intelligent traffic control system to pass the emergency vehicles such as ambulance, fire brigade etc. and also detect and track the stolen vehicles. The design also has scope for further expansion. Density of the road is calculated using IR sensors. IR sensors are used to detect the number of vehicles based on the IR sensor; the traffic light is operated. IR sensors are less cost and more effective.

Keywords - Arduino, LED, Selective Sensor, Traffic, Density, IR sensors.

I. INTRODUCTION

Smart letter In modern life we have to face with many problems one of which is traffic congestion becoming more serious day after day. It is said that the high volume of vehicles, the inadequate infrastructure and the irrational distribution of the development are main reasons for increasing traffic jam[1]. The major cause leading to traffic congestion is the high number of vehicle which was caused by the population and the development of economy. Due to the massive growth in urbanization and traffic congestion, automatic based traffic light controller is needed to reduce the traffic delay and travel time especially in developing countries. Traffic congestion is now considered to be one of the biggest problems in the urban environments. Traffic problems will be also much more widely increasing as an expected result of the growing number of transportation means and current low-quality infrastructure of the roads [2] . In addition, many studies and statistics were generated in developing countries that proved that most of the road accidents are because of the very narrow roads and because of the destructive increase in the transportation means. This idea of controlling the traffic light efficiently in real time has attracted many researchers to work in this field [3] with the goal of creating automatic tool that can estimate the traffic congestion and based on this Variable, the traffic signal can be varied.

II. COMPONENTS USED

2.1 ARDUINO

Arduino is an open-source project that created microcontroller based kits for building digital devices and interactive objects that can sense and control physical devices. The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing which also supports the languages C and C++. The first Arduino was introduced in 2005, aiming to provide a low cost, easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits. The hardware design specifications are openly available, allowing the Arduino boards to be produced by anyone. Ad fruit Industries estimated in mid-2011 that over 300,000 officials Arduino had been commercially produced, and in 2013 that 700,000 official boards were in users' hands.

2.2 LED

A light-emitting diode (LED) is a two-lead semiconductor light source as shown in figure2.It is a p–n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the

semiconductor. An LED is often small in area (less than 1 mm2) and integrated optical components may be used to shape its radiation pattern. Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are still frequently used as transmitting elements in remote-control circuits, such as those in remote controls for a wide variety of consumer electronics. The first visible light LEDs were also of low intensity, and limited to red. Modern LEDs are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness. Early LEDs were often used as indicator lamps for electronic devices, replacing small incandescent bulbs. They were soon packaged into numeric readouts in the form of seven segment displays, and were commonly seen in digital clocks. Recent developments in LEDs permit them to be used in environmental and task lighting. LEDs have many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. Light emitting diodes are now used in applications as diverse as aviation lighting, automotive headlamps, advertising, general lighting, traffic signals, camera flashes and lighted wallpaper. As of 2016, LEDs powerful enough for room lighting remain somewhat more expensive, and require more precise current and heat management, than compact fluorescent lamp sources of comparable output. They are, however, significantly more energy efficient and, arguably, have less environmental concerns linked to their disposal.

III. SELECTION OF SENSOR

3.1 Proximity sensor:

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target. The maximum distance that this sensor can detect is defined "nominal range". Some sensors have adjustments of the nominal range or means to report a graduated detection distance. Some know this process as "thermo sensation". Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between sensor and the sensed object. Proximity sensors are commonly used on smart phones to detect (and skip) accidental touch screen taps when held to the ear during a call. They are also used in machine vibration monitoring to measure the variation in distance between a shaft and its support bearing. This is common in large steam turbines, compressors, and motors that use sleeve-type bearings. A proximity sensor adjusted to a very short range is often used as a touch switch. The main disadvantages are that a significant part of the measurement is external (i.e.) no metallic part intrusion within 3-inch spherical radius" of the sensor. Hence IR sensors are used to detect the density of traffic.

3.1 IR sensor

IR Transmitter

IR transmitter looks like an LED. This IR transmitter always emits IR rays from it. The operating voltage of this IR transmitter is 2 to 3V. These IR (infra red) rays are invisible to the human eye. But we can view these IR rays through camera. Infrared is an invisible radiant energy, electromagnetic radiation with longer wavelengths than those of visible light, extending from the nominal red edge of the visible spectrum at 700 nanometers (frequency 430 THz) to 1000000 nm (300 GHz) (although people can see infrared up to at least 1050 nm in experiments). Most of the thermal radiation emitted by objects near room temperature is infrared. Infrared radiation is used in industrial, scientific, and medical applications. Night-vision devices using active near infrared illumination allow people or animals to be observed without the observer being detected. Infrared astronomy uses sensor-equipped telescopes to penetrate dusty regions of space such as molecular clouds, detect objects such as planets, and to view highly red-shifted objects from the early days of the universe. Infrared thermal imaging cameras are used to detect heat loss in insulated systems, to observe changing blood flow in the skin, and to detect overheating of electrical apparatuses.

IR Receiver (Photodiode):

A photodiode is a semiconductor device that converts light into current. The current is generated when photons are absorbed in the photodiode. A small amount of current is also produced when no light is present. Photodiodes may contain optical filters, built-in lenses, and may have large or small surface areas. Photodiodes usually have a slower response time as their surface area increases. The common, traditional solar cell used to generate electric solar power is a large area photodiode. Photodiodes are similar to regular semiconductor diodes except that they may be either exposed (to detect vacuum UV or X-rays) or packaged with a window or optical fiber connection to allow light to reach the sensitive part of the device. Many diodes designed for use specifically as a photodiode use a PIN junction rather than a p–n junction, to increase the speed of response. A photodiode is designed to operate in reverse bias.

IV. RESULTS

The working of the project is divided into three steps

- If there is traffic at all the signal, then the system will work normally by controlling the signals one by one.

- If there is no traffic near a signal, then the system will skip this signal and will move on to the next one. For example, if there is no vehicle at signal 2, 3 and currently the system is allowing vehicles at signal 1 to pass. Then after signal 1, the system will move on to signal 4 skipping signal 2 and 3.
- If there is no traffic at all the 4 signals, system will stop at the current signal and will only move on the next signal if there will be traffic at any other signal.

V. CONCLUSIONS

Nowadays, the technology and science is in progress day by day new technologies are invented and new things are created by human. In this system we have studied a smart letter box system that notifies the letter is received in the letter box. In our daily life it is not possible for us to check the letter box we proposed this system that the system notifies the user by sending message that letter is arrived. In this paper we conclude that science is non stoppable, new things arrive and growth of smart system.

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LPG Gas Leakage Detector

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Abstract –Home fires have been taking place frequently and the threat to human lives and properties is growing in recent years. Liquid petroleum gas (LPG) is highly inflammable and can burn even at some distance from the source of leakage. Most fire accidents are caused because of a poor-quality rubber tube or the regulator is not turned off when not in use. Therefore, developing the gas leakage alert system is very essential. Hence, this paper presents a gas leakage alert system to detect the gas leakage and to alarm the people onboard.

Keywords –Arduino Pro Mini, LPG Gas Sensor Module, Buzzer

I. INTRODUCTION

Password While LPG is an essential need of every household, its leakage could lead to a disaster. To alert on LPG leakage and prevent any mishappening there are various products to detect the leakage. Here we have developed an Arduino based LPG gas detector alarm. If gas leakage occurs, this system detects it and makes an alert by buzzing the buzzer attached with the circuit. This system is easy to build and anyone who have some knowledge of electronics and programming, can build.

II. COMPONENTS

2.1 Main Components:

1. Arduino Pro Mini
2. Lpg Gas Sensor Module
3. Buzzer
4. Bc 547 Transistor
5. 16x2 Lcd
6. 1k Resistor
7. Bread Board
8. 9 Volt Battery
9. Connecting Wires

2.2 LPG Gas Sensor Module:

This module contains a MQ3 sensor which actually detects LPG gas, a comparator (LM393) for comparing MQ3 output voltage with reference voltage. It gives a HIGH output when LPG gas is sensed. A potentiometer is also used for controlling sensitivity of gas sensing. This module is very easy to interface with microcontrollers and arduino and easily available in market by name "LPG Gas Sensor Module". We can also build it by using LM358 or LM393 and MQ3.

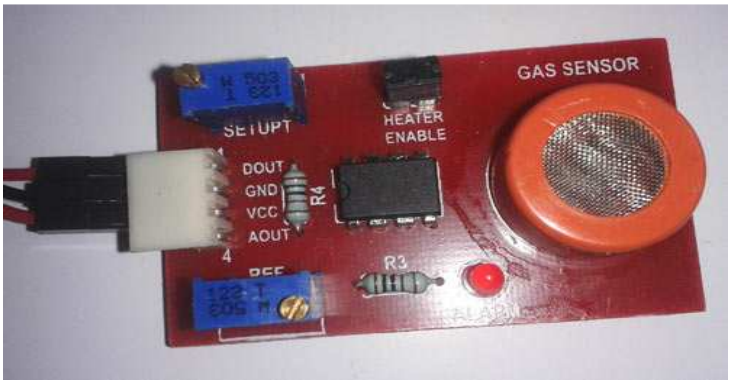

Fig. 1 Design of LPG leakage detection

III. WORKING PRINCIPLE

We have used a LPG gas sensor module to detect LPG Gas. When LPG gas leakage occurs, it gives a HIGH pulse on its DO pin and arduino continuously reads its DO pin. When Arduino gets a HIGH pulse from LPG Gas module it shows "LPG Gas Leakage Alert" message on 16x2 LCD and activates buzzer which beeps again and again until the gas detector module doesn't sense the gas in environment. When LPG gas detector module gives LOW pulse to arduino, then LCD shows "No LPG Gas Leakage" message.

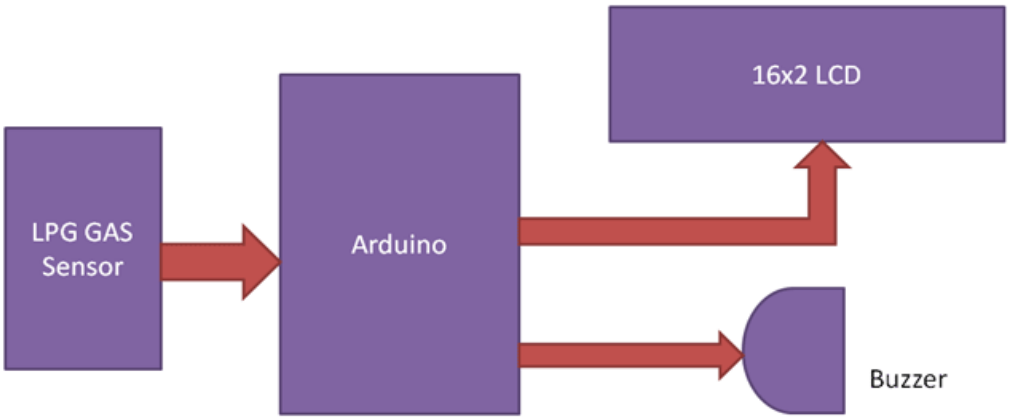

Fig. 2 LPG leakage detection and alert system

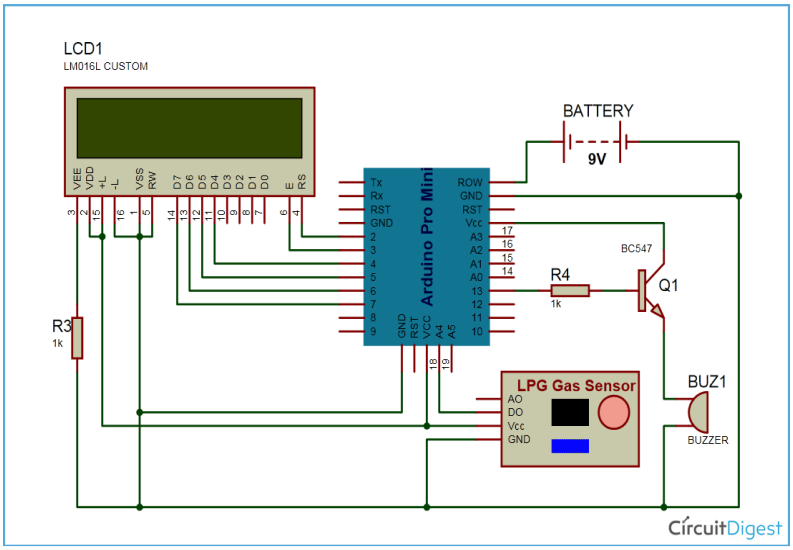

Fig. 3 Circuit Diagram and Description

As shown in the schematic diagram above, it contains Arduino board, LPG GAS Sensor Module, buzzer and 16x2 LCD module. Arduino controls the whole process of this system like reading LPG Gas sensor module output, sending message to LCD and activating buzzer. We can set sensitivity of this sensor module by inbuilt potentiometer placed on it.

LPG gas sensor module's DO pin is directly connected to pin 18 (A4) of Arduino and Vcc and GND are connected to Vcc and GND of arduino. LPG gas sensor module consist a MQ3 sensor which detects LPG gas. This MQ3 sensor has a heater inside which needs some heater supply to heat up and it may takes up to 15 minute to get ready for

detecting LPG gas. And a comparator circuit is used for converting Analog output of MQ3 in digital. A 16x2 LCD is connected with arduino in 4-bit mode. Control pin RS, RW and En are directly connected to arduino pin 2, GND and 3. And data pin D0-D7 are connected to 4, 5, 6, 7 of arduino. A buzzer is connected with arduino pin number 13 through a NPN BC547 transistor having a 1 k resistor at its base.

IV. CONCLUSIONS

Gas leakage leads to severe accidents resulting in material losses and human injuries. Gas leakage occurs mainly due to poor maintenance of equipments and inadequate awareness of the people. Hence, LPG leakage detection is essential to prevent accidents and to save human lives. This paper presented LPG leakage detection and alert system. This system triggers LED and buzzer to alert people when LPG leakage is detected. This system is very simple yet reliable.

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Smart Waste Management System

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Abstract - Garbage! In our daily life, we see the pictures of garbage bins being overfull and all the garbage smells out. This leads to the number of diseases as large number of insects and mosquitoes breed on it. A big face up to the smart cities is solid waste management, not only in India almost all the countries in the world

Keywords - Arduino microcontroller through RS232, LCD, Arduino Software (IDE)

I. INTRODUCTION

This project gives the most efficient ways to keep our environment clean and green. The upcoming large number of smart cities, large numbers of responsibilities is also required to be fulfilled. The most important need of a smart way of life begins with cleanliness and cleanliness begins with smart dustbin. A people will get its waste dispatch properly only if the dustbins are placed well and collected well. The main problem in the current waste management system in most of the cities is the damaging status of dustbins. So, by using the new technology we send the information to the concern persons and display boards are arranged in the concern offices. The progress of waste across the entire city can be tracked and thus can be monitored by a single system efficiently and concretely. This system can prove to be a revolution for the whole waste management system of future smart cities.

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II. MATERIALS AND METHODS

Hardware Requirements

The hardware requirements for the system are as follows.

Ultrasonic Sensors: Detecting the level of Garbage. The Ultrasonic Sensor sends out a high-frequency sound pulse and then times how long it takes for the echo of the sound to reflect back. The sensor has 2 openings on its front. One opening transmits ultrasonic waves, the other receives them. The speed of sound is approximately 341 meters (1100 feet) per second in air. The ultrasonic sensor uses this information along with the time difference between sending and receiving the sound pulse to determine the distance to an object.

It uses the following mathematical equation:

Distance = (Time x Speed of Sound)/2

Time = the time between when an ultrasonic wave is transmitted and when it is received.

To measure the distance to an object, the time from transmission of a pulse to reception is measured and converted into arrange by knowing the speed of sound. This signal together with noise is then passed through various forms of signal processing, which for simple sensors may be just energy measurement. It is then presented to some form of decision device that calls the output either the required signal or noise. This decision device may be an operator with headphones or a display, or in some systems this function may be carried out by software. Further processes may be carried out to classify the target and localize it, as well as measuring its velocity. Some ultrasonic sensors have multiple beams to provide all round cover while others only cover an arrow arc, although the beam may be rotated, relatively slowly, by mechanical scanning.

GSM Modem: GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use itsRS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily using GSM as shown below.

The modem can either be connected to Arduino microcontroller through RS232. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. This GSM modem is a highly flexible plug and play quad band SIM900A GSM modem for direct and easy integration to RS232applications. Supports features like Voice, SMS, Data/Fax, GPRS and integrated TCP/IP stack.

Liquid Crystal Display: To display the dustbin location.

A liquid crystal display (LCD) is a display module with liquid crystals and backlight by LEDs. A 16x2 LCD display consists of two rows of display with each row consisting of 16 characters. LCD Module has 16 pins and operates

with 5V. Power pins i.e. pins 1, 2, 3, 15 and 16 are used to supply for the module as well as the backlight LEDs. The voltage to the Contract Adjust Pin (Pin 3 or VEE) is usually given from a Potentiometer and will or battery to get started. The major advantage is control multiple appliances with a single board.

Software Requirements:

Arduino IDE: The Arduino is open source Integrated Development Environment or Arduino Software (IDE). It contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus.

Writing Sketches: Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor. Arduino Language is user friendly and for programming is merely a set of C/C++ functions that can be called from your code.

III. DESIGN AND IMPLEMENTATION:

The project can be divided into two modules, one is detection of garbage level and then the second module is send the information to the corresponding officials through GSM.

Description of project: Garbage level detection is the done by ultrasonic sensors (HC-SR04).The ultrasonic sensors is placed on top of the dustbin facing the bottom. The sensors continuously emits the sonic waves, when the sonic waves hit the object and reflect back, the echo in the sensors senses the waves and calculates the distance of the object. Arduino Mega 2560 is used for controlling whole the process detecting garbage in different places and depending on the program first display in LCD to reminding the garbage level in the bin even though the garbage is not take out from the bin then the particular bin information is sent to higher officials through GSM.

IV. CONCLUSION

Garbage monitoring systems are the needs of Smart buildings. Smart waste monitoring and management is the keen idea of smart city planners. Garbage monitoring systems is a new idea of implementation which makes a normal dustbin smart using sensors for garbage level detection and sending message to the user updating the status of the bin. As soon as the dustbin is full it gives the information in LCD and sent the message to corresponding officials.

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Sun Tracking Solar Panel

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Abstract - This project employs a solar panel mounted to a time-programmed stepper motor to track the sun so that maximum sun light is made incident upon the panel at any given time of the day. This is better compared to the light sensing method that may not be accurate always – for example, during cloudy days. With the impending scarcity of non-renewable resources, people are considering to use alternate sources of energy. Barring all the other available resources, the solar energy is the most abundant and it is comparatively easy to convert into electrical energy. The usage of solar panel to convert Sun energy into electrical energy is very popular, but due to the transition of sun from east to west, the fixed solar panel may not be able to generate optimum energy. The proposed system solves this problem by an arrangement for the solar panel to track the Sun. This tracking movement is achieved by coupling a stepper motor to the solar panel such that the panel maintains its face always perpendicular to the sun to generate maximum energy. This is achieved by using a programmed microcontroller to deliver stepped pulses in periodical time intervals for 12 hours for the stepper motor to rotate the mounted panel in one direction and then return to the start point for next day light as desired. The Arduino controller used in this project is from the Arduino family. The Stepper motor is driven by an interfacing IC as the controller is not capable of handling the power requirements of the stepper motor. Furthermore, this project can be enhanced by using an RTC (Real Time Clock) to follow the sun. This helps in maintaining the required position of the panel even if the power is interrupted for some time.

Keywords - Solar Panel, Stepper motor, Programmed Microcontroller, Real Time clock, 89C51.

I. INTRODUCTION

In this article we are going to make a Sun Tracking Solar Panel using Arduino, in which we will use two LDRs (Light dependent resistor) to sense the light and a servo motor to automatically rotate the solar panel in the direction of the sun light. Advantage of this project is that Solar panel will always follow the sun light will always face towards the sun to get charge all the time and can provide the supply the maximum power. The prototype is very easy to build. Below you will find the complete description of how it works and how the prototype is made.

II. COMPONENTS AND METHODS

- Servo Motor (sg90)
- Solar panel
- Arduino Uno
- LDR's X 2 (Light Dependent Resistor)
- 10K resistors X 2
- Battery (6 to 12V)

III. RESULTS AND DISCUSSION

In this project, LDR's are working as light detectors. Before we go into detail, we will have to understand how the LDR's work. LDR (Light Dependent Resistor) also known as photo resistor is the light sensitive device. Its resistance decrease when the light falls on it and that's why it is frequently used in Dark or Light Detector Circuit. Check the various circuits based on LDR here.

The two LDR's are placed at the two sides of solar panel and the Servo Motor is used to rotate the solar panel. The servo will move the solar panel towards the LDR whose resistance will be low, mean towards the LDR on which light is falling, that way it will keep following the light. And if there is same amount of light falling on both the LDR, then servo will not rotate. The servo will try to move the solar panel in the position where both LDR's will have the same resistance means where same amount of light will fall on both the resistors and if resistance of one of the LDR will change then it rotates towards lower resistance LDR. Check the Demonstration Video at the end of this Article.

IV. RESULTS AND DISCUSSION

To make the prototype, you will have to follow the below steps:

Step 1:

First of all, take a small piece of cardboard and make a hole at one end. We will insert the screw in it to fix it with the servo later on.

Step 2:

Now fix two small pieces of cardboard with each other in a V shape with help of glue or hot gun and place solar panel on it.

Step 3:

Then attach the bottom side of the V shape to the other end of small piece of cardboard in which you made a hole in first step.

Step 4:

Now insert the screw in the hole you made on card board and insert it through the hole into the servo. The screw comes with the servo motor when you buy it.

Step 5:

Now place the servo on another piece of cardboard. The size of the cardboard should be larger enough so that you can place a Arduino Uno, a breadboard and a battery on it.

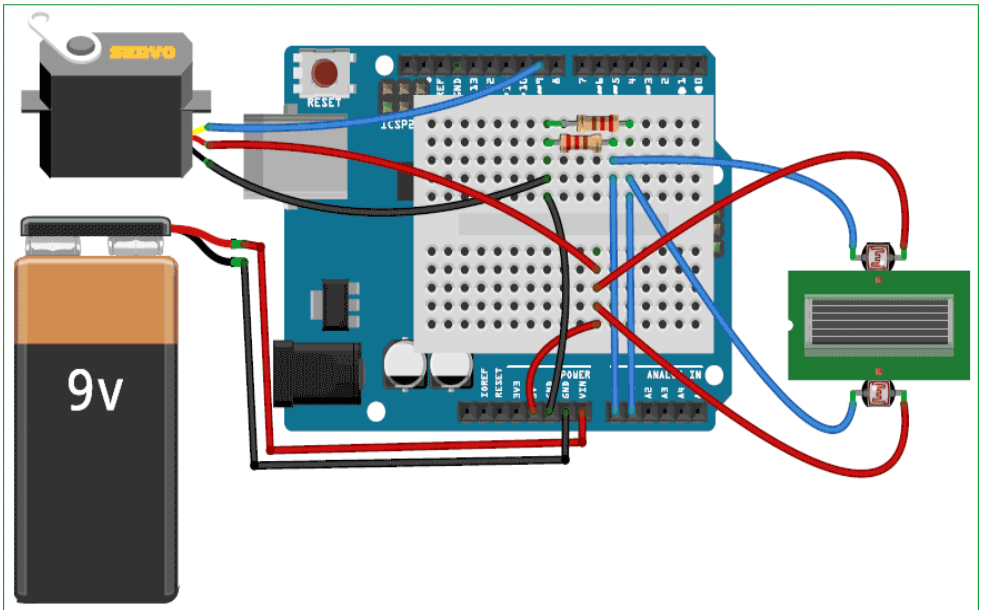
Step 6:

Attach the LDRs on the two sides of the solar panel with the help of glue. Make sure you have soldered the wires with the legs of the LDR's. You will have to connect these with the resistors later on.

Step 7:

Now place the Arduino, battery and the breadboard on the cardboard and make the connection as described in the Circuit diagram and Explanation section below. The final prototype is shown below.

In this Arduino Solar Panel Tracker, Arduino is powered by the 9V battery and all the other parts are powered by the Arduino. Arduino recommended input voltage is from 7 to 12 volts but you can power it within the range of 6 to 20 volts which is the limit. Try to power it within the recommended input voltage. So connect the positive wire of the battery to the Vin of the Arduino and the negative wire of the battery to the ground of the Arduino.



Next connect the servo to the Arduino. Connect the positive wire of the servo to the 5V of Arduino and ground wire to the ground of the Arduino and then connect the signal wire of Servo to the digital pin 9 of Arduino. The servo will help in moving the solar panel.

Now connect the LDRs to the Arduino. Connect one end of the LDR to the one end of the 10k resistor and also connect this end to the A0 of the Arduino and connect the other end of that resistor to the ground and connect the other end of LDR to the 5V. Similarly, connect the one end of second LDR to the one end of other 10k resistor and also connect that end to the A1 of Arduino and connect the other end of that resistor to ground and connect the other end of LDR to 5V of Arduino.

V. CONCLUSION

In this project, the sun tracking system is developed based on 89C51 microcontroller. The microcontroller 89C51 based circuit is used in this system with a minimum number of components and the use of stepper motors enables accurate tracking of the sun. It has been shown that the sun tracking systems can collect maximum energy than a fixed panel system collects and high efficiency is achieved through this tracker, it can be said that the proposed sun tracking system is a feasible method of maximizing the light energy received from sun. This is an efficient tracking system for solar energy collection.

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Street Light that Glows on Detecting Vehicle Movement

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Abstract - This project employs a solar panel mounted to a time-programmed stepper motor to track the sun so that maximum sun light is made incident upon the panel at any given time of the day. This is better compared to the light sensing method that may not be accurate always – for example, during cloudy days. With the impending scarcity of non-renewable resources, people are considering to use alternate sources of energy. Barring all the other available resources, the solar energy is the most abundant and it is comparatively easy to convert into electrical energy. The usage of solar panel to convert Sun energy into electrical energy is very popular, but due to the transition of sun from east to west, the fixed solar panel may not be able to generate optimum energy. The proposed system solves this problem by an arrangement for the solar panel to track the Sun. This tracking movement is achieved by coupling a stepper motor to the solar panel such that the panel maintains its face always perpendicular to the sun to generate maximum energy. This is achieved by using a programmed microcontroller to deliver stepped pulses in periodical time intervals for 12 hours for the stepper motor to rotate the mounted panel in one direction and then return to the start point for next day light as desired. The Arduino controller used in this project is from the Arduino family. The Stepper motor is driven by an interfacing IC as the controller is not capable of handling the power requirements of the stepper motor. Furthermore, this project can be enhanced by using an RTC (Real Time Clock) to follow the sun. This helps in maintaining the required position of the panel even if the power is interrupted for some time.

Keywords - Microcontroller, Sensor, Street Light

I. INTRODUCTION

Nowadays, street lighting systems in industries or cities are growing rapidly. The important considerations in the field of different technologies like electrical and electronics are cost effective, automation and power consumption. There are different street lighting systems are developed to maintain and control the lighting systems. These lighting systems are used to control and decrease energy consumption. This article illustrates the street light that glows on detecting vehicle movement. Street light controlling is one of the most developing systems in India to conserve the energy.

Generally, street light controlling system is a simple concept which uses a transistor to turn ON in the night time and turn OFF during the day time. The entire process can be done by a using a sensor namely LDR (light dependent resistor). Nowadays conserving the energy is an essential part and day by day energy resources are getting decreased. So our next generations may face a lot of problems due to this lack of resources. This system doesn't need a manual operation to turn ON/OFF the street lights. The street light system detects whether there is need of light or not.

II. COMPONENTS AND METHODS

- Servo Motor (sg90)
- Solar panel
- Arduino Uno
- LDR's X 2 (Light Dependent Resistor)
- 10K resistors X 2
- Battery (6 to 12V)

III. RESULTS AND DISCUSSION

In this project, LDR's are working as light detectors. Before we go into detail, we will have to understand how the LDR's work. LDR (Light Dependent Resistor) also known as photo resistor is the light sensitive device. Its resistance decrease when the light falls on it and that's why it is frequently used in Dark or Light Detector Circuit. Check the various circuits based on LDR here.

The two LDR's are placed at the two sides of solar panel and the Servo Motor is used to rotate the solar panel. The servo will move the solar panel towards the LDR whose resistance will be low, mean towards the LDR on which light is falling, that way it will keep following the light. And if there is same amount of light falling on both the LDR, then servo

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To make the prototype, you will have to follow the below steps:

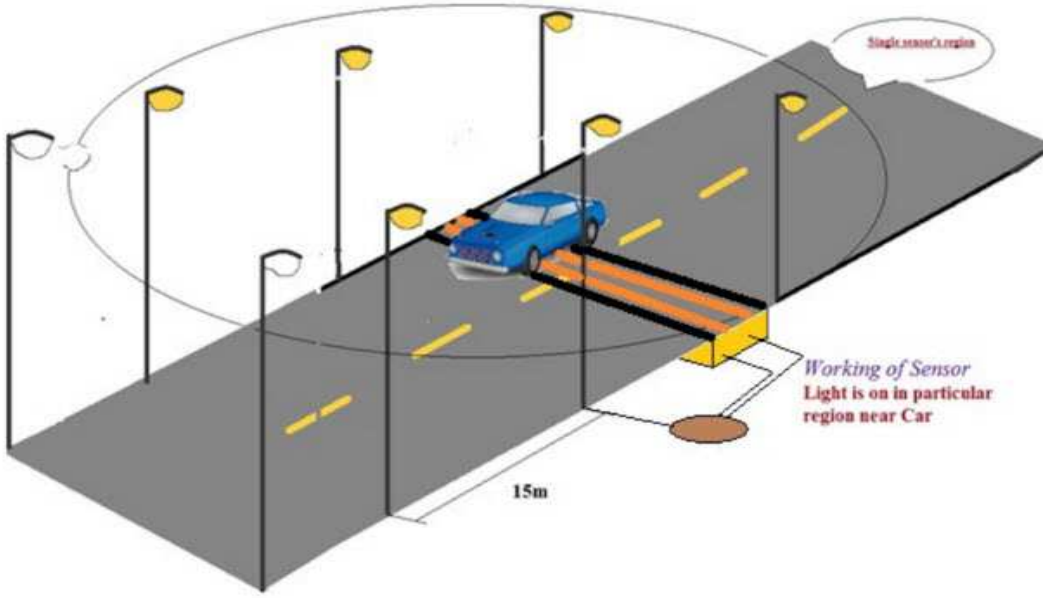

Fig.1 Street Light that Glows on Detecting Vehicle Movement Circuit

The working principle of this circuit is, when light falls on the light dependent resistor, then its resistance will be decreased, which results in an increase of the voltage at pin2 of the 555 IC. This 555 IC is inbuilt with a comparator, which associates between the i/p voltage from pin2 of the IC and 1/3rd of the power supply voltage. When i/p falls below 1/3rd then o/p is fixed to high otherwise it is fixed to the lower.

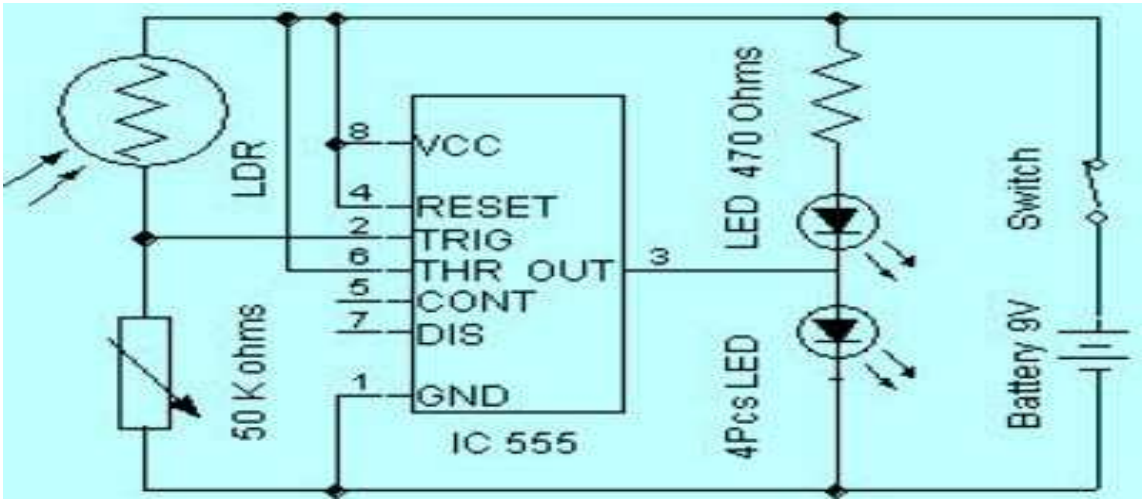

Fig. 2. Street Light that Glows on Detecting Vehicle Circuit

The proposed circuit is built with ATmega microcontroller, DS1307 IC, LDR, LCD, PIR sensor, Array of LED. This circuit is very useful in our day to day life like highways, real time street lights, the parking areas, restaurants and hotels.

V. CONCLUSION

In Proposed system is power saving mechanism for street lights by using LED lamps as replacement of normal lamps and using special power savings mechanism for microcontroller. It turns out most reliable and time efficient way to switch ON/OFF streetlights. It provides an effective measure to save energy by preventing unnecessary wastage of electricity, caused due to manual switching or lighting of street-lights when it is not required..

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Smart Dustbin Using ARDUINO, Ultrasonic Sensor & Servo Motor

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Abstract - Mostly in our daily life we encounter dustbins that are excessively full and garbage spilling out of them. This kind of situation is neither good for our environment nor for our advancement. This problem leads to huge number of diseases as large number of insects and mosquitoes breed on the waste accumulated in this garbage. Hence, we developed a project to control the overfilling of the dustbin by making the dustbin smart enough to notify itself for its cleaning. In this project the smart dustbin management system is built on the microcontroller based system having ultrasonic sensors on each of the four dustbins that will show the current status of garbage on the LCD screen as well as on the mobile.

Keywords -. ATMEGA328P, Ultrasonic Sensor, ESP8266, IR Sensor, PIR sensor

I. INTRODUCTION

In this project, I will show you How to Make a Smart Dustbin using Arduino, where the lid of the dustbin will automatically open when you approach with trash. The other important components used to make this Smart Dustbin are an HC-04 Ultrasonic Sensor and an SG90 TowerPro Servo Motor.

II. LITERATURE SURVEY

Since smart cities are becoming centre of attraction for the advancement of developing countries and without the removal or solution to the garbage problem these cities will be not that attractive. Therefore, large number of projects and research is going on in the area of smart dustbins for smart cities and to implement such projects typically use microcontroller based real time bin monitoring system, RFID technology, GPS, GSM, RF module etc. Yusof et al. [2], presented an Arduino Uno micro controller based smart garbage monitoring system to ascertain the level of waste in the garbage bin in real-time and before there is overflow in garbage bin the system sense out and alert through SMS municipality for the bin to be emptied an garbage to be collected immediately.

III. COMPONENTS AND METHODS

- Concept behind Smart Dustbin using Arduino
- How to Build a Smart Dustbin using Arduino?
- Connecting the Servo
- Connecting the Ultrasonic Sensor
- Wiring up the Components
- Circuit Diagram
- Components Required
- Code
- Working
- Output Video
- Conclusion

IV. RESULTS AND DISCUSSION

In this Dustbins (or Garbage bins, Trash Cans, whatever you call them) are small plastic (or metal) containers that are used to store trash (or waste) on a temporary basis. They are often used in homes, offices, streets, parks etc. to collect the waste. In some places, littering is a serious offence and hence Public Waste Containers are the only way to dispose small waste. Usually, it is a common practice to use separate bins for collecting wet or dry, recyclable or non-recyclable waste. In this project, I have designed a simple system called Smart Dustbin using Arduino, Ultrasonic Sensor and Servo Motor, where the lid of the dustbin will automatically open itself upon detection of human hand. The two LDR's are placed at the two sides of solar panel and the Servo Motor is used to rotate the solar panel. The servo will move the solar panel towards the LDR whose resistance will be low, mean towards the LDR on which light is falling, that way it will keep following the light. And if there is same amount of light falling on both the LDR, then servo will not rotate. The servo

will try to move the solar panel in the position where both LDR's will have the same resistance means where same amount of light will fall on both the resistors and if resistance of one of the LDR will change then it rotates towards lower resistance LDR. Check the Demonstration Video at the end of this Article.

V. RESULTS AND DISCUSSION

To make the prototype, you will have to follow the below steps:



Fig. 1. Experimental Kit Diagram

VI. CONCLUSION

In Proposed system, the implementation of smart dustbin management system using IOT as a hardware and ionic framework as our software insures the cleaning of dustbins soon when the garbage level reaches its maximum. If the dustbin is not cleaned in specific time, then the record is sent to the higher authority in our case the admin who can take appropriate action against the concerned employee.

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Concept behind Smart Dustbin Using ARDUINO

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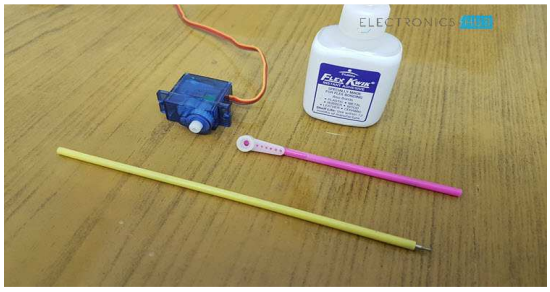
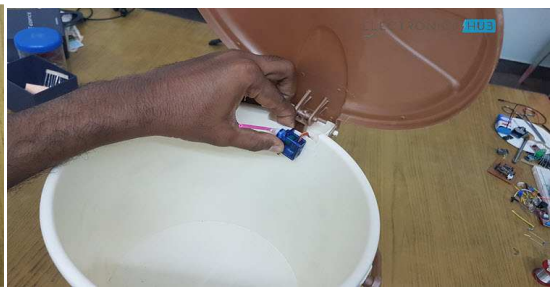
Abstract - Mostly in our daily life we encounter dustbins that are excessively full and garbage spilling out of them. This kind of situation is neither good for our environment nor for our advancement. This problem leads to huge number of diseases as large number of insects and mosquitoes breed on the waste accumulated in this garbage. Hence, we developed a project to control the overfilling of the dustbin by making the dustbin smart enough to notify itself for its cleaning. In this project the smart dustbin management system is built on the microcontroller based system having ultrasonic sensors on each of the four dustbins that will show the current status of garbage on the LCD screen as well as on the mobile.

Keywords -. ATMEGA328P, Ultrasonic Sensor, ESP8266, IR Sensor, PIR sensor

I. INTRODUCTION

The main concept behind the Smart Dustbin using Arduino project is Object Detection. I have already used Ultrasonic Sensor in **Object Avoiding Robot**, where upon detecting an object, the Robot will change its course of direction.A similar methodology is implemented here, where the Ultrasonic Sensor is placed on top of the dustbin's lid and when the sensor detects any object like a human hand, it will trigger Arduino to open the lid. In this project, I will show you How to Make a Smart Dustbin using Arduino, where the lid of the dustbin will automatically open when you approach with trash. The other important components used to make this Smart Dustbin are an HC-04 Ultrasonic Sensor and an SG90 TowerPro Servo Motor.

For this mechanism to be able to open the lid of the dustbin, it must be placed near the hinge where the lid is connected to the main can. From the following image, you can see that I have fixed the servo motor on the can. Also, make sure that the lifting arm is parallel to ground under closed lid condition. **NOTE:** According to the Laws of Physics, you will require more energy to push the lid from the hinge than at the extreme end. But in order to open the lid and not have any obstacle, this is the only place to fix the servo motor with its arm.

II. COMPONENTS AND METHODS

- Concept behind Smart Dustbin using Arduino
- How to Build a Smart Dustbin using Arduino?
- Connecting the Servo
- Connecting the Ultrasonic Sensor
- Wiring up the Components
- Circuit Diagram
- Components Required
- Code
- Working
- Output Video
- Conclusion

Connecting the Ultrasonic Sensor:
Once the servo is in position, you can move onto the Ultrasonic Sensor. Make two holes corresponding to the Ultrasonic Sensor on the lid of the dustbin, as shown in the following image.

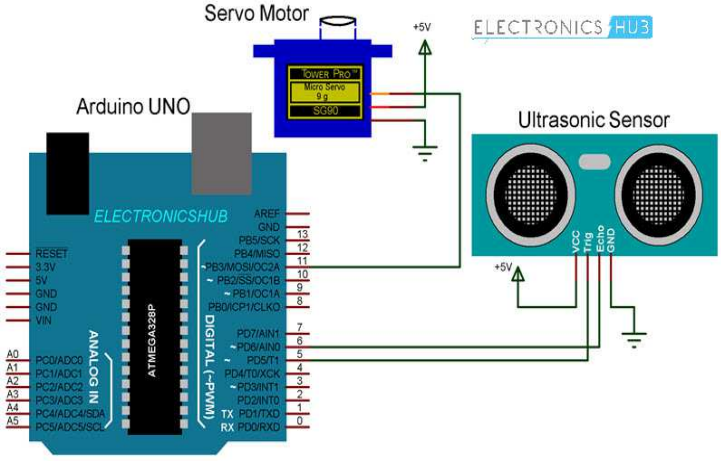
III. RESULTS AND DISCUSSION

In this Dustbins (or Garbage bins, Trash Cans, whatever you call them) are small plastic (or metal) containers that are used to store trash (or waste) on a temporary basis. They are often used in homes, offices, streets, parks etc. to collect the waste. In some places, littering is a serious offence and hence Public Waste Containers are the only way to dispose small waste.



WARNING: You have to use a sharp object with a lot of force to make these holes. Be careful.

All the wires from both the components i.e. Ultrasonic Sensor and Servo Motor are connected to respective pins of Arduino. This finishes up the build process of the Smart Dustbin.
The two LDR's are placed at the two sides of solar panel and the Servo Motor is used to rotate the solar panel. The servo will move the solar panel towards the LDR whose resistance will be low, mean towards the LDR on which light is falling, that way it will keep following the light. And if there is same amount of light falling on both the LDR, then servo will not rotate. The servo will try to move the solar panel in the position where both LDR's will have the same resistance means where same amount of light will fall on both the resistors and if resistance of one of the LDR will change then it rotates towards lower resistance LDR. Check the Demonstration Video at the end of this Article.



IV. RESULTS AND DISCUSSION

To make the prototype, you will have to follow the below steps:

- Working
- After setting up the Smart Dustbin and making all the necessary connections, upload the code to Arduino and provide 5V power supply to the circuit. Once the system is powered ON, Arduino keeps monitoring for any object near the Ultrasonic Sensor.

- If the Ultrasonic Sensor detects any object like a hand for example, Arduino calculates its distance and if it less than a certain predefined value, Arduino will activate the Servo Motor and with the support of the extended arm, it will list the lid open. After certain time, the lid is automatically closed.

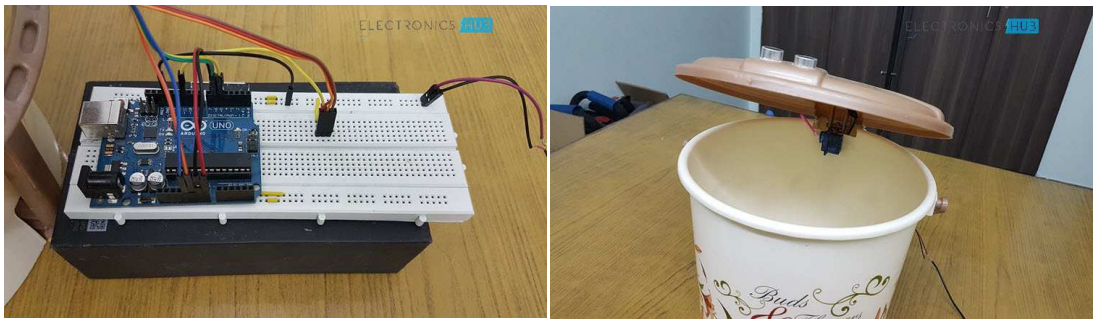


Fig. 1. Experimental Kit Diagram

V. CONCLUSION

A simple but useful project called Smart Dustbin using Arduino is designed and developed here. Using this project, the lid of the dustbin stays closed, so that waste is not exposed (to avoid flies and mosquitos) and when you want dispose any waste, it will automatically open the lid. If the dustbin is not cleaned in specific time, then the record is sent to the higher authority in our case the admin who can take appropriate action against the concerned employee.

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Sensor Based Street Lightening for Vehicle Movement

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Abstract - The project is to designed detect vehicle movement on highways to switch ON only a block of street lights ahead of the vehicle, and to switch OFF the behind lights to save energy. During night all the lights on the highway remain ON for the vehicles, but lots of energy is wasted when there is no vehicle his movement. This proposed system provides a solution for energy saving. This is achieved by sensing an approaching vehicle and switches ON a block of street lights ahead of the vehicle. As the vehicle passes by the behind lights switch OFF automatically. So when there are no vehicles on the highway, then all the lights remain OFF. Sensors used on either sides of the road send logic commands to microcontroller to switch ON/OFF the LEDs. Intensity control is also possible by Pulse Width Modulation (PWM) generated by the microcontroller. Thus this way of dynamically changing intensity ON/OFF helps in saving a lot of energy.

Keywords -. Microcontroller, Sensor, Street Light.

I. INTRODUCTION

Street lighting provides a safe night time environment for all road users including pedestrians. Providing street lighting is one of the most important and expensive responsibilities of a city. Lighting can account for 10–38% of the total energy bill in typical cities worldwide. Street lighting is a particularly critical concern for public authorities in developing countries because of its strategic importance for economic and social stability. Inefficient lighting wastes significant financial resources every year, and poor lighting creates unsafe conditions. Energy efficient technologies and design mechanism can reduce cost of the street lighting drastically. The main objective of the present project is to reduce the power consumption and efficient utilization of renewable sources for the application of street lightening and traffic signalling. Hence, this paper is aimed at design and implementation of an automatic system to control the traffic and reduce energy consumption of streets public lighting system up to the maximum possible extent. The density of traffic is sensed by using an array of Infrared Sensors (IR), which senses the traffic movement.

II. COMPONENTS AND METHODS

- Servo Motor (sg90)
- Solar panel
- Arduino Uno
- LDR's X 2 (Light Dependent Resistor)
- 10K resistors X 2
- Battery (6 to 12V)

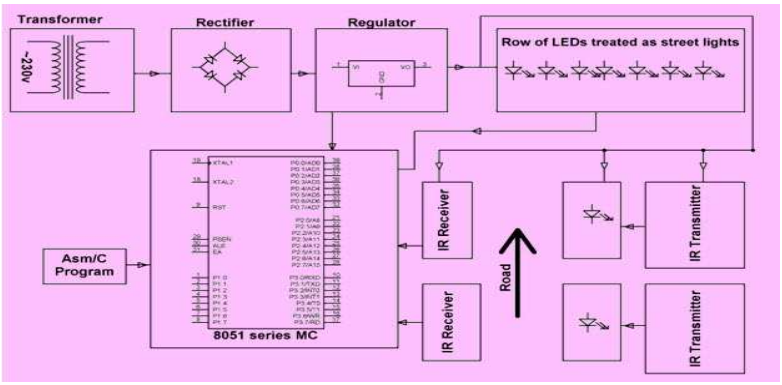

Fig. 1 Circuit Diagram

III. RESULTS AND DISCUSSION

In this project, LDR's are working as light detectors. Before we go into detail, we will have to understand how the LDR's work. LDR (Light Dependent Resistor) also known as photo resistor is the light sensitive device. Its resistance decrease when the light falls on it and that's why it is frequently used in Dark or Light Detector Circuit. Check the various circuits based on LDR here.

The two LDR's are placed at the two sides of solar panel and the Servo Motor is used to rotate the solar panel. The servo will move the solar panel towards the LDR whose resistance will be low, mean towards the LDR on which light is falling, that way it will keep following the light. And if there is same amount of light falling on both the LDR, then servo will not rotate. The servo will try to move the solar panel in the position where both LDR's will have the same resistance means where same amount of light will fall on both the resistors and if resistance of one of the LDR will change then it rotates towards lower resistance LDR. Check the Demonstration Video at the end of this Article.

IV. RESULTS AND DISCUSSION

To make the prototype, you will have to follow the below steps:

The power supply of this project comprises of a step-down transformer, which steps down the voltage from 230v to 12V AC. This is transformed to a DC using a Bridge rectifier. A capacitor is used to remove the ripples using a capacitive filter, and it is then regulated to +5V from 12v using a 7805 IC voltage regulator, which is compulsory for the microcontroller as well as other components.

Furthermore, this project can be extended by using suitable sensors for detecting the street light failure, and then sending an SMS to the control department through a GSM modem for suitable action.

By using this project a lot of energy can be saved. The proposed system uses LEDs instead of other lamps. The project is especially designed for street lighting in remote rural and urban areas where the traffic is low at times. The system is multipurpose, extendable and totally variable to user needs. The applications of this street light that glows on detecting vehicle movement mainly involve in highways, real time street lights, hotels, parking areas and restaurants, etc. The advantages are; low cost, more life span and energy can be saved.

Thus, this is all about street light that glows on detecting vehicle movement circuit and it working. We hope that you have got a better understanding of this concept of the information which we have given in the above. Furthermore, any queries regarding this topic or microcontroller based projects, please give your valuable suggestions by commenting in the comment section below.

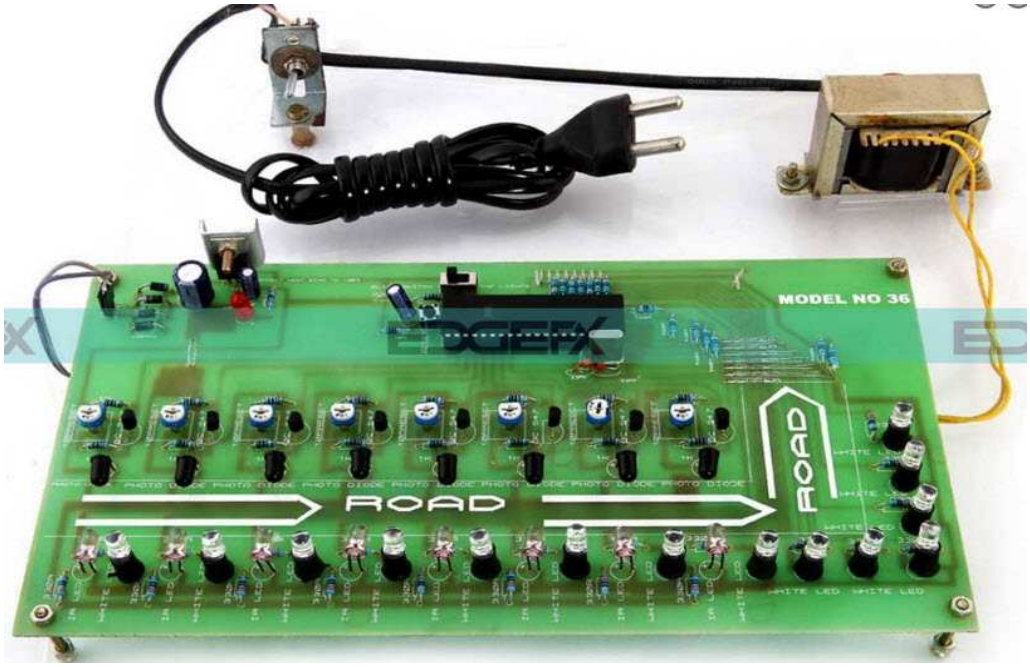

Fig. 2. Sensor Based Street Lightening Kit

V. CONCLUSION

In Proposed system During the night time all the lights on the highway road remain on throughout the night, so the energy loss will be high when there is no movement of vehicles. This project gives a solution for saving the energy. This is attained by detecting an approaching vehicle by turning ON the street lights. As the vehicle passes away from the street light, then the lights get turn OFF. If there are no vehicles on the road, then all the lights will turn OFF.

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Hill Area Accident Protection

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Abstract - Mostly in Road traffic accidents and deaths caused by them are most critical issues now a days. It is also impacting the country's economy. Research in this paper includes important issues like road accident and their impacts, causes of this accident, effect of accident, prevention and control that we can improve this situation. Also it is not safe now a days to cross the ghat while having any long journey. Percentage of accident in ghat area is increasing day by day. Severity of this accidents are non-reparable. Road traffic accidents (RTA) are responsible for 1.2 million deaths worldwide each year. So it is first important to control this scenario and have some safety measures in ghat area. This paper includes some solutions and ideas to improve safety in ghat areas.

Keywords -. Accident, Road safety, Ghat Section,.

I. INTRODUCTION

Today, road traffic injuries are one of the leading causes of death, disabilities and hospitalization in the country. Road network in India, of about 56 lakh km in March 2016, is one of the largest in the world. A total of 4,64,910 road accidents have been reported by States and Union Territories (UTs) in the calendar year 2017 claiming 1,47,913 lives and causing injuries to 4,70,975 persons. These figures translate, on an average, into 1274 accidents and 405 deaths every day or 53 accidents and 17 deaths every hour in the country. There are many dangerous roads in the world like mountain roads, narrow curve roads, T roads. The problem in these curve roads is drivers can't able to see the vehicle or obstacles coming from other end of the curve. If the vehicle is in very speed then it is difficult to control and there are chances of falling to cliff. The solution for this problem is alerting the driver about the obstacle or vehicle. Usually horn is used for this purpose but it is not a valid. To avoid these problems in curve roads or T roads we are introducing sensor based accident prevention system. That is we are keeping ultrasonic sensor in one side of the road before the curve and keeping a LED light after the curve.

Mostly, in the hilly areas of Northern India, accidents due to poor development of national highways and hazard zones. In India the rate of accidents in ghat section is increasing day by day. In India 1 out of 6 serious victim's dies, but in the U.S.A. the figure is 1:200. It will become the third largest contributor to the Global burden of the disease. It is estimated that 60,000 are killed on the roads every year.

- Preventive measures
- Engineering measures
- Enforcement of regulation.
- Educators of public in traffic laws.

Road design, road lighting, penance of the defective vehicles taken to decrease the rate of accidents. Speed control, traffic control, training and supervision, section observance of law and regulation and medical check up to all these points were included in the enforcement of regulation. It is necessary to provide education related to traffic laws to educate the road user regarding the necessary safety precaution taken while using the road.

II. SURVEY

Some road conditions responsible for accident
Road crossing
Potholes
Damaged road
Diversions
Illegal speed breakers
Merging of rural road with highways
Signal crossing
Narrow width of road at bridge section
Ghat section

III. METHOD

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller, simply connect it to a computer with a USB cable or power it with an AC to-DC adapter or battery to get started. The power for Arduino can be derived from Nonconventional sources like solar energy.

Ultrasonic sensors

Ultrasonic sensors are “based on the measurement of the properties of acoustic waves with frequencies above the human audible range” often at roughly 40 kHz. They typically operate by generating a high-frequency pulse of sound, and then receiving and evaluating the properties of the echo pulse. In the presence of vehicle the sensor senses the vehicle; the light will glow at the other end of the curve. In the absence of the vehicle the sensor will not sense and the light will not glow. This process repeats continuously.

3.1 Causes of road accidents in ghat section

1. This happens while a vehicle tries to overtake other vehicle when entering village town and suddenly a road divider starts.
2. For increasing number of accident is overloading vehicle
3. So many times while driving drivers are drunk
4. Lack of connectivity between villages Occur due to drivers losing control over the vehicle at sharp bends
5. 25% of accident have occur because of drunken driving.
6. Also the enforcement of police is weak
7. Topography nature of ground is another reason for spread in accident.
8. It is observed that 50% accidents have occurred while negotiating the sharp bends.
9. A majority of drivers are not properly trained and many drivers not even have their licence.
10. Basic elements in accident on road user’s vehicle road and its condition environmental factors etc.
11. Drivers pedestrian’s element of surprise passenger vehicle defects road condition Road design whether animal’s other causes are also the cause of accident.

IV. RESULTS AND DISCUSSION

Ultrasonic sensor has 4 pins. They are +5V VCC, GND, Trig pin and Echo pin. Here Trigger pin is output pin and Echo pin is input pin. Ultrasonic sensor sends the signal in the form of pulses from trigger pin. When this signal hit the object it will get reflected back and is received by the echo pin. From echo the signal is sent to microcontroller Arduino UNO. Microcontroller Arduino UNO processes this data and operates the LED which is connected to output pin of the microcontroller Arduino UNO. LED is operated according to the command. In this study, we got to know about the accident which occurs on the road at Ghat section. We understand the causes and effect of accidents and then founded out a solution introducing a new technique to avoid such accident.

V. CONCLUSION

The new technique consists of two CCTV cameras and two LCD screen which displays the live scene captured from the CCTV. This help in reducing the accidents and to enjoy the safer ride. Life is important than any other thing, once gone cannot be regained. So, to save this valuable life, this method have important role. It can help Road users at Ghats from being killed in a serious injury.

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Implementation of Smart Letter Box System through the Wireless Sensor Networks

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Abstract - This system presents a low cost, less time consuming, safe and effective implementation of Smart Letter Box System through the wireless sensor networks which makes the use obstacle sensor. A special device, called hardware kit is realized and design for this purpose. Obstacle sensors has IR transmitter and IR receiver.IR transmitter transmit the rays. When the rays fall on to the object then it gets reflected to IR receiver, it results that the object is detected. In existing system user is notified by sending a text message through a SIM card, but here we introduce Android Application which gives the notification through the internet. The paper illustrates the description of this device, the android application which receives the notification .This system reduces the Human efforts. The additional component of the current system is a battery backup which is used to avoid power failure of the system. The final aim is to minimize the human efforts, reduce cost as well as power failure.

Keywords - Smart Sensor Box, Sensor , Hardware Kit, Android, MySQL

I. INTRODUCTION

Smart letter box is the new and the latest technology that have been involved from recent times. The use of letter box is largely finding in government post box, courier system, and home letter box system in societies. Such letter box are use to post the letter. In this smart letter box system it involves five parties: the admin who has the highest authority. The area manager, pick-upper, operator and user. The area manager is given different areas. Pick-upper and operator are under area manager. Pick-upper is supposed to pick up the letters from the letter box and operator installs the letter box on the hardware kit. The hardware kit include obstacle sensor. Obstacle sensors has IR transmitter and IR receiver.IR transmitter transmit the rays. When the rays fall on to the object then it gets reflected to IR receiver, it results that the object is detected. Then the notification is send to user using internet connection on android application. The android application is used to receive the notification from the kit. The hardware kit also include SIM card which is used for internet connection. Battery backup is provided to the kit so the power failure problem will not occur. Here MySQL database is used to store the data. Data in sense it stores the count of the letters that has been dropped in letter box. The address from where the letter has been received. The existing system reduces the human efforts as well as cost. This system is the best approach in IoT. Fig:-Basic diagram of letter box.

II. LITERATURE SURVEY

Geometric filter algorithm uses geometric objects such as line segment, points and circle to represent shadowed links ,possible target locations which reduces the number of computations and storage.GF uses the prior information to improve the tracking results making it most robust to noise. To remove the outlier links and points a circular prior region is used. It maintains the computational efficiency and improve the location estimate. The prior region is used to assign the weights to maintain computational efficiency and it improves the location estimate. The weight are based on the amount of swallowing experienced by the links. And distance of intersection point to the prior location estimate. The problems that comes in t-tracking in two aspects. One aspect is to investigate more practical issues using the concept of faces as localized areas for tracking, mainly in the case of a target localization by two nodes. Another aspect is to check the proposed scheme in different tracking situations.

For instance, intruders like people are moving toward the fence (or border) of a surveillance region and are taking different directions. In this instance, it can be consider the edge crossing between the monitor and backup as the border crossing of the surveillance region[2]. An efficient target tracking mechanis m(ETT) for a single target which dynamically wake up in a distributed manner with the minimal number of working sensors in which the user-defined tracking quality is satisfied. Energy conservation when the target not entering the monitoring region: In the initialization phase the ETT only wakes up boundary sensors. For energy conservation. All the other sensors stay in sleeping state In addition, the boundary sensor that monitors the longer boundary segment has assigned the higher priority to participate in the monitoring task to minimize the number of working boundary sensors. Most works did not consider the situation that target does not enter the monitoring region.

III. WORKING PRINCIPLE

There are four major parts in this system.

1. Sensing circuit: Sensing circuit is a comparator which is builds using Im 358 ic. Output of this comparator is directly connected to the digital pin number 3. In thiscircuit IR transmitter and IR receiver are placed in letter box in the same direction when any obstacle or inserted into the letter box comparator detects the obstacle then it send signal to Arduino.
2. Controller circuit:- After getting signal from comparator, Arduino sends command to GSM module for sending a notification message to a specified number.
3. GSM Module:- Rx and Tx pins of GSM are directly connected with Tx and Rx pins of Arduino respectively. And ground pins of both modules should be connected to each other.4
4. Real time clock:- This RTC clock is used here for running the time and when delivery , if letter occurred, letter delivery time of RTC is saved in EEPROM of Arduino.. Android Application Android application system: Android is an open handset Alliance. It is a mobile operating system and is developed by Google which is based upon linux kernel. Software stack in android operating system consist of java application which is based on object oriented-application. A smart letter box system is access anywhere and at any time .The record can be accessed using android mobile operating system .The report generated message is stored in server database. Mobile application is developed and installed in the mobile and the message generated with the hardware kit which hasGSM in build in it. C.DATABASE My SQL database is used at server side and is connected through GPS to Mobile Android Application . Literature Survey Letter box system is actually an indication system, it shows indications whenever there arrives letter in the letter box It works using on the concept of Obstacle detection. In this arrangement IR Transmitter and IR Receiver are placed near to each other, whenever any obstacle (i.e Letter) comes in front of the obstacle sensor the rays gets reflected and thus we get the output as HIGH Thus the letter have been detected in the Letter the Box. Thus the letter have been detected in the Letter the Box In the days of technology postman still comes to our house to deliver the letters, courier and parcels. Because the things courier and parcels cannot be sent via email and by any other electronic media. So to get notification of letter delivery in our mail box here we design an intelligent letter box that provides notification of delivery of letters in our mail box through the message to our smart phone our GSM mobiles. This system uses IR pair that is used to sense the incoming letter in the letter box and a GSM module is used to send message to our phone. And a 16x2 LCD display displays time and letter box status (empty or not), delivery time, date and a real time clock circuit is also used in this system. LED is configured to indicate that letter box is empty or not. When any person insert letter in the letter box, IR sensor sense the obstacle that is letter and then Arduino send the command to GSM module to send notification message to the certain phone number. Than we can collect the letter if possible otherwise after some time. When we collect letters we have to press the reset button that clears the entries of letters, we add an additional feature in which data will not be lost after power failure. Because in this system Arduinos EEPROM is used to store the delivery time of letter and date. This system is designed to save only 6 delivery reports of letters.

The mobile application is used to receive the notification. Here the obstacle sensor is used to detect the object (letter). The RTC clock is used to store the time the delivery of the letter. GSM module is used to send the notification through message and the GPS detects the location at which address the letter has been received. We have used Android operating system in this system which has lot of features integrated in it. MySQL database is used to store the records. This database is easy to maintained records.

IV. CONCLUSION

Nowadays, the technology and science is in progress day by day new technologies are invented and new things are created by human. In this system we have studied a smart letter box system that notifies the letter is received in the letter box. In our daily life it is not possible for us to check the letter box we proposed this system that the system notifies the user by sending message that letter is arrived. In this paper we conclude that science is non stoppable, new things arrive and growth of smart system.

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Bluetooth Controlled Robot using ARDUINO

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Abstract - Robot is a re-programmable, multi functional device which is primarily designed to do work like human such as pick and place, loading and unloading, surveillance, health care, industrial, aerospace application. Robots can perform dangerous and accurate work to increase the productivity as they can work 24 hours without rest. This paper deals with the design and control of automated vehicle type robot which can move in desired direction and captures pictures and videos of required location. An android application has developed using MIT App inventor and a Bluetooth communication is made with robot which interfaces with microcontroller to control its speed and direction. Aim of this work is to design and control the motion of robot using Bluetooth device of an Android phone.

Keywords -HC-05 ,MATLAB ,Arduino UNO, L298N Motor Driver Module

I. INTRODUCTION

The design and develop a Bluetooth Controlled Robot using Arduino, HC-05 Bluetooth Module and L298N Motor Driver Module. On the other end of the Bluetooth Communication, I will be using a Smart Phone and a simple Android App to control the Robotic Car. Robots are always a fancy topic for students, hobbyists and DIYers. If you are beginner, then building a robot (like a car or an arm) is probably one of the important projects to do after learning about the basics.



HC-05 Bluetooth Module

Implementing Bluetooth Controlled Robot using Arduino and a few other components and build a simple robotic car that can be controlled using an Android Phone (through an App) over Bluetooth Communication.

Prerequisites for Bluetooth Controller Robot

Apart from Arduino, which is the main controlling module of the project, there are two other important modules that you have to be familiar with in order to implement the Bluetooth Controlled Robot project.

They are the HC-05 Bluetooth Module and the L298N Motor Driver Module.

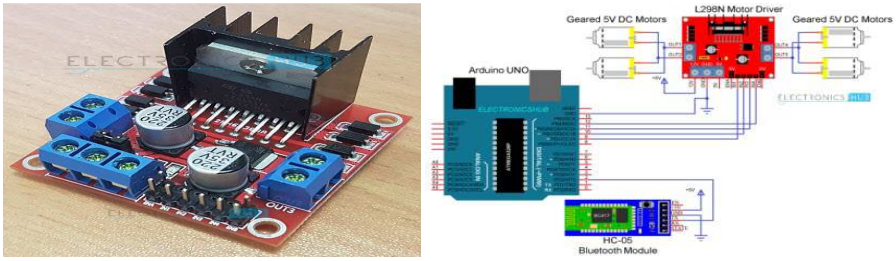
The HC-05 Bluetooth Module is responsible for enabling Bluetooth Communication between Arduino and Android Phone.

L298N Motor Driver Module

The L298N Motor Driver Module is responsible for providing the necessary drive current to the motors of the robotic car. I have provided information about L298N Module in an earlier project called Arduino DC Motor Control using L298N. So, refer to ARDUINO DC MOTOR CONTROL USING L298N for more information on interfacing L298N with Arduino.

Circuit Diagram of Bluetooth Controlled Robot

The following is the circuit diagram of Bluetooth Controlled Robot using Arduino, L298N and HC-05.



II. COMPONENTS REQUIRED

- Arduino UNO
- L298N Motor Driver Module
- HC-05 Bluetooth Module
- Robot Chassis
- 4 x 5V Geared Motors
- Connecting Wires
- Battery Holder
- Power Supply
- Android Phone
- Bluetooth Controller App

I have used L298N Motor Driver Module to drive the motors of the robot. You can use either this one or L293D Motor Driver Module. If you are using L293D, then check out for the connections.

Circuit Design: I wouldn't go into the details of the construction of the robot as your robot chassis might be different from mine and you can easily figure it out how to build the robot from the available parts and possible cable management for making the robot more appealing. Coming to the design of the circuit, first is the HC-05 Bluetooth Module. The +5V and GND pins of the Bluetooth Module are connected to +5V and GND of Arduino. Since I will be only transmitting data related to the Robot's movement from Android Phone to Bluetooth Module and do not intend to receive any data from Arduino, I will connect only the TX pin of the Bluetooth Module to RX Pin of Arduino. This RX pin of Arduino is based on Software Serial library (Pin 2 and Pin 3 are configured as RX and TX on Arduino). The RX pin of the Bluetooth is left open. Now, the L298N Motor Driver Module. Digital I/O Pins 9 through 12 of Arduino are configured as Input pins of the Motor Driver and are connected to IN1 through IN4 of the L298N Motor Driver Module. Both the Enable Pins are connected to 5V through provided jumper. The robot chassis which I am using in this Bluetooth Controlled Robot Car project is supplied with 4 geared motors. Since L298N has slots for only two motors, I have joined the left side motors as one set and the right side motors as other set and connected both these sets to the output of L298N Module.

III. WORKING

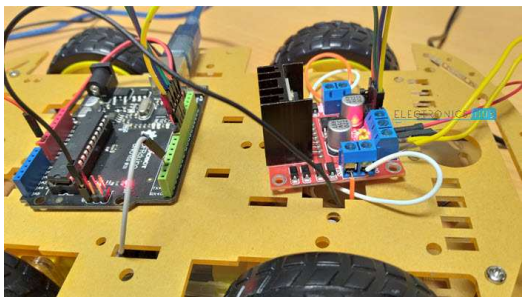
Assemble the robot, make the necessary connections and upload the code to Arduino.

If you understood the HC-05 Bluetooth Module tutorial, then understanding the Bluetooth Controlled Robot project is very easy.

First, in the Android App, I have used 5 keys as Forward, Reverse, Left, Right and Stop. The corresponding data associated with each key is as follows:

- Forward – 1
- Reverse – 2
- Left – 3
- Right – 4
- Stop – 5

When a key is pressed, the corresponding data is transmitted to the Bluetooth Module from the Phone over Bluetooth Communication.





In the Arduino code, the Arduino UNO receives any of this data from the Bluetooth Module (as per the key pressed) and performs a simple switch case operation, where each case associated with appropriate instructions to the Motor Driver Input Pins. For example, if 'Forward' key is pressed in the Android Phone, then '1' is transmitted. Arduino will then make IN1 and IN3 as HIGH and IN2 and IN4 as LOW to achieve a forward motion.

Similarly, other keys correspond to appropriate setting of IN1 – IN4 pins.

IV. LIMITATIONS

- As the range of the Bluetooth Communication is limited (a maximum of 10 meters for class 2 devices for example) the control range of Bluetooth Controlled Robot is also limited.

- Make sure that sufficient power is provided to all the modules especially the Bluetooth Module. If the power is not sufficient, even though the Bluetooth Module powers on, it cannot transmit data or cannot be paired with other Bluetooth devices.

V. APPLICATIONS

- Low range Mobile Surveillance Devices
- Military Applications (no human intervention)
- Assistive devices (like wheelchairs)
- Home automation

VI. CONCLUSION

The OS of smart phone is android which can develop effective remote control program. At the same time, this program uses blue-tooth connection to communicate with robot. It has proven to allow for meaningful two way communication between Android phone and the robot which allows a non-expert to interact with and adjust the functionality of system

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Innovative Technologies in Road Life

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Abstract - This document gives the Automatic Room Lights using Arduino and PIR Sensor, where the lights in the room will automatically turn ON and OFF by detecting the presence of a human. Such Automatic Room Lights can be implemented in your garages, staircases, bathrooms, etc. where we do not need continuous light but only when we are present. Also, with the help of an automatic room light control system, you need not worry about electricity as the lights get automatically off when there is no person. So, in this DIY project, we have implemented Automatic Room Lights using Arduino and PIR Sensor.

Keywords - Arduino UNO,PIR Sensor,Relay Module, LED and 1N4007 PN Junction Diode.

I. INTRODUCTION

Automatic Room Lights System using Arduino is a very useful project as you need not worry about turning on and off the switches every time you want to turn on the lights. The main components of the Automatic Room Lights project are Arduino, PIR Sensor and the Relay Module. Out of the three components, the PIR Sensor is the one in focus as it is the main device that helps in detecting humans and human motion. In fact, the Automatic Room Lights project can be considered as one major application of the PIR Sensor. A similar concept is being already implemented in automatic toilet flush valves, hand dryers, etc.

II. MATERIALS AND METHODS

Components Required for Automatic Room Lights using Arduino

- 5V Relay Module (Relay Board)
- LED
- 100Ω Resistor (1/4 Watt)
- Connecting Wires
- Breadboard
- Power Supply

If you do not have a Relay Module, use the following components:

- 5V Relay
- 2N2222 (or BC547) NPN Transistor
- 1N4007 PN Junction Diode
- 1KΩ Resistor (1/4 Watt)

Component Description

PIR Sensor

We have already seen about PIR Sensor in the PIR Motion Sensor Tutorial and In order to control a single relay on the board, we need to use three pins of the relay module: VCC, GND and IN1.

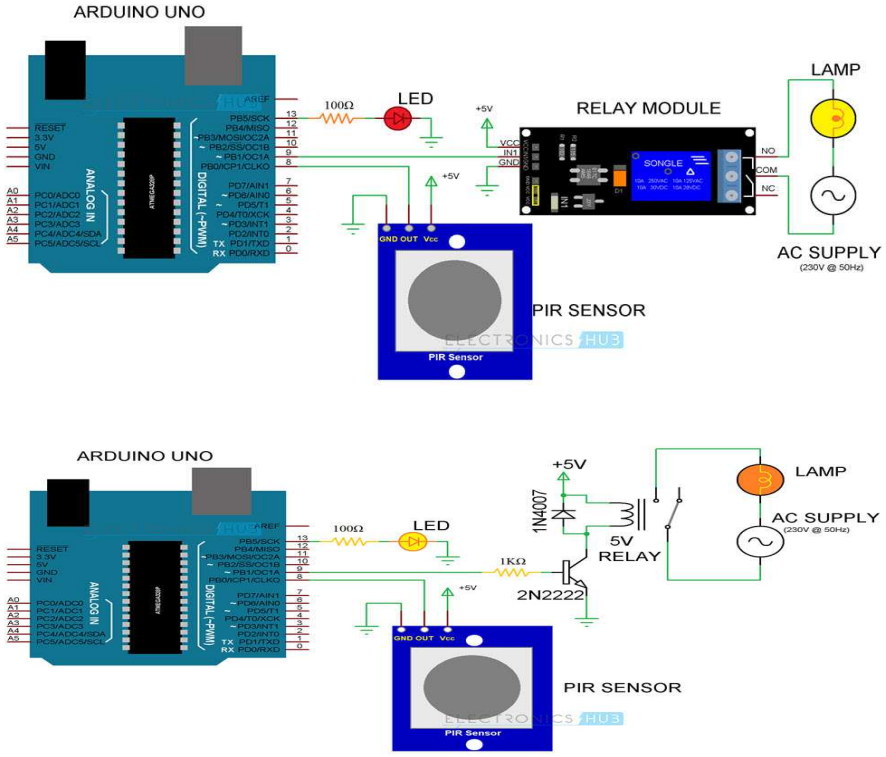


Relay Module

A Relay Module is a very useful component as it allows Arduino, Raspberry Pi or other Microcontrollers to control big electrical loads. We have used a 2-channel Relay Module in this project but used only one relay in it. The relay module used in this project is shown below.

Circuit Diagram of Automatic Room Lights using Arduino

The following image shows the circuit diagram of the project implemented using Arduino UNO, PIR Sensor and a Relay Module. If you do not have a relay module, you can make one yourself using very simple hardware. The following circuit diagram shows the project being implemented with the help of discrete components for the Relay Module.



and Relay to mains supply. If you are unfamiliar with the connections, I strongly recommend having an adult supervision (or an expert supervision).

III. CIRCUIT DESIGN

PIR Sensor's Data OUT Pin is connected to Arduino's Digital I/O Pin 8. An LED is connected to pin 13 of Arduino to indicate whether the light is turned ON or OFF.

The IN1 pin of the Relay Module is connected to Pin 9 of Arduino. A bulb is connected to mains supply through relay. One terminal of the bulb is connected to one wire of the mains supply. The other terminal of the bulb is connected to the NO (Normally Open) contact of the Relay Module.

COM (Common) contact of the Relay is connected to the other wire of the mains supply. Be careful when connecting this part of the project.

IV. WORKING OF THE PROJECT

The Automatic Room Lights using Arduino and PIR Sensor is a simple project, where the lights in the room will automatically turn on upon detecting a human motion and stay turned on until the person has left or there is no motion.

Working of this project is very simple and is explained here.

Initially, when there is no human movement, the PIR Sensor doesn't detect any person and its OUT pin stays LOW. As the person enters the room, the change in infrared radiation in the room is detected by the PIR Sensor.

V. RESULTS AND DISCUSSION

As a result, the output of the PIR Sensor becomes HIGH. Since the Data OUT of the PIR Sensor is connected to Digital Pin 8 of Arduino, whenever it becomes HIGH, Arduino will activate the relay by making the relay pin LOW (as the relay module is an active LOW module).

This will turn the Light ON. The light stays turned ON as long as there is movement in front of the sensor. If the person takes a nap or leaves the room, the IR Radiation will become stable (there will be no change) and hence, the Data OUT of the PIR Sensor will become LOW. This in turn will make the Arduino to turn OFF the relay (make the relay pin HIGH) and the room light will be turned OFF.

Applications

I've already mentioned a few applications of the Automatic Room Lights concept. Some of them are:

- Garage Lights
- Bathroom Lights
- Hand Dryers
- Toilet Flushers
- Security Lights

VI. CONCLUSION

By using Automatic Room Lights using Arduino and PIR Sensor, where the lights in the room will automatically turn ON and OFF by detecting the presence of a human. Such Automatic Room Lights can be implemented in your staircases, bathrooms, etc.

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AN EFFICIENT HARDWARE IMPLEMENTATION OF DATA COMPRESSION USING MODIFIED GOLOMB RICE CODING ARCHITECTURE

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ABSTRACT

Golomb coding is a loss-less data compression method using a family of data compression codes. Rice codes are a class of Golomb codes in which the divisor is valid only when it can be expressed as power of two. This work aims to increase compression by further encoding the unary part of the Golomb Rice (GR) code to decrease the numberof bits used. The algorithm was developed and coded in Verilog Hardware Description Language (VHDL) and simulated using Modelsim. The modifications carried out and reduction in bits used for a linearly distributed data set. Worst-case delays have been reduced acceptable level. Area reduction varies for different methods. An approximate 4% to 7% reduction in power consumption is observed. Modified Golomb Rice coding is used to compress multiple data types, which should ideally have a geometrical distribution.

KEYWORDS: Golomb Rice Algorithm, Data Compression, Image Processing and VHDL

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Original Article

INTRODUCTION

S.W.Golombin the 1960s introduced the Golomb coding method. This algorithm is one of the lossless data compression methods and is using a family of data compression codes [1]. Golomb coding is highly suitable for situations in which the occurrence of small values in the input stream is significantly more likely than large values. In general, the images are classified in to two types First one is a Gray Scale image and second one a Colour Image. In analysis, compared with gray scale image, the colour image needs more attention and observation. In Image processing to reduce the memory size of the image and bandwidth, a high-performance lossless compression and decompression techniques is used [2-3]. Such cases, two algorithms are mainly used namely, Raster file and Golomb Rice Algorithm.

Embedded system applications and performance improvements the compressed memory schemes are used. Operating system-based and Discrete Cosine Transform based memory compressions are mainly focused areas in embedded system. Hadamard transform and Golomb-Rice coding are proposed for many researchers in hardware architecture-based Image compression [4]. Some demerits are in both Hadamard transform and Golomb-Rice encoding because of losses in data. So, overcome this difficulties and maintain the lossless data compression and decompression can be used to achieve low bit rate and improve imagequality [5].

Golomb Rice Coding

The sensor data and reduced data loss one of the efficient algorithms is Rice Golomb coding [5-7].

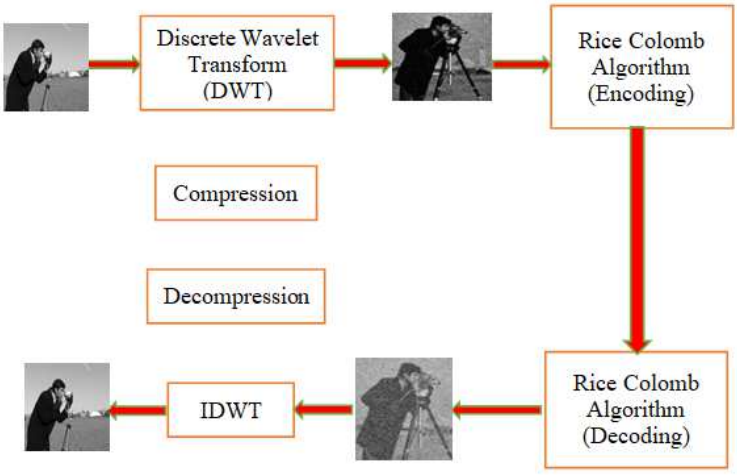

Figure 1: Block diagram of Image compression and Decompression.

In Figure 1, shows the discrete wavelet transform based compressed input image. The output of the 2-Dimensional discrete wavelet transform is in the form of sub-windows of m x n arrays. Then the image is converted into differential data by using raster file conversion. By using Golomb-Rice algorithm differential data has been encoded to produce length and code word of the input image. Based on the length and code word obtained the encoded image has been Decoded using Golomb-Rice algorithm. Thedecoded image has been decompressed using the inverse 2-D discrete wavelet transform. The output produced is similar to that of the input image.

OBJECTIVES

- To analyze and identify whether the proposed technique is a valid methods for image compression anddecompression.
- To compare the proposed method to exitingmethods.
- To prove, the proposed technique is efficientone.

METHODOLOGY

A simple procedure is adopted here for the easy implementation of Golomb, and it gives the pre ‘x’codes for the suboptimal. By a single parameter, the proposed method codes are distinguished from each other, in order to achieve dynamic update and accomplished for parameters estimations. Here, the methods are explained step by step procedure. From, countable alphabet the symbols are encoded by Golomb codes. All the encoded symbols are arranged in descending probability order. The Non negative integers beginning with ‘0’and the total number of encode integer is assigned value ‘n’. The ‘g’ is Golomb parameter. The ‘reset’ (rst) compute ‘hn=gc’ and output this integer using a unary code. Then we compute n mod m and output this value using a binary code, adjusted as described above so that we sometimes use ‘gc’bits and sometimes ‘ga’bits. Golomb coding and Rice coding are most probably same algorithm. Hence to encode integer n using the Rice code with parameter ‘z’ and ‘rst’ compute ‘hn=2kc’ and output this integer using a unarycode. Golomb-Rice

Encoder main task – as described before – is to generate code and length values. At each clock cycle, it receives the residual values of four pixels of one specific subtle (a1, a2, a3, and a4) of one component, and generates corresponding "code"and "header" values for each pixel. The Encoder block consists of three sub-blocks shown in Figure 2.

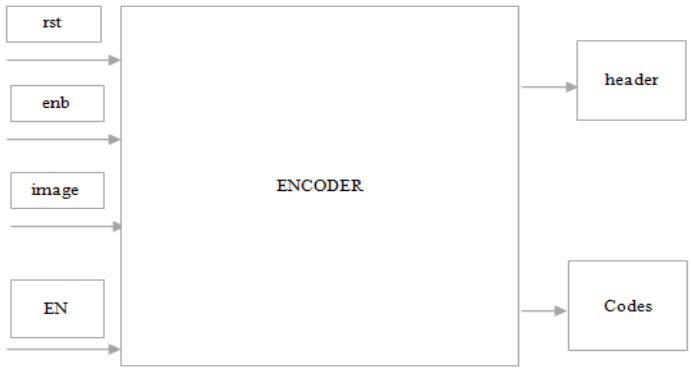

Figure 2: Encoder Block.

RESULTS AND DISCUSSIONS

The compressor and decompressor data path blocks are synthesized with the target clock frequency of 220MHz. The overall block size of the compressor is 9.20kgates. This size includes data path blocks; input-output data registers and address generators. 59.2 % of this block is combinational, and the rest is sequential logic size. In order to verify the functionality of the design, a verification framework has been designed. This framework consists of oneRAM blocks, a counter to generate the address for the memory, and a control block which is a finite state machine. There are three modes of operation during the functional verification. The input image to be compressed has already been converted to binary representation in MATLAB and stored in a text file as input file to the framework. This file has 32 columns which is equal to the 32-bit memory word-length. The number of lines in the file depends on the image size and therefore the memory size has to be adjusted accordingly. In the first mode, content of the input file is stored in the source memory, RAM. It takes 'n' clock cycle to perform this data transfer where 'n'is the number of lines in the input file. That is when the FSM issues "Execution" signal and the operation enters the next mode where the compressor/decompressor starts performing its task and sending the result to the destination memory, RAM. When it issues "Execution Complete" signal, FSM changes to the final mode where the content of RAM is written to the output text file. The functional verification blocks are shown in Figure3.

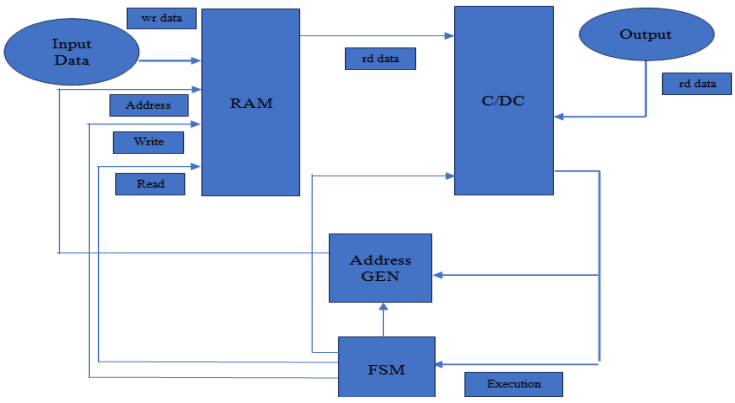

Figure 3: Functional Verification Frame.

The overall block includes 618 registers. The sub-block sizes inside the datapath are also of interest. Table 1

shows the hierarchical area distribution of the whole block.

Table 1: The Hierarchical Area Distribution Compressor

S.No.	Block Name	Area (kgates)
1.	Compressor	9.20
2.	Color Transform 1	0.23
3.	Color Transform 2	0.21
4.	Golomb- Rice Encoder	2.34
5.	Encoder 1	0.37
6.	Encoder 2	0.36
7.	Encoder 3	0.37
8.	Encoder 4	0.37
9.	GR Control	0.48
10.	GR Parameter Estimation	0.36
11.	Input Preparation	0.67
12.	Address generator 1	0.59
13.	Address generator 2	0.45
14.	Encoder register file control	1.87
15.	Prediction Register File control 1	0.65
16.	Prediction Register File control 2	0.66
17.	Prediction Register File control 3	0.72
18.	Prediction Register File control 4	0.73
19.	Predictor 1 -4	0.35

The overall block size of the decompressor is 9.23kgates. This size includes data path blocks; input-output data registers and address generators. 59.1 % of this block is combinational, and the rest is sequential logic size. The overall block includes 498 registers. The sub-block sizes inside the data path are also of interest. Table 2 shows the hierarchical area distribution of the whole block. An important result that can be extracted from synthesis is that functional blocks constitute relatively small portion of the overall cost. The more costly operations are the ones that are related with the traversal of the image. Also due to high throughput requirement (one pixel/clock in our case) the pipeline registers and temporary storage registers constitute a significant portion of overall size. In that sense, it would not be wrong to claim that fast implementations of such simpler algorithms are control dominated in terms of hardware cost. Another result is that the Ctrl block, which is added to improve compression ratio, only takes 470 gates to implement which corresponds to 3.9% of the overall compressor data path.

Table 2: The Hierarchical Area Distribution - Decompressor

S.No.	Block Name	Area (kgates)
1.	Decompressor	9.23
2.	Color Transform	0.29
3.	Golomb- Rice Encoder	0.27
4.	Output preparation	1.46
5.	Reverse Color Transform	0.18
6.	Address Generator 1	0.68
7.	Address Generator 2	0.46
8.	Construction register file control 1	0.51
9.	Construction register file control 2	0.58
10.	Construction register file control 3	0.58
11.	Construction register file control 4	0.58
12.	Constructor 1- 4	0.36
13.	Decoder register file control	1.61

CONCLUSIONS

The proposed work carried out in this paper investigated Modified Golomb Rice algorithms from hardware implementation point of view to be used in high throughput hardware. One such algorithm is aimed to be implemented in hardware in order to validate early cost estimations and gain more insight into problematic parts of the algorithms in terms of hardware implementation. A possible hardware realization for functional blocks of compression and decompression is proposed in this paper. Then, the work continued with introducing a compression algorithm based on proposed algorithm for in order to get a better compression performance. This proposed algorithm is chosen for hardware implementation in VHDL. In future various parameters will be considered for evaluation of the proposed algorithm and will be compared with different methods for optimum solution.

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DESIGN OF TRANSFORMER LESS UPFC BASED ON MULTI LEVEL INVERTER

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ABSTRACT

The conventional Unified Power Flow Controller (UPFC) exists two back 2 back inverters and more complex zigzag transformers for isolation and accomplishment high power & voltage ratings. To overcome these difficulties, two zigzag transformers are wholly eliminated in this place two cascaded multi-level inverters are presented. The single configuration and control of two CMIs as a power flow controller lead to the possible to separately control real and reactive power over a transmission line. The proposed configuration is exceptional features and several advantages over the traditional UPFC such as transformer less, high efficiency, light weight, low cost, high reliability and fast dynamic response. In this work, Fuzzy Logic Controller (FLC) is design to improve the system performance. In this work is done by MATLAB/Simulation model.

Key words: Multi level inverter, Transformer, CMI, UPFC, FLC

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1. INTRODUCTION

The radial system are presented to transferring power with less reliability under uncertainty conditions, to avoid this problem have implemented the grid system. In recent days, power capability in grid system has to empower load ability of line, but additional control devices are used to get better performance operation and reliability. Hence, solution for power flow control in grid network, no limit for reactors, SSSC, UPFC and so forth. And also providing better solutions for power quality issues we are using custom power devices like STATCOM, DVR, and UPQC. Generally, the principle of FACTS has to enlarge capability and controllability of power transmitted in ac-system [1]. Comparing to past 20 years ago, this is drastically change came to our world. We need efficient and fast operating devices. Thus our electrical engineering mixed with combining mechanical & electronics engineering for providing fast and efficient equipment. These are sensitive and sophisticated devices manufacturing with mostly electronic components. In today life, large transformers are utilized in several appliances that are FACTS equipment are example to reach values in grid system. This requirement is provide to power flow controlled in transmission system. Generally, large transformers have following limitations are high priced, massively, energy wastage and collapse at few disturbances in system. Therefore system is not capable for sudden changing in power flow conditions. These problems are eradicated by introducing the power electronic devices. These devices are providing to large power and increasing power controls for utility applications.

2. MULTI-LEVEL INVERTERS

Multi-level inverter was brought into application by Dr. Nabae in 1981. This type inverters were classified with different strategies is: diode-clamped type, flying capacitor type and cascade multilevel type have developed [2]. So these inverters have following advantages are:

- Very low voltage dv/dt and low distortion in output-voltage waveforms.
- Small distortion in current at input waveforms.
- Low common node voltage.
- Facilitate the utilization of commercial low voltage devices in high/medium voltage applications.
- Minor switching losses because used short switching frequency.

Meanwhile, dominance shared by multilevel arrangement, these obtained more benefits and limitations of different strategies. This diodes can raises the cost but also cause problems and presents parasitic inductances. The FCI require large capacitance, and its complicated control. Also, to maintain each capacitor voltage this needs the high-switching frequency. Comparatively, modular implementation of CMI is best suited and it's able to develop multi-step voltage waveform in form of staircase, when increasing the no. of levels while approaching nearer to sinusoidal output voltage. Moreover, there are no need additional circuits for voltage balancing at dc link. Therefore structure design and layout is simple, hence it builds more useful for high voltage and huge energy applications. Commonly, multilevel inverter is classified into two major types are Fundamental Frequency Modulation (FFM) and second one is Pulse Width Modulation (PWM) are utilized. Every device of FFM is simply switches to develop a voltage, the no. of levels is increasing while approaching a sinusoidal output-voltage [5].

3. APPLICATIONS OF MULTI-LEVEL INVERTER IN FACTS DEVICES

Above mentioned FACTS controllers, no substance in either transmission level or distribution level, have to response on heavy and difficulty of zig-zag transformers for output voltage and isolation requirement. Multi-level inverter is to build up technologies, particularly CMI has to utilize in FACTS application of multilevel design. The CMI based STATCOMs have been established in Europe and Asia (up to 200Mvar). Moreover, it can also demonstrate that CMI has based SSSC can coupled direct to transmission line without coupling transformer [3].

In despite of, the CMI could not couple directly to general UPFC, because it requires two inverters deal with real power ex-change. This problem can solved, a UPFC with CMI,s was introduced to eradicate of zig-zag transformers, Fig.1 shows at Circuit configuration of UPFC**,** that needed the normal multi-pulse inverter based UPFC and still required a isolation transformer [4-5] .

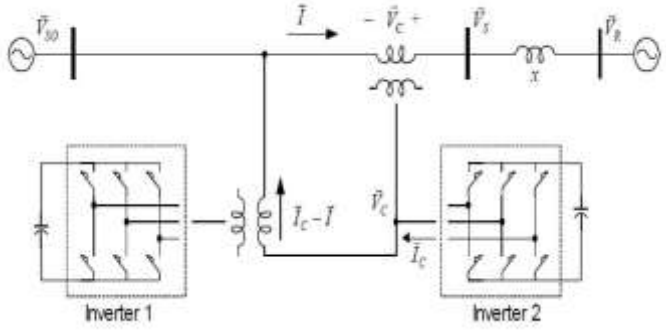
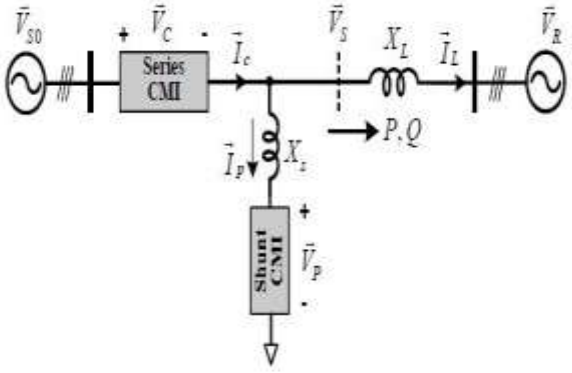
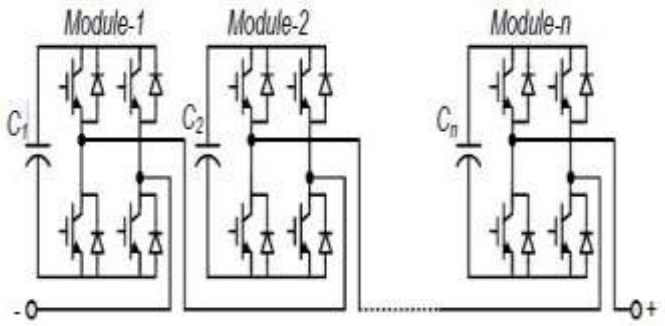


Figure 1 Circuit configuration of UPFC.

The transformer is eliminated totally, a new transformer-less UPFC has been proposed with novel configuration of two CMIs [6]. The system configuration is shown at Fig.2 (a). This arrangement UPFC exists two CMIs, one is series CMI, and it associated in series with line and the other shunt CMI, which parallel connected afterwards series CMI at sending end respectively. Each CMI has built of series cascade H bridge modules as shown Fig.2 (b) [7].



(a)



(b)

Figure 2 (a) Novel configuration of transformer-less UPFC (b) One phase of cascaded multilevel inverter.

4. CONTROL OF TRANSFORMERLESS UPFC

4.1. Dynamic Models of UPFC

In previous section, equations are restricted to steady-state analysis operation. A vector-oriented control is implement to perform dynamic conditions also for proposed transformer less UPFC, the dynamic modules is mandatory. And it based on synchronous reference (dq) outline. Voltage (V_{S0}) at actual sending end for the phase-angle is achieved from digital phase-locked loop (PLL), while *abc* to dq transformation used. In entire system, A dynamic models are illustrated at Fig.3 will classified into various parts, In dynamic models, voltages are from new sending end to user end bus is:

$$\begin{cases} V_{sd} = R_L i_{Ld} + L_L \dfrac{di_{Ld}}{dt} - \omega L_L i_{Lq} + V_{Rd} \\ V_{sq} = R_L i_{Lq} + L_L \dfrac{di_{Ld}}{dt} + \omega L_L i_{Ld} + V_{Rq}. \end{cases} \quad \text{.....} \quad (1)$$

Since, the series-CMI voltage Vc is subtracted from actual voltage Vs is equal to new voltage V_{S0} at sending end, are $\begin{cases} V_{cd} = V_{sod} - V_{sd} \\ V_{cq} = V_{soq} - V_{sq} \end{cases}$ (2)

Further model from new sending end to shunt CMI is

$$\begin{cases} V_{sd} = R_s i_{Pd} + L_s \dfrac{di_{Pd}}{dt} - \omega L_s i_{Pd} + V_{pd} \\ V_{sq} = R_s i_{Pd} + L_s \dfrac{di_{Pd}}{dt} + \omega L_s i_{Pd} + V_{pq}. \end{cases} \quad \text{.....} \quad (3)$$

4.2. Overall DC Voltage and Power Flow Control

It is desired to implement a control system, that stabilizes independently of P & Q over line, then similar as capacitor voltages of two CMIs has maintain at given values. While they are parted into three stages, that are stage-I, stage-II and stage-III.

Stage-I: The $\overrightarrow{V^*_{C0}}$ and $\overrightarrow{I^*_{p0}}$ are calculated from P^*/Q^*. As mentioned earlier, the $\overrightarrow{V^*_{C0}}$ is series-CMI voltage as reference, that developed according to transmitted power ordered is

specified, while $\overrightarrow{I^*_{p0}}$ is reference for shunt-CMI current, which keeps the zero active power for two CMIs are specified. Therefore, the $\overrightarrow{V^*_{C0}}$ is calculated alternative way instead of directly calculated. Reference line currents are I^*_{Ld}/I^*_{Lq} are computed with P^*/Q^* reference, then d- & q-axis components of series voltage V^*_{C0d}, V^*_{C0q} are determined. This includes the first dynamic model. Then current was controlled through a decoupling feed-forward control, so it achieved the better dynamic response for the line current [8].

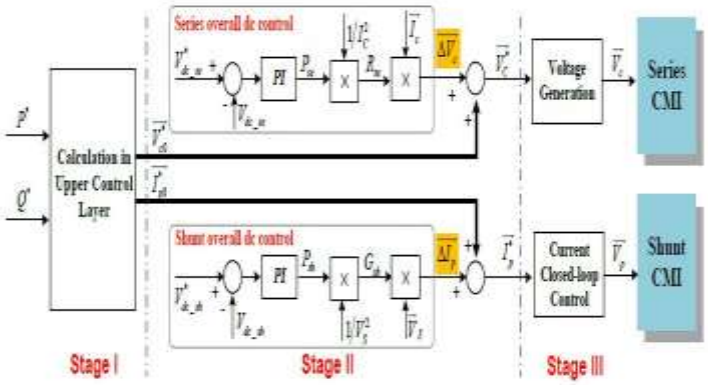
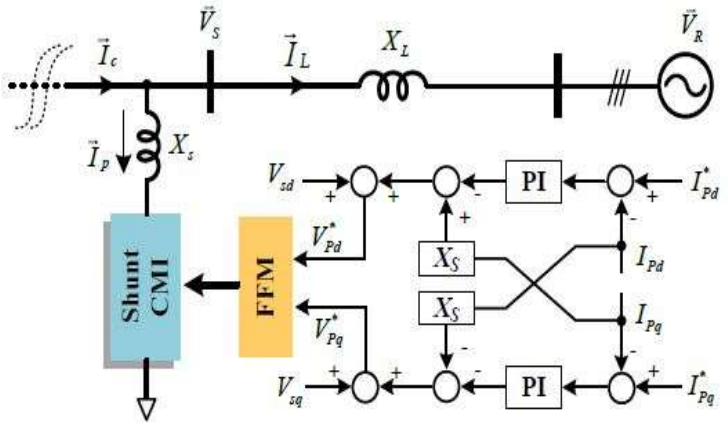


Figure 3 Overall DC voltage and power flow control

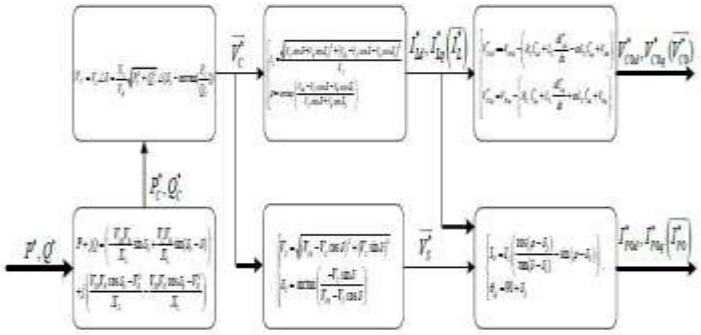
Stage-II: Overall dc-link voltage regulation. In previous stage a dc link voltage cannot sustained because followed three causes are, 1)the CMIs always have a power loss, 2) parameters deviations at error calculation and 3) error between actual and reference output. To maintain a dc link voltage with robust designs and variables of $\overrightarrow{\Delta V_C}$, $\overrightarrow{\Delta I_P}$ are presented for voltage regulation at dc link for series and shunt CMIs respectively, shown in Fig.3 Respectively $V^*_{dc\_se}$ and $V^*_{dc\_sh}$ is series and shunt CMIs references of dc voltages and V_{dc_se} and V_{dc_sh} are averaged for both CMIs of dc feedback [9].

For series-CMI, P_{se} is the output of overall dc-link voltage regulation loop, R_{se} is determined by ratio of P_{se} to I^2_{se}, finally $\overrightarrow{\Delta V_C}$ is produced with R_{se} and series-CMI current $\overrightarrow{I_C}$, which considered as active voltage component. When $P_{se} = P_{loss}$, resistance R_{se} are balanced for dc link and series CMI. For shunt-CMI, $\overrightarrow{\Delta I_P}$ is introduces for DC voltage control in same manner.

Stage-III: Generation of voltage for series and current for shunt CMIs respectively. For shunt CMI, output current can control by feedback signal of current with $\overrightarrow{I^*_P}$ as reference current, illustrated at Fig.4 (a,b) whereas, output of series CMI voltage can generated directly from $\overrightarrow{V^*_C}$ by FFM [10].



(a)



(b)

Figure 4 (a) Closed loop current for shunt CMI (b) P^*/Q^* to $\overrightarrow{V^*_{C0}}$ and $\overrightarrow{I^*_{p0}}$ calculation.

The given Fig.5 transformer less UPFC are proposed with desired control and modulation strategies, proposed system of 4160V are implemented in Matlab/simulink and the voltage $\vec{V}_R$ at sending eng is similar amplitude of actual voltage $\overrightarrow{V_{S0}}$ at sending end, hence a 30° phase lagging. A transformer2 are establishes that 30° phase lagging difference with Y/Δ arrangement. Basic functions of UPFC are implemented this system [11].

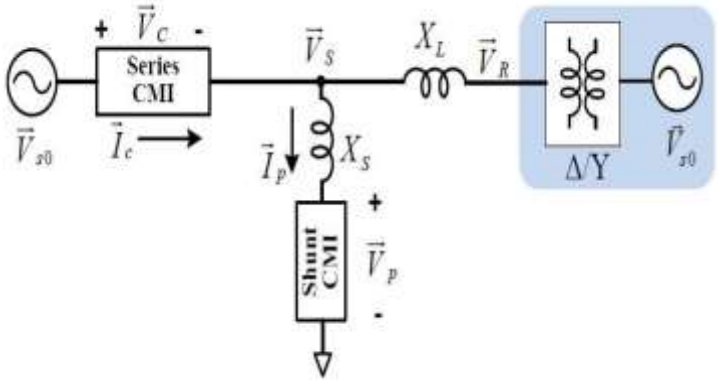


Figure 5 Equivalent circuit of transformer less UPFC.

5. FUZZY LOGIC CONTROL

5.1. Introduction to Fuzzy Logic

Fuzzy logic is another class of artificial intelligence, but its application in control theory has been developed in recent days. According to George Boole, humanoid thinking are based on yes/no or 1/0 logic. But the human thinking does not always follow the crisp logic yes/no, but this is qualitative, uncertain, and imprecise in nature. Based on the imprecise inputs, Lotfi Zadeh an Irish computer scientist developed fuzzy logic or fuzzy set theory. In the developing days it was highly criticized by the professionals, but in recently it is emerged as the new discipline of artificial intelligence.

The control architecture of process which is based on FL is defined as fuzzy control. A fuzzy control system specifically embeds experience and perception of a human plant operator. The design of normal control system is constructed on mathematical modeling of system. But this mathematical implementation is complex to design. On the other hand fuzzy control does not need any mathematical model and mainly on operator experience and heuristic. Fuzzy logic found in several applications specifically in power electronic controls at recent days. The generalized designing procedure for fuzzy control given as follows[12].

- At first, analyse the whether the system elements to warrant to FL applications.
- Collect all the information regarding the system parameters to be controlled.
- Identify the main elements where FL to be implemented.
- Identify input and output variables of each fuzzy system.
- Design the corresponding membership function (MF) for each variable.
- Formulate fuzzy rule table.
- Using defuzzification method to get required output.

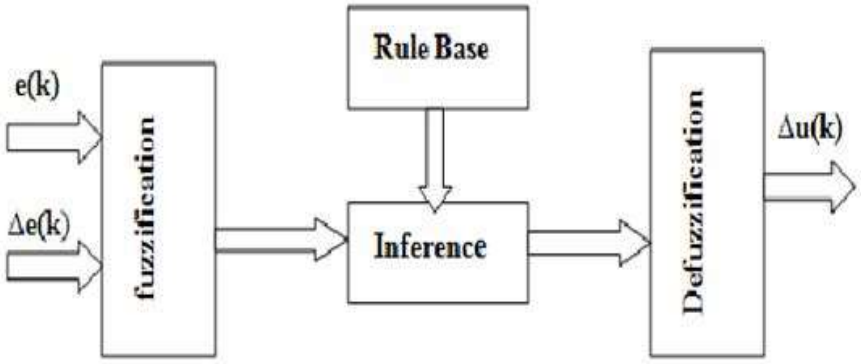


Figure 6 Block diagram of operation of FL.

Fuzzy logic execution of block diagram is presented in Fig.6, in which it contains mainly three basic blocks called as fuzzification, inference and defuzzification.

5.2. Fuzzification

Fuzzification is process where the numerical or any other format of input data is converted into fuzzy membership functions (MF). In FL there are so numerous types of membership functions like triangular membership function; trapezoidal membership function, Gaussian membership function etc. are available in fuzzy toolbox. Here the input variable is error and

change in error and output variable is change in duty cycle. The suitable membership functions are implemented for these variables.

5.3. Inference

The actual rules are given in this block. A suitable operator like AND, OR and NOT will be selected and IF-THEN rules are implemented. Select the appropriate operator between input variables. The rules are framed on knowledge base as human thinking.

5.4. De-fuzzification

Till now the result of implication and aggregation step is the fuzzy output, and union of all individual membership functions are validated. Conversion of this fuzzy output into crisp output is called defuzzification. Some of defuzzification methods like centre of area or centre of gravity, height method and mean of maxima methods are available. In this work centre of gravity (COG) method is utilized for de-fuzzification. Crisp output Z_0 of the Z variable is considered as geometric center of output fuzzy value $\mu_{out}(Z)$ area, where $\mu_{out}(Z)$ of is formed by taking union of all contributions of all rules. The general expression of COG defuzzification is

$$Z_0 = \frac{\int Z.\mu_{out}(Z)}{\int \mu_{out}(Z)dZ} \qquad (4)$$

With discretized universe of discourse, the expression is

$$Z_0 = \frac{\sum_{i=1}^{n} Z_i \mu_{out}(Z_i)}{\sum_{i=1}^{n} \mu_{out}(Z_i)} \qquad .... \qquad (5)$$

COG method of defuzzification is well known method in fuzzy systems as it is simple and fast.

Fuzzy logic for transformer less UPFC pulses is implemented using Matlab/Simulink fuzzy logic toolbox. The fuzzy logic toolbox is user friendly program developed in the Matlab environment. There are mainly five graphical tools used for building, editing, and witnessing of fuzzy inference system in fuzzy toolbox.

- Fuzzy inference system (FIS) editor
- Membership function editor
- Rule base editor

5.5. FIS Editor

After opening the fuzzy toolbox, FIS editor opens which displays general information about fuzzy system and this FIS editor is presented in Fig.7.

At left side of the top of editor consist of input variables and right side is output variables. MFs is shown in diagram is simple icons and there are not actual MFs. It is containing system name and inference method are indicated at below and right side the variable name for the associated MFs are given. All the viewer and editor boxes shows development of controlling the system.

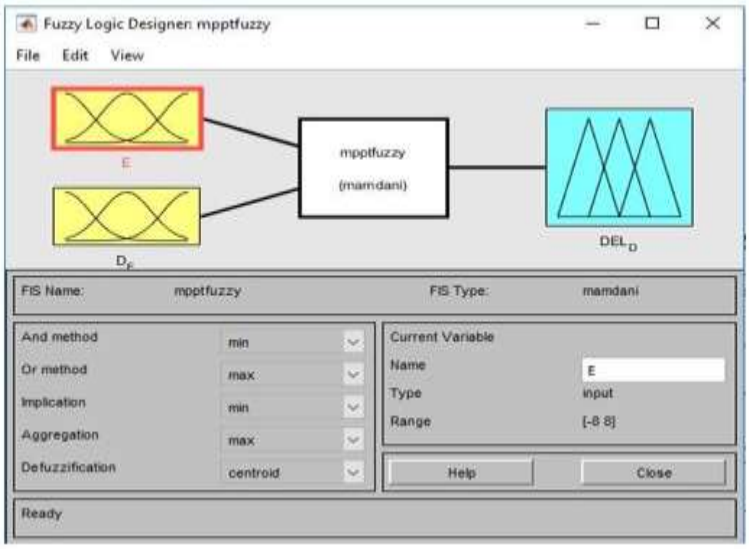


Figure 7 Fuzzy interfacing editor

5.6. Membership Function Editor

In proposed fuzzy system there are two input variables and single output variables are implemented. Input variables of fuzzy system are error (E), change in error (ΔE) and output variable is change in duty cycle (ΔD).

Error and change in error values are given as input to FIS editor and the MFs function for this input and out variables are given in fig.6. shows the MF of input variable error (E) and this work triangular based MF functions are considered.

6. SIMULINK DESIGN AND RESULTS

Simulation results are performed in Matlab/Simulink. In Simscape Power System toolbox is used for implementation of transformer less UPFC. Fig.8.4 (a,b) shows simulation model implemented in simulink and internal block diagram. Control structure is implemented as from proposed system and it helps for system stability and provides smooth variation at any changes in loadability as well as power commands in system.

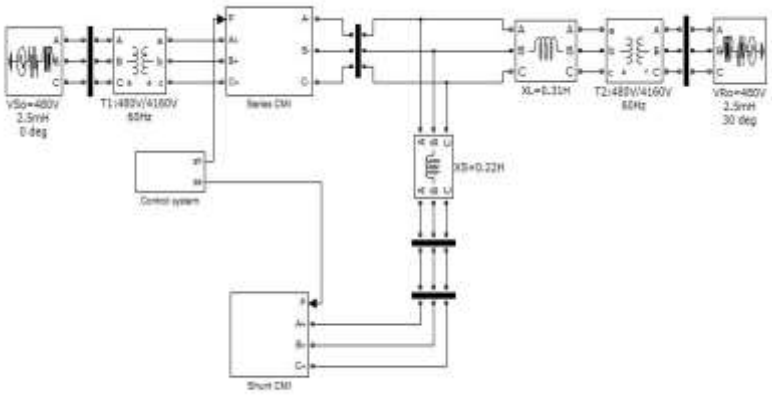


Figure 8 (a).Simulation model for proposed system

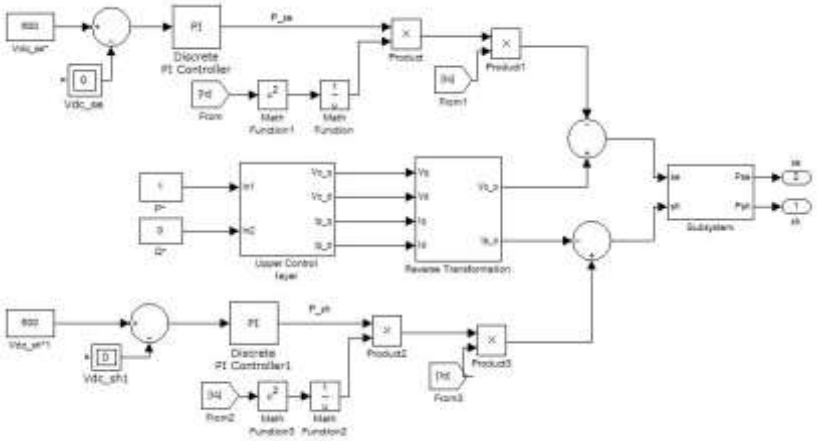


Figure 8 (b) Internal block diagram simulink block

6.1. Phase Shifting Control

Case1 to Case2:

From case1 to case2 (30° to 15° phase shift). In previous, there is 30° phase difference between voltages i.e., actual sending point $\vec{V}_{S0}$ and receiving terminal $\vec{V}_R$ voltages. For case1 $\vec{V}_S = \vec{V}_R$, the $\vec{V}_C$ is injected to shift $\vec{V}_{S0}$ by 30^0 lagging. Here, UPFC is compensating voltage difference caused by transformer 30° phase shift. Therefore, zero line current $\vec{I}_L$ has achieved.

While case2, new $\vec{V}_S$ is shifted from $\vec{V}_{S0}$ by 15°, therefore, 15° phase difference between $\vec{V}_S$ and $\vec{V}_R$ is 15^0. These results, 7.3A line current $\vec{I}_L$. Fig.(9) shows shunt-CMI line voltage V_{Pab} and line current $\vec{I}_L$. FFM have been generated with low THD of shunt-CMI phase voltage, even line-voltage has lesser THD because triplen harmonics in balanced system are absented and it is nearer to sinusoidal where doesn't usage extra filters. Here current easily and speedily raised from 0 to 7.3A, when operating point is changed from case1 to case2.

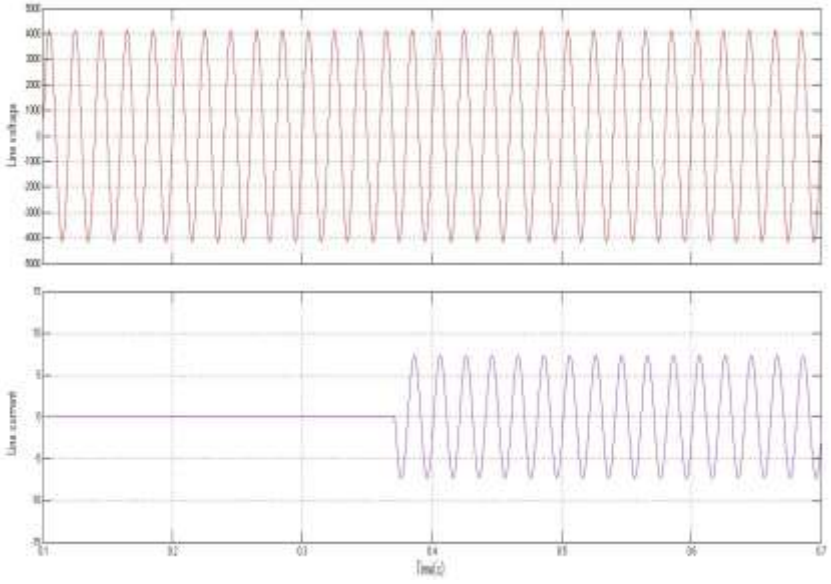


Figure 9 Shunt-CMI line voltage V_{Pab} and line current $\vec{I}_{La}$ in case1 to case2.

Case2 to Case3:

Like wise, case2 to case3 (15^0 to 0^0 phase shift). For case3 indicates a system has without compensation for 0^0 phase shift, then $\vec{V}_S = \vec{V}_{S0}$ and difference of $\vec{V}_S$ & $\overrightarrow{V_R}$ is 30^0. Hence, resulting current around 14.5A.

FFM has generated V_{Pa} and V_{Pb} with optimal firing angles, these are form in staircase. Then, shunt-CMI phase voltage V_{Pa} & V_{Pb} and line currents are I_{La}, I_{Lb} and I_{Lc} is illustrated at Fig.10 & 11.

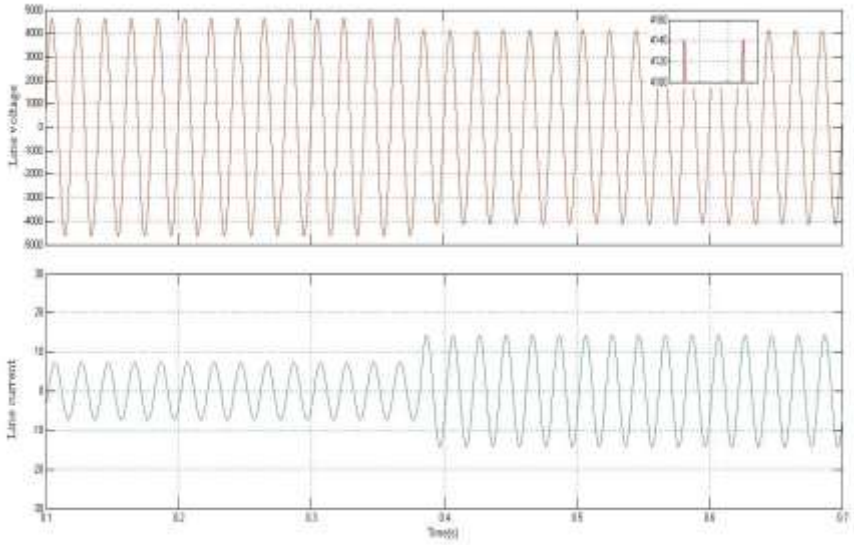


Figure 10 Shunt-CMI line voltage V_{Pab} and line current $\vec{I}_{La}$ in case2 to case3.

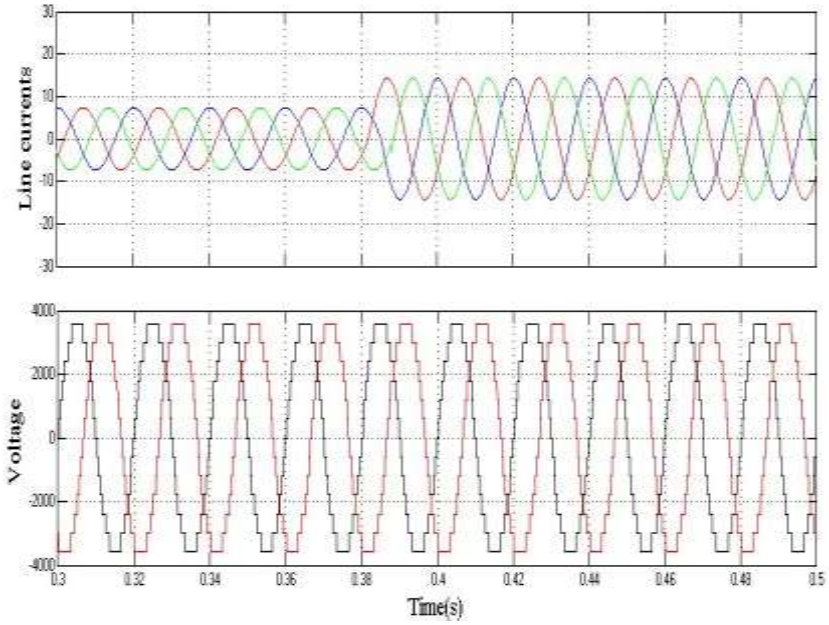


Figure 11 In mode1 to mode2, Line currents are I_{La}, I_{Lb} and I_{Lc} and shunt CMI phase voltages V_{Pa} & V_{Pb} .

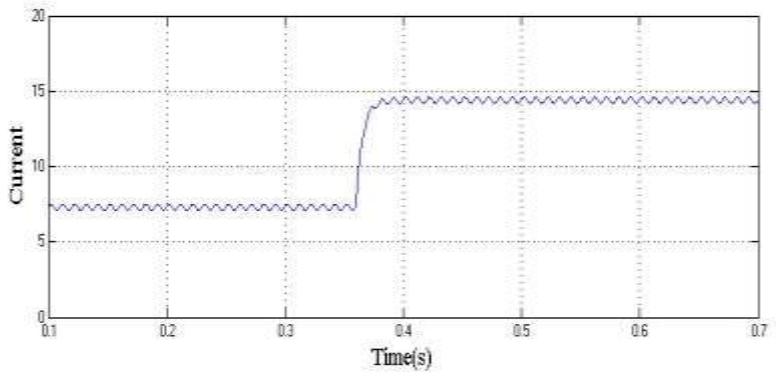


Figure 12 Dynamic response for changing case2 to case3.

The operating point changed from case2 to case3, then current is rapidly increases from 7.3A to 14.5A (amplitude) as shows Fig 12.

7. CONCLUSION

Hence, the cascaded multilevel inverter are used to eliminate the large transformers, generates output nearer to sinusoidal waveform and fast dynamic response. The controlling of new transformer less UPFC has successive improvements are extremely lower switching losses, greater efficiency of CMI by using FFM technique, all UPFC functions are achieved and quick dynamic response of the system. The operation and performance of new transformer less UPFC have been analyzed by using MATLAB/Simulink model. In proposed system FLC is improved the system performance and it gives better performance compared to conventional PI controller.

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Power Transformer For Residual Life Assessment

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Abstract: Power Transformers are the most vital components in a sub-station / Receiving station. Failure of a Transformer leads to loss of revenue besides affecting reliability of power supply to consumers. It can lead to non availability of the transformer for long durations. In this paper, an approach to evaluate transformer‘s aging condition is introduced based on multi-parameters. Firstly, the different types of insulations in transformers like solid insulation and liquid insulation have been discussed. Later, the ageing process of these insulations used in transformer has been illustrated in detail. Different condition monitoring techniques used for transformer are included to assess the life of insulating material. A program is developed in Visual Basic Software which is very user friendly software. Through the developed program, we can predict the remaining life of transformer. Moreover, a software system based on transformer’s electrical and thermal parameters is developed correspondingly, by using a multi- parameters analytic approach. This system is expected to help in planned maintenance of Transformer on fields. This can help the utilities in making optimum use of the transformers and also taking timely decisions regarding refurbishment / replacement of transformers. Various transformer insulation properties like electrical properties, oil quality and temperature are considered in assessment of remaining life of transformer.

Keywords: Transformer insulation, Insulation aging, Condition Monitoring, Dissolve gas analysis

I. INTRODUCTION

Power transformer is an electric device which is used to step up or step down the voltage level of the supply fed to its primary winding. The stepping up or down depends upon the number of turns of primary and secondary winding. If the number of turns on both the windings is same, and the losses of transformer are negligible, we may Conclude that the voltage across each of the winding is same. In this case the transformer is just utilized in isolating two electrical circuits. Generally power transformer is used in stepping up the voltage of the supply in order to decrease the transmission losses and then stepping.

These are mainly used in distribution side to interface step up and stepdown voltages. The life span of these type of transformers is around 30years.Based on ranges, the power transformers are classified into three types.

Small power transformers (500-7500KVA)
Medium power transformers (100MVA)
Large power transformers (100MVA and beyond)
These transformers transform the voltage and depend on the principal of faradays laws of induction. It holds a low voltage, high current circuit at one side of the transformer and on the other side of the transformer it holds the high voltage low current circuit.

II. POWER TRANSFORMER DESIGN

The skeleton of the power transformer is designed with metal which is laminated by sheets. It is fixed into either a core type or shell type. The skeletons of the transformer are wound and connected using conductors to make three 1-phase or one 3-phase transformer. Three 1-phase transformers requires each bank isolated from the additional and thus offer continuity of service when one bank flops. A single 3-phase transformer, whether the shell or core type, will not function even with one bank out of service.
The 3-phase transformer is inexpensive to make and it has a smaller footprint, and functions comparatively with higher efficiency.

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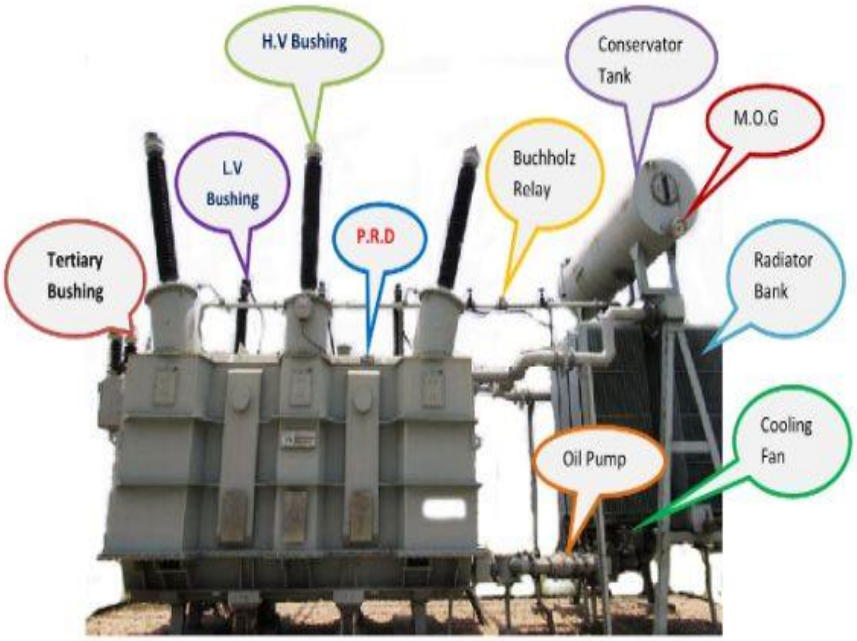

Power Transformer (160 MVA 220/132/33 KV Auto Transformer)

III.EXIXTING SYSTEM

It plays a very significant role of the transformer insulation system and has the important functions of acting as an electrical insulation as well as coolant to dissipate heat losses. Another main function of transformer oil is it act as a diagnostic tool of the transformer.

The basic raw materials for the production of transformer oil is a law viscosity lube termed as transformer oil base stock (TOBS), which is normally obtained by fractional distillation and subsequent treatment of crude petroleum. TOBS is further refined by acid treatment process to yield transformer oil. Power transformers undergo prolonged drying processes, using electrical self-heating, the application of a vacuum, or both to ensure that the transformer is completely free of water vapor before the insulating oil is introduced. This helps prevent corona formation and subsequent electrical breakdown under load.

Chemical composition

Transformer oil consists of four major generic class of organic compounds namely paraffins, Naphthene Aromatics and olefins. All these are hydrocarbons and hence insulation oil is purely a hydrocarbon mineral oil. For good fresh insulating oil, it is desirable to have more of saturated paraffins, less of aromatic and\or naphthenic and none of olefins. Depending upon the predominance, oil is usually termed as of paraffinic base or naphthenic base. This is carried out to ensure that these are within guaranteed limits. The test comprises of following:

1.Routine tests
2.Type tests
3.Special tests

Routine tests:
Measurement of winding resistance
Measurement of voltage ratio and check for voltage vector relationship
Measurement of insulation resistance
Dielectric tests

Type tests:

All the tests listed as above and the temperature rise test and dielectric type tests.

Special tests:
Short circuit test

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Measurement of a caustics noise level
Measurement of surge voltages on low voltages windings
Measurement of harmonics of the no load current

The key concept of life assessment is serviceability i.e., the ability to function as intended. Life assessment studies aim at comparing and ranking transformers with respect to their suitability for use in a relative evolution procedure of several transformer. The serviceability is determined by actions taken before the transformer was taken into the service and from the history and events occurring in service. The area evaluated for serviceability are: Technical Serviceability: - Detailed evaluation advanced of electrical, mechanical and auxiliaries. On-Technical Serviceability: - Strategies in particular to economy and environment. Screening Evaluation: en by the fans and oil pumps. It is a prime task to sort out the units, the efforts can be concentrated on doubtful units..Monitoring technique system for a transformer is an evolving process due to change in technologies, improving understanding..

S.No.	Item	Tolerance
a)	Total losses 1. component losses	±10% of the total loss ±15% of each component loss, provided that the tolerance for total losses is not exceeded
b)	Impedance voltage at rated current 2. Principal tapping 2-winding T/F Multi winding T/F 2. For tapping's other than the	 ±10% 0f declared impedance voltage ±10% Of the declared impedance voltage for one specified pair of windings Tolerance shall be increased

Purpose of Monitoring Technique:
avoid forced outages
minimize failures
optimize maintenance costs
improve safety to personnel and environment.

IV. PROPOSED SYSTEM

The need for reliable and stable systems is being increasingly felt. Thus, emphasis is now being laid on 100% capacity utilization and the availability of equipment for reliable operation of the system. Fortunately, many tools are now available or underdevelopment, which can be used for condition monitoring of the transformer. With a view to cover detailed information about DGA and condition monitoring, wise residual life assessment, this chapter has been divided into two sectors: Dissolved Gas Analysis Interpretation.RLA And Refurbishment.Incipient faults in oil filled transformers are usually the result of electrical or thermal stresses in either the transformer oil or insulating materials. It is known that such excessive stresses produce a mixture of gases characteristics of which give an indication of the type of fault and location associated with the fault It is recommended that analysis of dissolved gases in transformer oil by gas chromatograph equipment's is made at the time of commissioning and then every six months for transformer s of 145 KV class and above.

Analysis method
Oil in transformers can be sampled through the drain or sampling valve near the bottom of the tank. Special care is to be taken not to introduce air, foreign matter, or dirty oil into the sampling container. For this purpose, first 0.5-1.0 litre of oil from the transformer is to be over-flown through the oil container. The oil sample must not be exposed to air before analysis Before taking total outage of transformer following preliminary physical inspection, tests should be carried out to establish the reason for the increasing trend of fault of fault gases.

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Analysis of fault gases:
The gases to be analysed and the criteria for the gases found in the transformer oil are tabulated in below table.

Table: Analysis Method (S1)

S.no	Operating Condition	Gases to be analysed
1.	Normal	O2, N2, H2, CO, CO2, CH4.
2.	Abnormal	H2, CH4, C2H2, C2H4, C2H6.
3.	Deterioration	CO, CO2, CH4.

The generation of gases in oil by some typical faults in transformer active part models are shown in given below.
Table: Analysis Method (S2)

S.no	Type of faults	Decomposable gases in transformer oil
1.	Arcing in oil	H2, CH4, C2H4, (C2H6, C2H2, C3H6, C3H8)
2.	Overheating of solid insulating materials	CO, CO2, (C2H4, H2)
3.	Overheating of oil and paper combination	CO, CO2, CH4, C2H4, H2
4.	Arcing of oil and paper combination	H2, CO, CO2, CH4, (C2H4)

V. TEST RESULTS

Ulr no.	Tc657920000000300p	Discipline : electrical testing	Group : insulating oil	Date	25.02.2020
REF :Power Grid					

Date Of Receipt At R & D Lab.	13.02.2020	Appearance :	CLEAR
Date Of Testing	19.02.2020	Condition Of The Sample On Project :	Good

Name And Designation : DEE, M Organization : APTRANSCO			Address :400KVSS nellore (dist) Phone/Email Id: 9440817621	
Transformer Details			Sample Details	
Station	400KVSS NELLORE		Date Of Sampling	12.02.2020
Tr No.	ICT-1		Oil Temperature(^{O}c)	62
Make & Capacity	ABB	315MVA	Date Of Last Filtration	04/2006
Si.No & Year Of Mfg.	14001-003	2005	Sample Point	BOTTOM
Voltage Rating	400/220kV		Sample Container	SS container
Date Of Commng.	29.04.2006			
Load at sampling (MW)	208MW			

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Reference standard as per IS : 1866-2016					Dissolved gas analysis as per test method IS 9434:992 RA 2013, IS 10593:2017		
Parameter	UoM	Violation limit	Measured value	Test method	Parameter	Uo M	Measured value
B.D.V	Kv	60 min	81.0	IS6792	Total Combustile Gas	ml.	
Sp. resistance at 90°C	Ohm-cm	1.0E12 min	NT	IS6103	Hydrogen(H2)	Ppm	ND
Tan delta at90°C	---	0.1 max	NT	IS6262	Methane(CH4)	Ppm	4.5
Water content	Ppm	15 max	5.6	IS13567	Ethane(C2H6)	Ppm	1.9
Interfacial at27°C	mN/m	28 MIN	NT	IS 6104	Ethylene(C2H6)	Ppm	7.8
Density at 29.5°C	Mggm/ cc	-	NT	IS 1448 P-16	Acetylene(C2H2)	Ppm	ND
Acidity*	KOH/g	0.1 MAX	NT	IS1448 P-1	Carbon Monoxide(CO)	Ppm	297.1
Flash point*	°C	135 MIN	NT	IS1448 P-21	Carbon dioxide (C02)	Ppm	23362.0
Reference standard as per IS : 1866-2016					Dissolved gas analysis as per test method IS 9434:992 RA 2013, IS 10593:2017		
Parameter	UoM	Violation limit	Measured value	Test method	Parameter	Uo M	Measured value
B.D.V	Kv	60 min	81.0	IS6792	Total Combustile Gas	ml.	
Sp. resistance at 90°C	Ohm-cm	1.0E12 min	NT	IS6103	Hydrogen(H2)	Ppm	ND
Tan delta at90°C	---	0.1 max	NT	IS6262	Methane(CH4)	Ppm	4.5
Water content	Ppm	15 max	5.6	IS13567	Ethane(C2H6)	Ppm	1.9
Interfacial at27°C	mN/m	28 MIN	NT	IS 6104	Ethylene(C2H6)	Ppm	7.8
Density at 29.5°C	Mggm/ cc	-	NT	IS 1448 P-16	Acetylene(C2H2)	Ppm	ND
Acidity*	KOH/g	0.1 MAX	NT	IS1448 P-1	Carbon Monoxide(CO)	Ppm	297.1
Flash point*	°C	135 MIN	NT	IS1448 P-21	Carbon dioxide (C02)	Ppm	23362.0

VI. CONCLUSIONS

This paper analyzes factors that affect transformer life and points out the uncertainty of factors. Considering the uncertainty factors, residual life evaluation model is set up based on Visual Basic Software which is very user friendly software and evaluates the residual life, which can provide support for transformer maintenance schedule and be benefit to the safe and economic operation of power system.

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Modelling and Analysis of Microgrid by using Renewable Energy Sources

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Abstract: This paper presents a control of a micro-grid at an isolated location fed from wind and solar based hybrid energy sources. The machine used for wind energy conversion is Doubly Fed Induction Generator (DFIG) and a battery bank is connected to a common DC bus of them. A solar Photovoltaic (PV) array is used to convert solar power, which is evacuated at the common DC bus of DFIG using a DC-DC boost converter in a cost-effective way. The voltage and frequency are controlled through an indirect vector control of the line side converter, which is incorporated with droop characteristics. It alters the frequency set point based on the energy level of the battery, which slows down over charging or discharging of the battery. The system is also able to work when wind power source is unavailable. Both wind and solar energy blocks, have Maximum Power Point Tracking (MPPT) in their control algorithm. The system is designed for complete automatic operation taking consideration of all the practical conditions. The system is also provided with a provision of external power support for the battery charging without any additional requirement. A simulation model of system is developed in Matlab environment and simulation results are presented for various conditions e.g. unviability of wind or solar energies, unbalanced and nonlinear loads, low state of charge of the battery. Finally, a prototype of the system is implemented using a 5-kW solar PV array simulator and a 3.7 kW wound rotor induction machine and experimental results are produced to reaffirm the theoretical model and design.

Keywords: Photovoltaic, Maximum Power Point Tracking (MPPT), MATLAB, Boost Converter.

I. INTRODUCTION

There are many remote locations in the world, which don't have access to electricity. There are also many places, which are connected to the grid, however, they don't receive electricity for up to 10-12 hours in the day and as a result of it, economic activities of inhabitants suffer. Many of such places are rich in Renewable Energy (RE) sources such as wind, solar and bio-mass. An autonomous generation system utilising locally available RE sources, can greatly reduce the dependency on the grid power, which is predominantly fossil power. Wind and solar energy sources, are more favorited than bio-mass based system as latter is susceptible to supply chain issue. However, wind and solar energies suffer from high level of power variability, low capacity utilization factor combined with unpredictable nature.

As a result of these factors, firm power cannot be guaranteed for autonomous system. While the Battery Energy Storage (BES) can be helpful of lowering power fluctuation and increasing predictability, utilisation factor can be increased by operating each energy source at optimum operating point. The optimum operating point also called as Maximum Power Point Tracking (MPPT), requires regulation of the operating point of wind energy generator and solar PV (Photovoltaic) array in term of speed and voltage to extract maximum electrical energy from input resource. The MPPT can be achieved by Power Electronics (PE) based frequency based on state of charge of the battery and slows down deep discharge and over-charge of the battery.

II. EXISTING SYSTEM

DFIG may operate variable speed operation with lower power rated converters. However, to work the system as a micro-grid, the generated voltage should be balanced and THD (Total Harmonics Distortion), must be within requirement of IEEE-519 standard at no-load, unbalanced load as well as nonlinear load. Moreover, both the wind and solar energies sources should operate at MPPT. All these are the issues. In the proposed system performance parameters e.g. power quality, system efficiency etc under the different operating conditions are not mentioned. Moreover, they also lack experimental verification

III. PROPOSED METHOD

This project presents a control of a micro-grid at an isolated location fed from wind and solar based hybrid energy sources. The machine used for wind energy conversion is Doubly Fed Induction Generator (DFIG) and a battery bank is connected to a common DC bus of them.

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A solar Photo Voltaic (PV) array is used to convert solar power, which is evacuated at the common DC bus of DFIG using a DC-DC boost converter in a cost-effective way. The voltage and frequency are controlled through an indirect vector control of the line side converter, which is incorporated with droop characteristics. It alters the frequency set point based on the energy level of the battery, which slows down over charging or discharging of the battery.
The system is also able to work when wind power source is unavailable. Both wind and solar energy blocks, have Maximum Power Point Tracking (MPPT)in their control algorithm. The system is designed for complete automatic operation taking consideration of all the practical conditions.

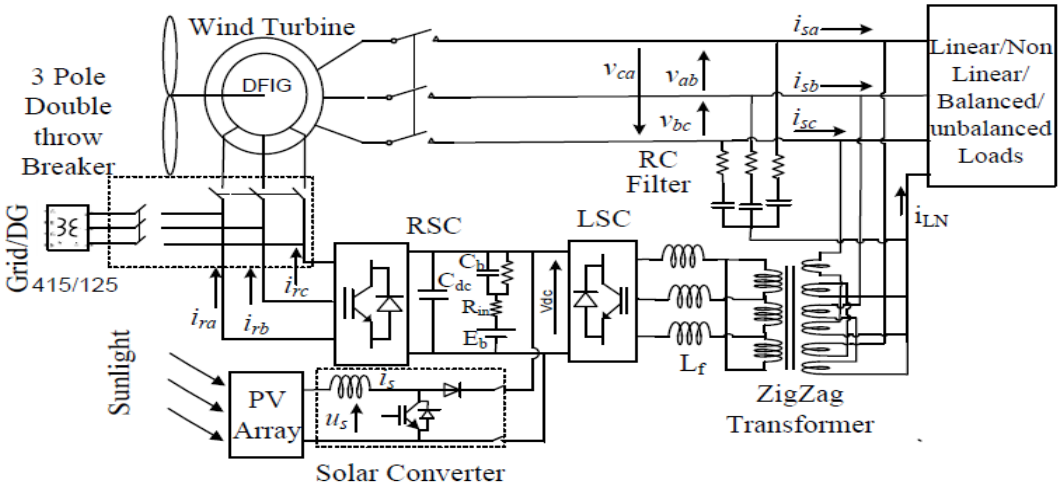

Fig: Schematic of isolated micro-grid network fed by renewable energy source using battery storage.

The system is also provided with a provision of external power support for the battery charging without any additional requirement. A simulation model of system is developed in Matlab environment and simulation results are presented for various conditions e.g. unreliability of wind or solar energies, unbalanced and nonlinear loads, low state of charge of the battery.

IV. RESULTS

The Simulink model of micro-grid fed by REGS is developed in Matlab. The solar panels and wind turbine are modelled using their functions. Fig. 1 shows the performance of the system when the wind generator is taken in an out of the system.

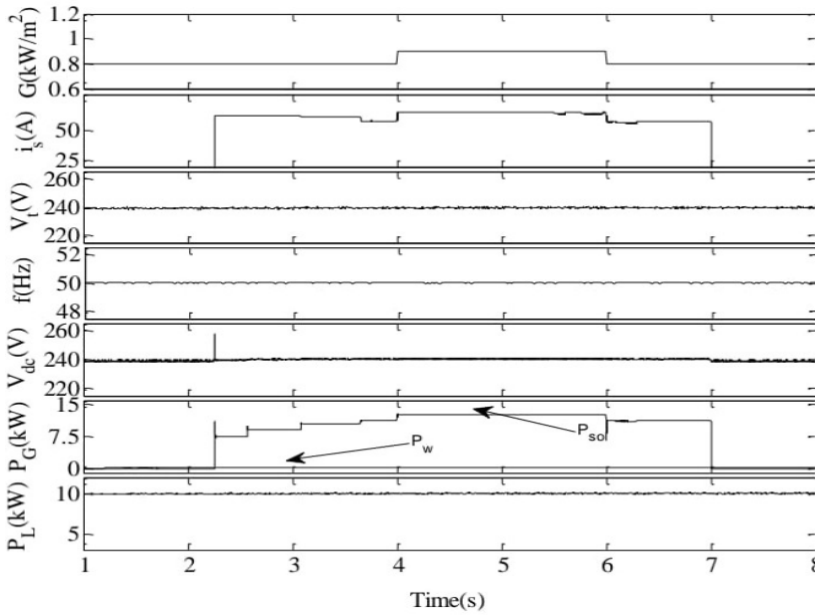

Fig. 1 Performance of REGS fed micro-grid with wind energy source

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Fig. 2 shows the performance of the system when solar PV system is taken in and taken out of the system.

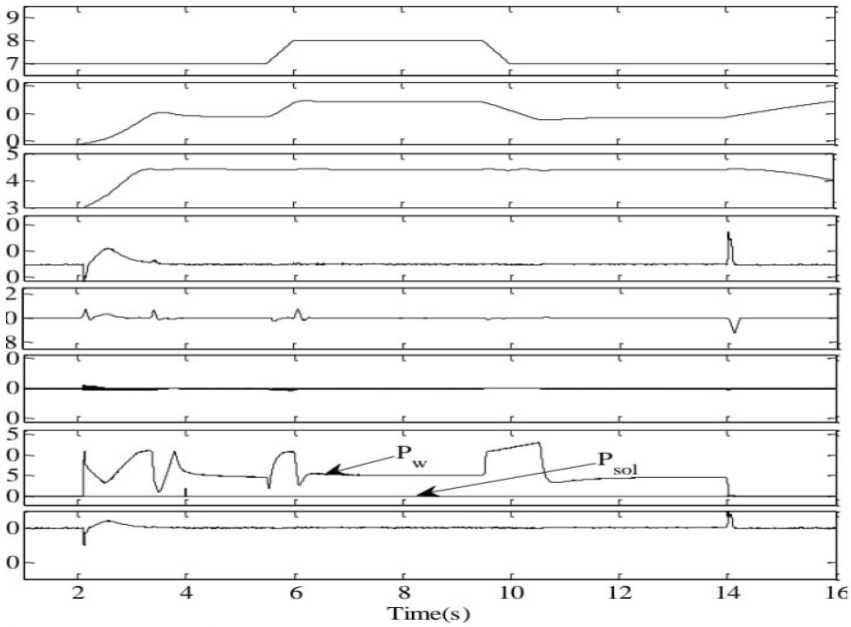

Fig. 2 Performance of the system without generating source and solar system

V. CONCLUSION

The proposed micro-grid system fed from REGS has been found suitable for meeting load requirement of a remote isolated location comprising few households. REGS comprises of wind and solar energy blocks, which are designed to extract the maximum power from the renewable energy sources and at the same time, it provides quality power to the consumers. The system has been designed for complete automated operation. This work also presents the sizing of the major components. The performance of the system has been presented for change in input conditions for different type of load profiles. Under all the conditions, the power quality at the load terminals, remains within acceptable limit. The effectiveness of the system is also presented with test results with prototype in the laboratory. The system has also envisaged the external battery charging by utilizing the rotor side converter and its sensors for achieving rectifier operation at unity power factor.

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A T, Star-Delta and Zigzag Connected Transformer Connections of 5-Level and 7-Level VSC Based DSTATCOM for Power Quality Improvement

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Abstract: In this paper, a new three-phase four-wire Distribution Static Compensator (DSTATCOM) based on a T-connected transformer and a three-leg Voltage Source Converter (VSC) is proposed for power quality improvement. The T-connected transformer connection mitigates the neutral current and the three-leg VSC compensates harmonic current, reactive power, and balances the load. Two single-phase transformers are connected in T-configuration for interfacing to a three-phase four-wire power distribution system and the required rating of the VSC is reduced. The Insulated Gate Bipolar Transistor (IGBT) based VSC is supported by a capacitor and is controlled for the required compensation of the load current. The DC bus voltage of the VSC is regulated during varying load conditions. The DSTATCOM is tested for power factor correction and voltage regulation along with neutral current compensation, harmonic elimination, and balancing of linear loads as well as nonlinear loads. The performance of the three-phase four-wire DSTATCOM is validated using MATLAB software with its Simulink and power system block set toolboxes.

Keywords: D-STATCOM, Harmonics, Inverter Transformer, Power Quality.

I. INTRODUCTION

D-STATCOM is a solid state, three phase inverter-based power controller which is connected in shunt to a distribution feeder through a coupling transfer that matches the inverter ac output voltage to the distribution system voltage [1]. Thus, D-STATCOM is used to protect the distribution system from power quality disturbances [2]. The main components of the D-STATCOM are the inverter using either GTO or IGBT, dc capacitor, coupling transformer and control system [3]. It can be regarded as an active energy exchanging device because it utilizes the passive energy storage component to realize the energy storing and exchanging and the switches to control the reactive power flow between different phases of a distribution system [4-6].The reactive power provided by the D-STATCOM is either capacitive or inductive depending on whether the magnitude of the D-STATCOM output voltage is larger or smaller than the magnitude of the system voltage [7]. In recent years, D-STATCOM has been extensively studied in which many papers in the literature have discussed its theory, modeling, control and applications (4,8-10). The conventional D-STATCOM is controlled at low switching fundamental frequency of the inverter based on the control of the phase angle of the fundamental switching pattern [11]. In recent years Electrical Power Quality had obtained more attention in power engineering. In present day's power distribution systems is suffering from severe power quality problems. These power quality problems include high reactive power burden, harmonics currents, load unbalance, excessive neutral current etc.

II. PROPOSED SYSTEM

Instantaneous real-power theory based cascaded multilevel inverter based DSTATCOM is connected in the distribution network at the PCC through filter inductances and operates in a closed loop. The DSTATCOM system contains a cascaded inverter, RL-filters, a compensation controller (instantaneous real-power theory) and switching signal generator (proposed triangular-sampling current modulator) as shown in the Figure 1. The three-phase supply source connected with non-linear load and these nonlinear loads currents contains fundamental and harmonic components. If the active power filter provides the total reactive and harmonic power, is (t) will be in phase with the utility voltage and would be sinusoidal. At this time, the active filter must provide the compensation current therefore; active power filter estimates the fundamental components and compensating the harmonic current and reactive power.

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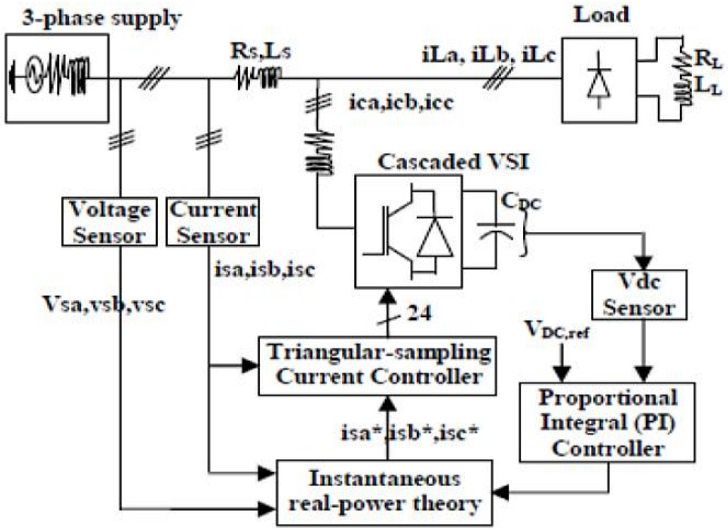

Fig 1: Schematic diagram of DSTATCOM

III. DESIGN OF THE T-CONNECTED TRANSFORMER

The figure shows the connection of two single-phase transformers in T-configuration for interfacing with three-phase four-wire system. The T- connected transformer not only provides a path for the zero-sequence fundamental current and harmonic current when connected in shunt at Point of Common Coupling (PCC).

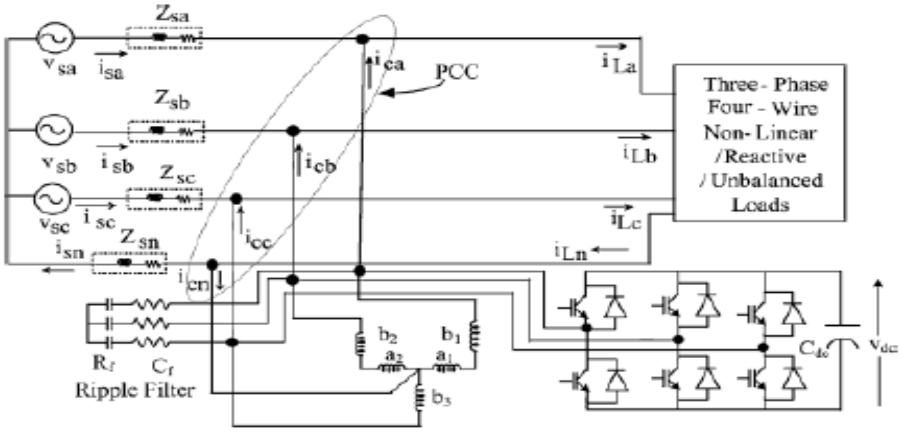

Fig 2.Schematics of the proposed three-leg VSC with T-connected transformer-based DSTATCOM connected in distribution system.

The T-connected transformer is used in the three-phase distribution system for different applications [6]–[8].But the application of T-connected transformer for neutral current compensation is demonstrated for the first time. Moreover, the T-connected transformer is suitably designed for Magneto Motive Force (mmf) balance. The T-connected transformer mitigates the neutral current and the three-leg VSC compensates the harmonic current and reactive power, and balances the load. The IGBT based VSC is self-supported with a dc bus capacitor and is controlled for the required compensation of the load current. The DSTATCOM is designed and simulated using MATLAB software with its Simulink and Power System Block set (PSB) toolboxes for power factor correction and voltage regulation along with neutral current compensation, harmonic reduction, and load balancing with nonlinear loads.

IV. DISTRIBUTION STATIC COMPENSATOR (D-STATCOM)

A D-STATCOM (Distribution Static Compensator), which is schematically depicted in Fig. 1 and consists of Voltage Source Converter (VSC), a DC energy storage device, a coupling transformer connected in parallel to the distribution network through a coupling transformer. Necessary adjustment of the phase and magnitude of the D-STATCOM output voltages allows effective control of active and reactive power which transfers between the D-STATCOM and the AC system. Such configuration allows the device to absorb or generate controllable active and reactive power flows. [7].

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The D-STATCOM commonly utilized mainly for regulation of voltage, correction of power factor and elimination of current harmonics. Such a device may be employed to provide continuous voltage regulation using an indirectly controlled converter. In this paper, the D-STATCOM is used to regulate the voltage at the point of common connection. The control technique is based on sinusoidal PWM and requires the measurement of the rms voltage at the load variation.

The shunt injected current I_{SH} can be written as,

$$I_{SH} = I_L - I_S$$

Where $I_S = \frac{V_{TH} - V_L}{Z_{TH}}$

Therefore

$$I_{SH} = I_L - I_S = I_L - \frac{V_{TH} - V_L}{Z_{TH}}$$

Or

$$I_{SH}\angle\eta = I_L\angle -\theta - \frac{V_{TH}}{Z_{TH}}\angle(\delta - \beta) + \frac{V_L}{Z_{TH}}\angle -\beta$$

The complex power injection of the D-STATCOM can be expressed as,

$$S_{SH} = V_L\, I_{SH}$$

It may be mentioned that the effectiveness of the D-STATCOM in correcting voltage variations depends on the value of ZTH or fault level of the load bus. When the shunt injected current ISH is kept in quadrature with VL, the desired voltage correction can be achieved without injecting any active power into the system. On the other hand, when the value of ISH is minimized, the same voltage correction can be achieved with minimum apparent power injection into the system.

V. REFERENCE CURRENT CONTROL STRATEGY

The control scheme of the shunt active power filter must calculate the current reference signals from each phase of the inverter using instantaneous real-power compensator. The block diagram as shown in Figure.3, that control scheme generates the reference current required to compensate the load current harmonics and reactive power. The PI controller is tried to maintain the dc-bus voltage across the capacitor constant of the cascaded inverter. This instantaneous real-power compensator with PI-controller is used to extracts reference value of current to be compensated. To enhance the performance of distribution system, D-STATCOM was connected to the distribution system. D-STATCOM to be designed using MATLAB - SIMULINK R2010a 7.10 version [6].

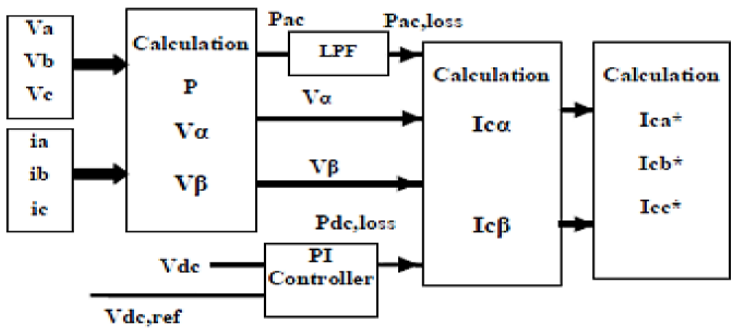

Fig 3: Reference control strategy for instantaneous real-power theory

D-STATCOM Simulations and Results for THD Total harmonic distortion, which is the summation of all harmonic components of the Voltage or current waveform compared against the fundamental component of the voltage or current wave.

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Simulation model and results:

DSTATCOM for mitigating power quality problems like voltage variations with load balancing in 3-phase 4-wire distribution network. Four leg inverter is used for the compensation purpose and .synchronous reference frame theory based controller is used with the control of DSTATCOM.

Here the simulation is carried out by Seven cases:

1. Non-linear load Without DSTATCOM and APF
2. Non-linear load with APF
3 Non-linear load with DTSATCOM and APF
4. Non-linear load with DSTATCOM, PI Controller and five-level cascaded multilevel.
5. Non-linear load with DSTATCOM, PI Controller and seven-level cascaded multilevel.
6. Non-linear load with DSTATCOM, PI Controller and five-level cascaded multilevel, with T and PI connections.
7. Non-linear load with DSTATCOM, PI Controller & seven-level cascaded multilevel, with T and PI connections.

Three-phase Transformer Line Voltage and Current

Configuration	Line Voltage	Current
Delta – Delta	$V_L \Rightarrow nV_L$	$I_L \Rightarrow \frac{I_L}{n}$
Delta – Star	$V_L \Rightarrow \sqrt{3}.nV_L$	$I_L \Rightarrow \frac{I_L}{\sqrt{3}.n}$
Star – Delta	$V_L \Rightarrow \frac{nV_L}{\sqrt{3}}$	$I_L \Rightarrow \sqrt{3}.\frac{I_L}{n}$
Star – Star	$V_L \Rightarrow nV_L$	$I_L \Rightarrow \frac{I_L}{n}$

Where: n equals the transformers "turns ratio" (T.R.) of the number of secondary windings N_S, divided by the number of primary windings N_P. (N_S/N_P) and V_L is the line-to-line voltage with V_P being the phase-to-neutral voltage.

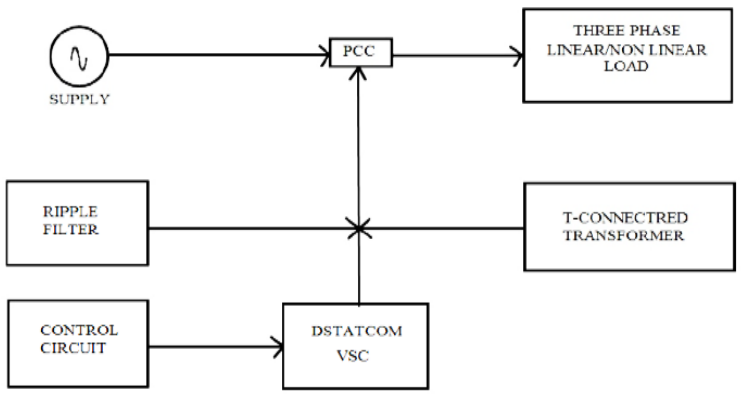

Fig 4. Block Diagram of T-connected VSC DSTATCOM

The block diagram representation of the proposed Three-Phase Four-Wire DSTATCOM and T-connected Transformer based distribution System is as shown in fig 2.1. It consists of three phase linear/nonlinear load block, ripple filter block, control circuit block and shunt active filter block. The T-connected Transformer block is used for neutral current compensation and it reduces the rating of three leg voltage source converter. The control circuit consists of DSATATCOM with Three leg Voltage Source Converter. This block is used to compensate the harmonic current and reactive power and load balancing. Also The DSTATCOM is tested for power factor correction and voltage regulation. The three leg VSC is used as an active shunt compensator along with a T-connected transformer. The ripple filter block is used to reduce the high frequency ripple voltage in the voltage at **Point of Common Coupling (PCC)**. High frequency ripple is due to switching current of the VSC of the DSTATCOM. All the blocks should be connected at PCC.

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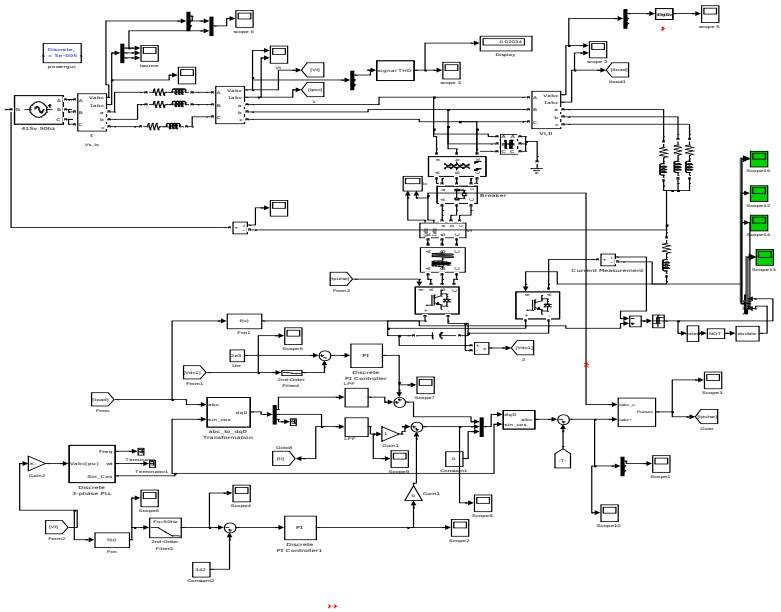

Fig 5. Simulation model of Five-level MLI with T-connected VSC DSTATCOM

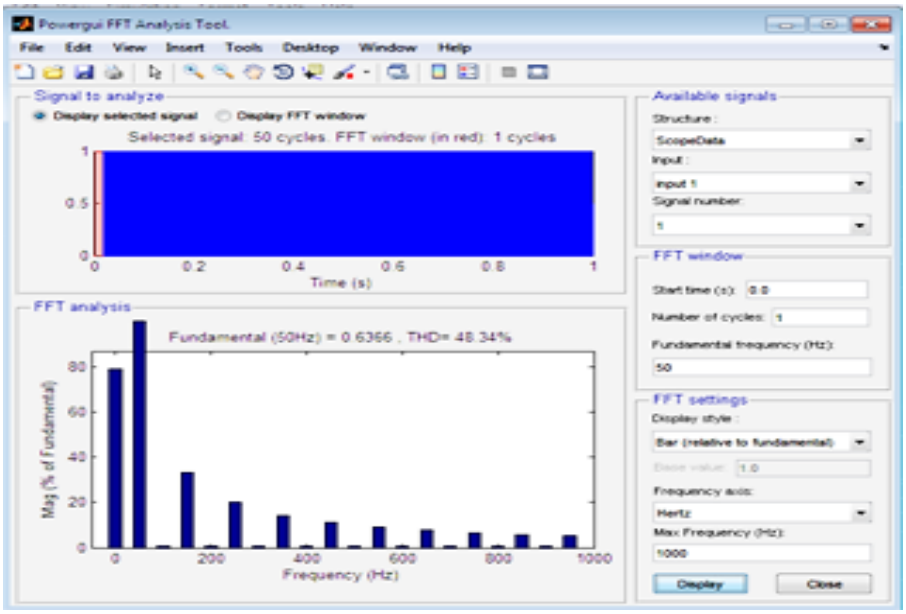

Fig 6. THD of Five-level MLI with T-connected VSC DSTATCOM

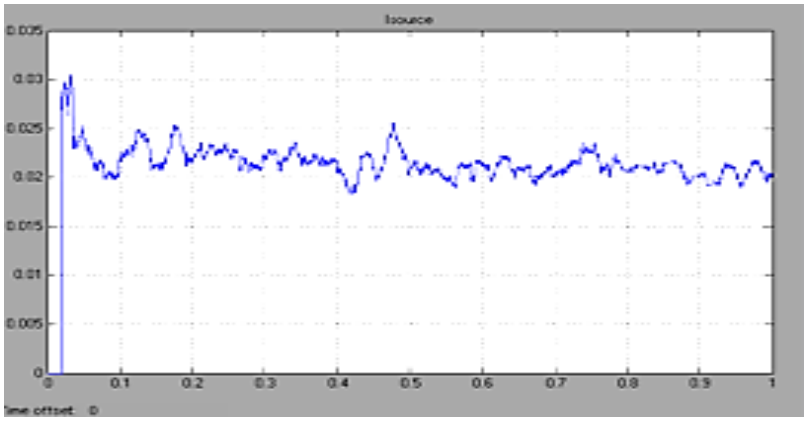

Fig 7. THD (load side) of Five-level MLI with T-connected VSC DSTATCOM

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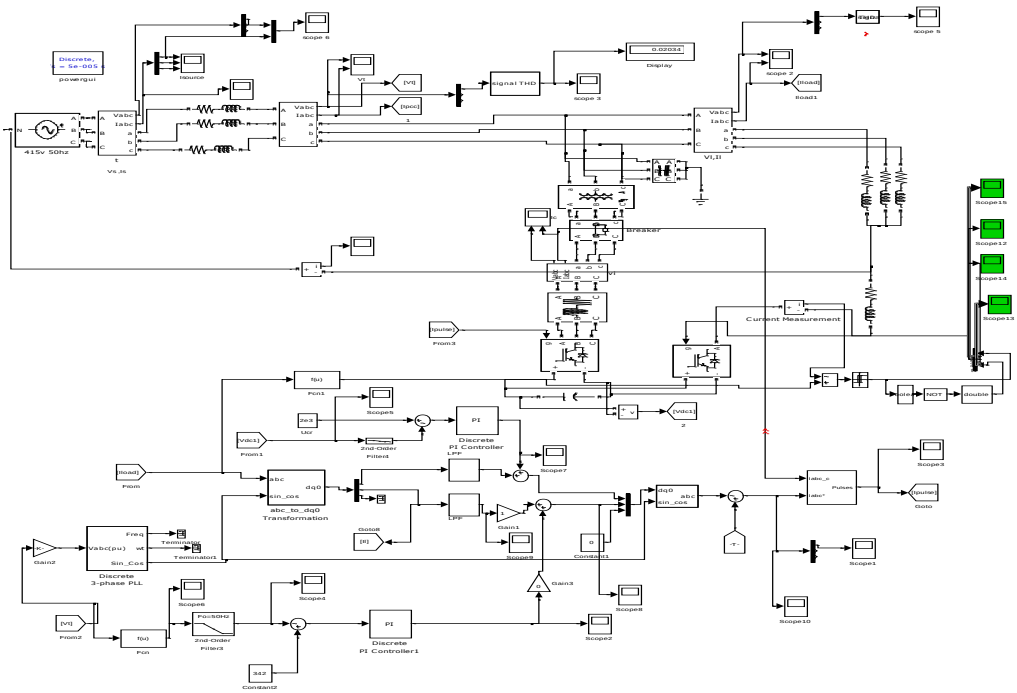

Fig 8. Simulation model of Five-level MLI with star-delta connected VSC DSTATCOM

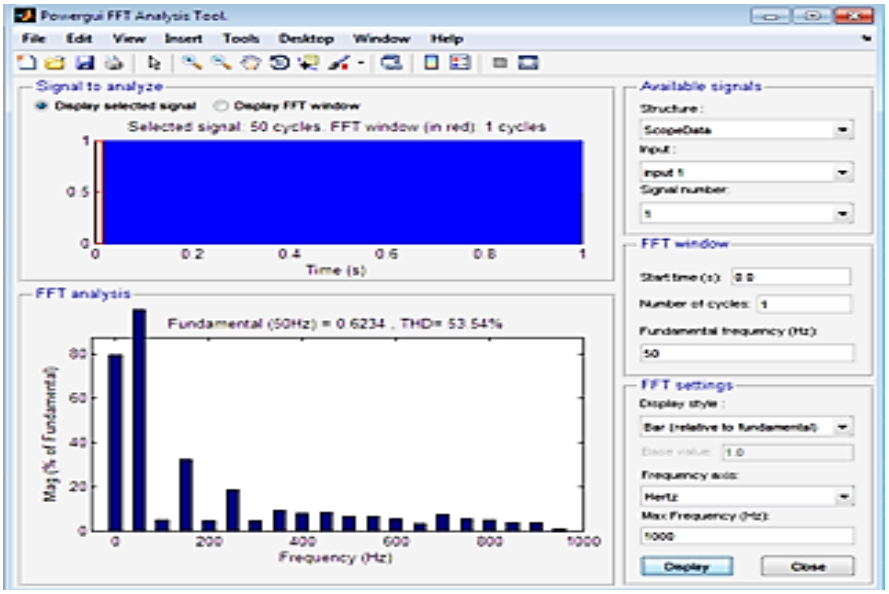

Fig 9. THD of Five-level MLI with Star-Delta connected VSC DSTATCOM

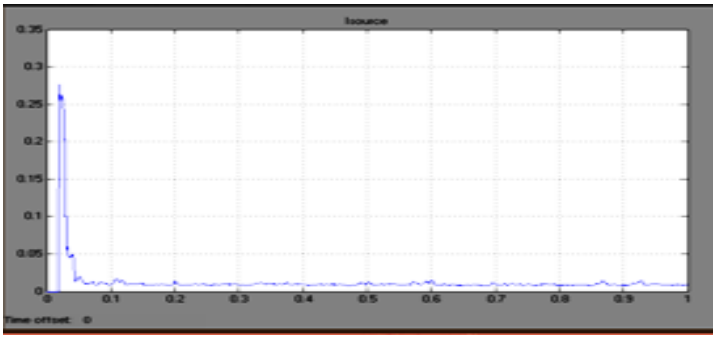

Fig 10. THD (Load side) of Five-level MLI with Star-Delta -connected VSC DSTATCOM

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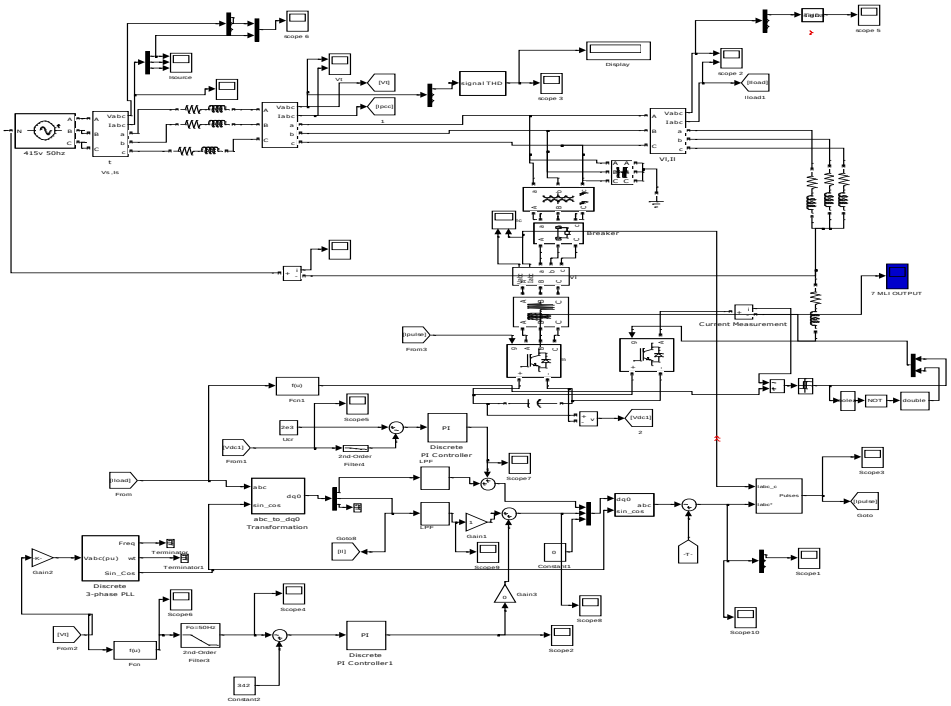

Fig 11. Simulation model of Seven-level MLI with T-connected VSC DSTATCOM

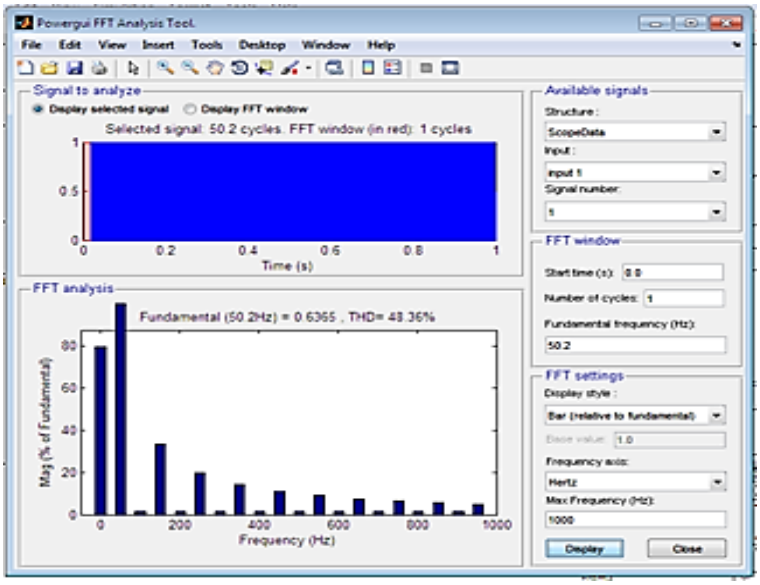

Fig 12. THD of Seven-level MLI with T-connected VSC DSTATCOM

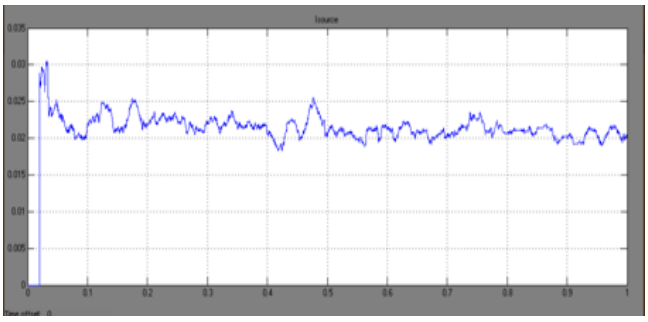

Fig 13. THD (load side) of Seven-level MLI with T-connected VSC DSTATCOM

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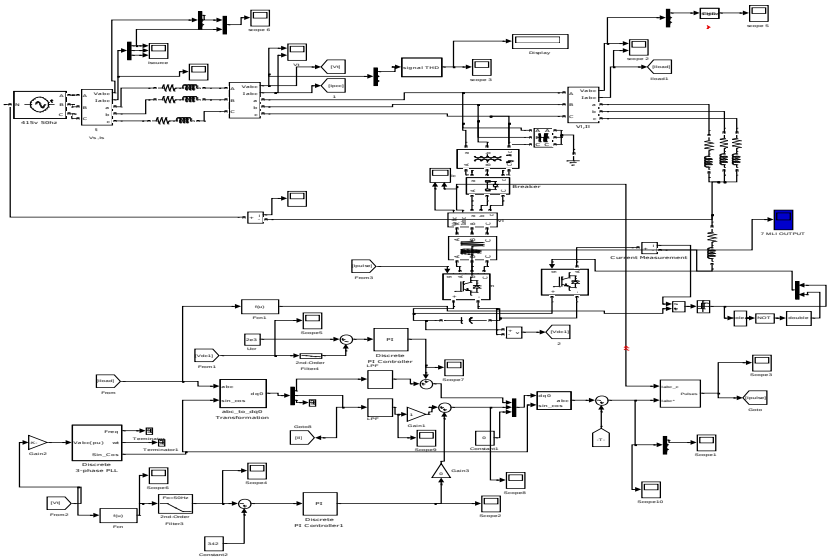

Fig 14. Simulation model of Seven-level MLI with star-delta connected VSC DSTATCOM

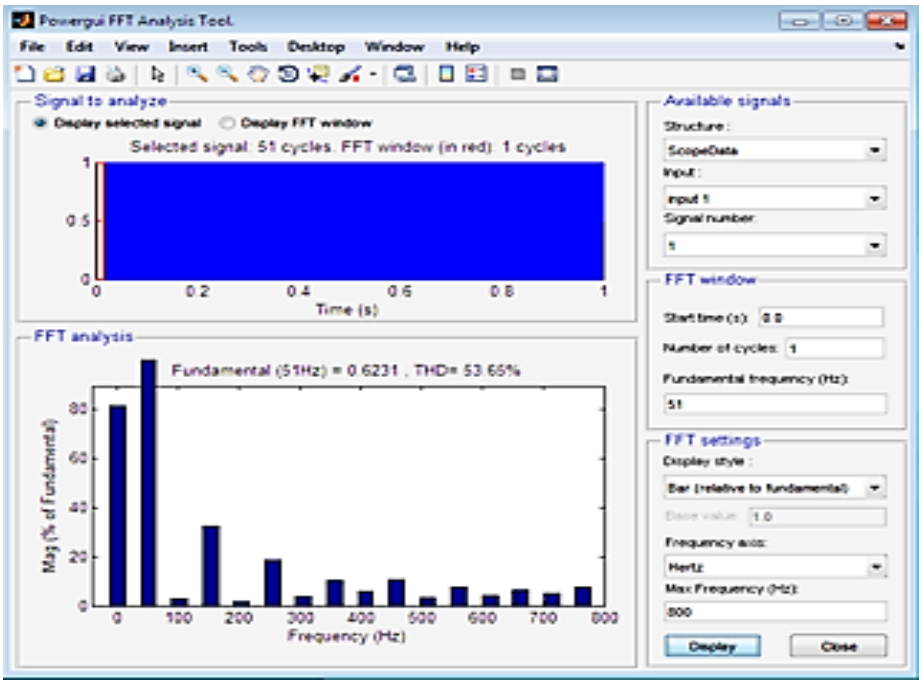

Fig 15. THD of Seven-level MLI with Star-Delta connected VSC DSTATCOM

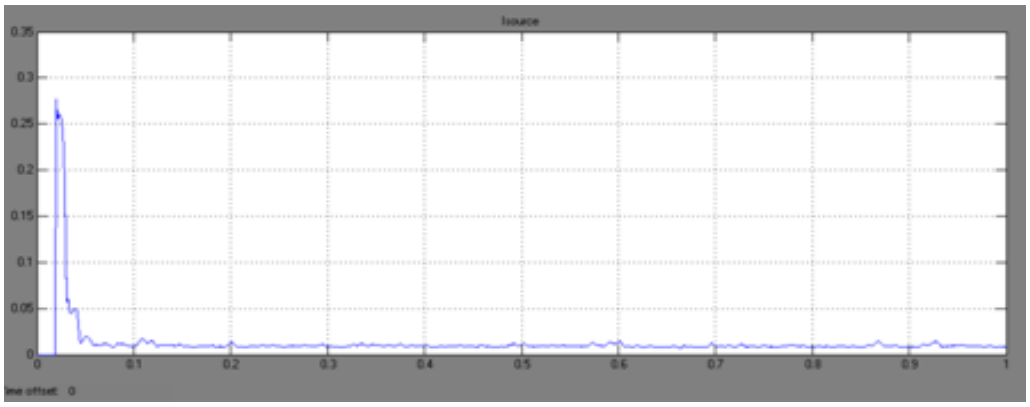

Fig 9. THD(Load side) of Seven-level MLI with Star-Delta connected VSC DSTATCOM

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Table 1: Comparison Table of THD for five-level and seven –level with different transformer connections

Voltage (THD)	Five-level (%)		Seven-level(%)	
	Star-star	Star-Delta	Star-star	Star-Delta
	48.34	53.54	48.36	53.65

Table 2: System Specifications

S.No	System Parameters	Rating
1	voltage	415v,50Hz
2	inductance	2e-3 h
3	resistance	0.01ohm
4	Load	R=30,L=70e-3
5	Inverter parameters	DC Link voltage=14kv

VI. CONCLUSION

A seven level cascaded multilevel voltage source inverter based DSTATCOM using instantaneous real power controller is found to be an effective solution for power line conditioning. A new three phase four wire DSTATCOM using T-connected transformer has been proposed for Three-Phase Four-wire DSTATCOM system to improve the power quality. The performance of three-phase four-wire distribution system with and without controller circuits for Non-linear load was discussed in the above section and following observation is obtained. Two single phase transformers are used for the T-configuration of the transformer to interface with a three-phase four-wire system. The total kilovolt amperes rating of the T-connected transformer is lower than a star/delta transformer for a given neutral current compensation. From the above discussion, the proposed technique is very efficient one for power quality improvement of Three-phase Four-wire distribution system compared to other techniques (Using star-delta and etc).

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JOURNAL OF CRITICAL REVIEWS

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HISTOGRAM PATTERN AND KALMAN FILTER APPROACH BASED REAL TIME OBJECT RECOGNITION AND TRACKING SYSTEM

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ABSTRACT

Human tracking is implemented on a video sequence, which involves the analysis of the presence, size, shape and position of human beings. Human tracking is generally used in applications like video surveillance, crowd monitoring. Videos are series of images, called frames, which are displayed in faster frequency, such that human eyes will not be able to percept the continuous contents. Usually, the information of the contents present in two consecutive frames will be closely related. This paper presents a new approach for recognition of human use Histogram Specification with Kalman filtering approach. The main aim of this work is provide accurate recognition of human and view of their location from an unknown scene, Finally Kalman filter approach is apply the different positions of humans are identified based on the computation of Euclidian distance by using correlation matrix method. In this work results are drawn by using MATLAB tool by in view of the input video dataset taken from different sources and extract the frames from the input video for the detection and the efficiency of the proposed techniques will be calculated.

KEYWORDS: Histogram pattern, Kalman filter, Morphological operation, Euclidian distance.

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I. INTRODUCTION

Image Processing is the field where various number of research work has been taken up and implemented successfully. With increasing concerns for public safety and security nowadays, the need for automatic surveillance systems based on real time videos of public places is realized. The highly crowded and sensitive places like markets, shopping space, famous restaurants, railway stations etc. Must be equipped with these surveillance systems, without constraining their application to security under public spaces, they are also most demanded for the purposes of traffic control and examination, activity recognition and tracking, fault detection in industrial applications and semantic video indexing. In order to achieve the high level tasks of classification or tracking a target from video stream, the strategy used is to detect the target of interest in individual frames in the first place.

The technique used in many of the works for surveillance is the background subtraction method. This technique performs extraction of the foreground object i.e. the target under motion by separating the background and foreground pixels in the frame under processing. The advantages of this method namely the performance in the presence of a non-mobile video camera and illumination invariance are well exploited by many researchers. The building of a background model of the captured video frame is a key point to be considered.

II. HISTOGRAM SPECIFICATION WITH THE KALMAN FILTERING

The histogram specification is mainly applied for multiple human identification, the blob detections carried out using background modelling. The blob detection is mainly used to carry out the filing operation which is mainly

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needed to identify the connected components in the video frames. These connected components are defined as the blobs which are identified by using the adjacency of the neighbour frame pixels that are similar in nature. The present location of the identification stage is predicted by the features of the human being. These types of features are mainly obtained using the centroid of the blobs for the each blob that should be tracked [1-2].

The common plan of background segmentation is to involuntarily produce a binary mask that splits the cluster of pixels into 2 sets, foreground and background pixels. A stationary background frame are often matched to current frame uncomplicated cases. Pixels with high pixels area unit known as foreground. This straightforward technique may add few specialised situations. Each constituent is characterised by its intensity within the RGB house.

Next is Kalman Filtering Kalman filter may be a region primarily based technique to seek out the regions of the article in forthcoming frame. Centre of object is set 1st then Kalman filtering is formed use for predicting position of a similar within the next frame. Kalman filtering is most popular to cipher the state of a linear system. Kalman filtering consists of 2 steps, prediction and correction [3-5].

III.ALGORITHM FOR HISTOGRAM PATTERN WITH THE KALMAN FILTERING

It provides optimum estimate to come up with the position for the motion model for a moving object though the video contains some quantity of dynamic noise and uproarious observations concerning the position at on every occasion step. For Gaussian noises, Kalman filtering can give an optimum resolution. The filter reduces the mean sq. Errors of the parameters like position, velocity, etc [9].The Kalman filter is essentially an internet method, which implies the new observations are going to be processed as and once they arrive. A distinct time dynamic linear system having AN additive racket that may model surprising disturbances are going to be needed to formulate a Kalman filter is the problem [10].

Step1: Firstly, reading the input video data; a continuous signal to extract the individual frames it is comprised of is performed.
Step2: The input video is usually color image in RGB color space. It is easy to apply image processing techniques.

Step3: Thus, next step is to convert each RGB video frame into its gray scale form.

Step4: Blob analysis technique can be applied involves Thresholding and morphological operations.
Step 5: In the next step sing Kalman filtering technique can be applied to remove noise inherent in the frames so that final output is refined well.
Step 6: The task of background subtraction is a challenge as it is subject to variations in the lighting conditions or occlusions in the scene.
Step 7: Morphological processing is carried out on the target detected frames where a number of operations perform noise removal.
Step 8: As a last step, Fourier transform is applied on the morphologically processed frame to extract the lost frequencies of the target video frame in the noise signal so that no data is compromised.

IV.FLOWCHART FOR PROPOSED SYSTEM

This diagram presents in theform of bubble graphs can be defined as dfds. Data flow diagram is one of the easiest graphical representations describes in Figure 1 [11].

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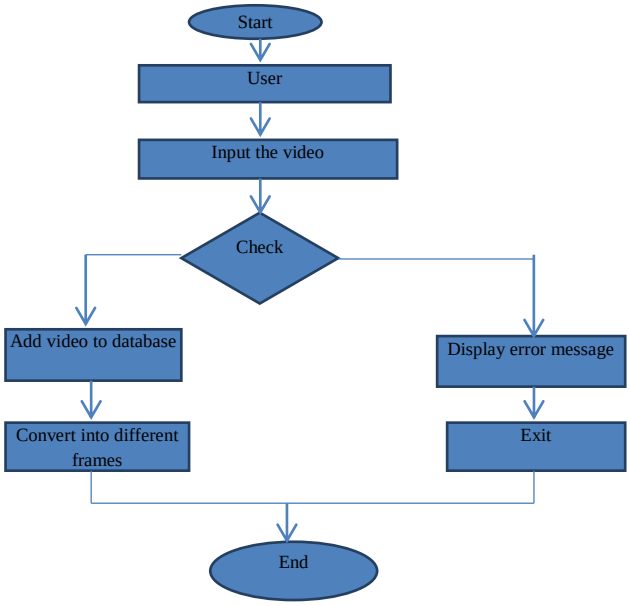

Figure 1: Data Flow Diagram for Add Database

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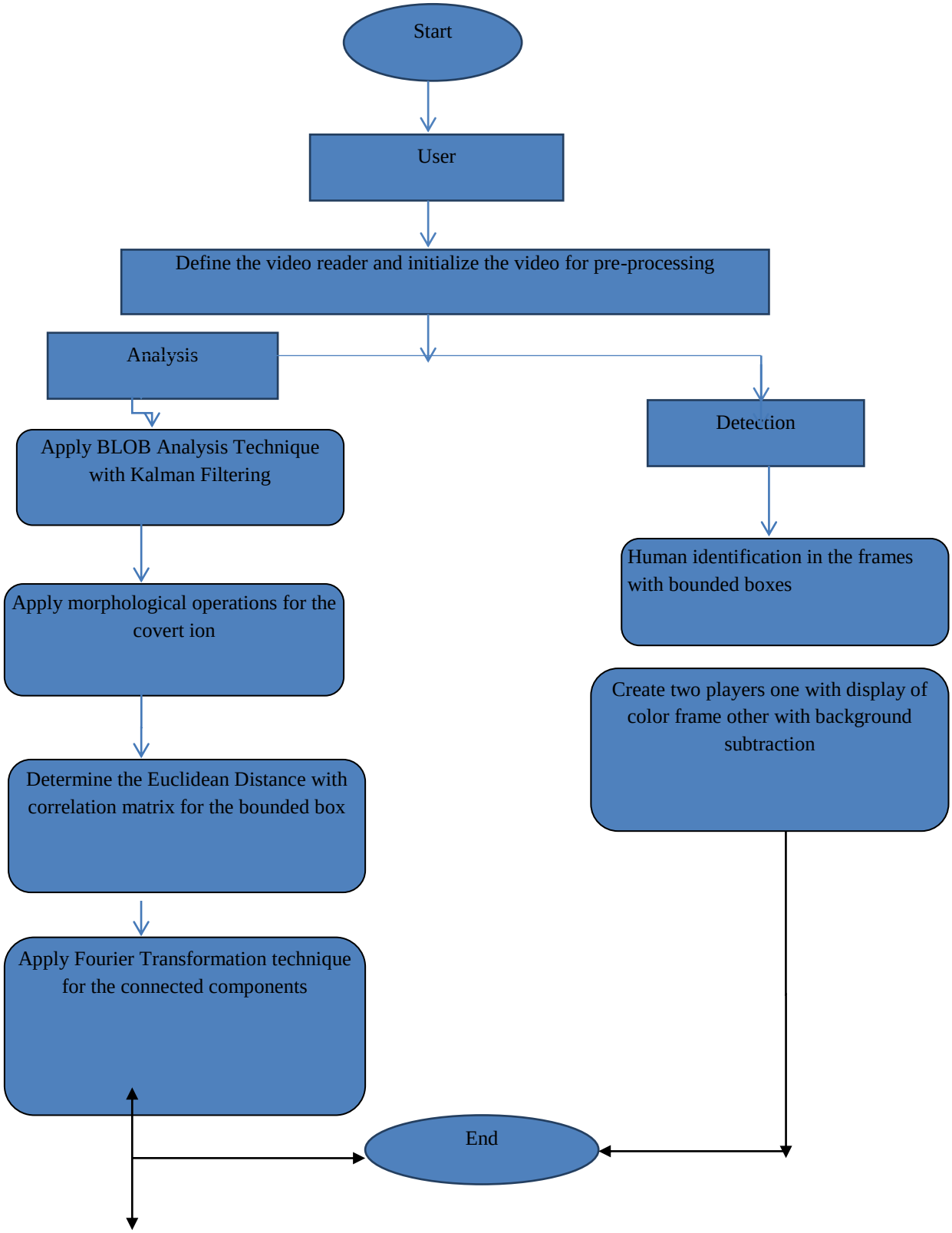

Figure 2: Data Flow Diagram for Proposed Technique

Use Case Diagrams

The use case diagram depicted in the Figure.3 describes the communication between the end user and the application framework, where each functionality and the communication will be recorded and performed accordingly. The characters who are involved in the process will be referred as on screen characters and who are

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performing outside the framework will be referred as performing artists. The main objective of this design diagram is to describe how the communication between each module is done, that's helps in the implementation of the work [14-15].

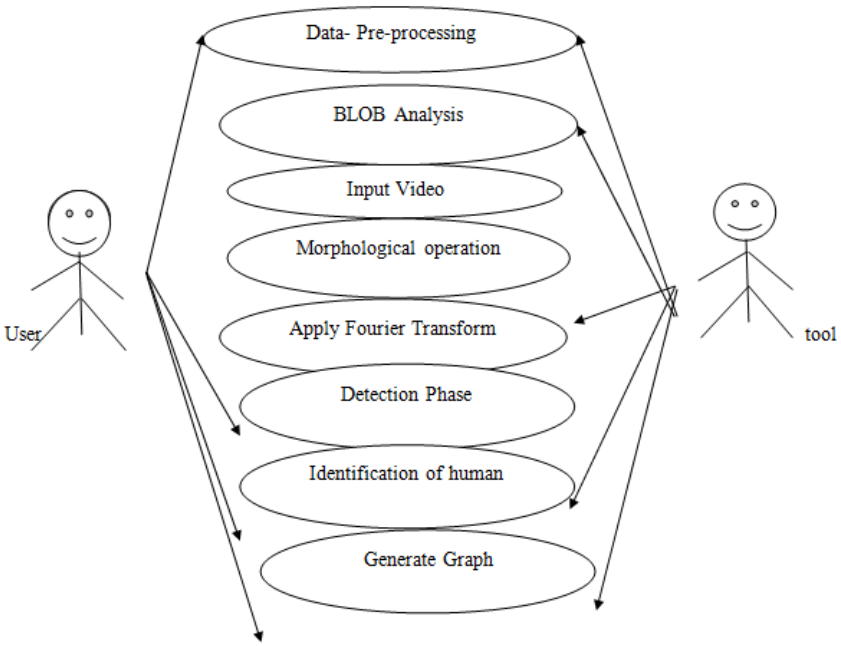

Figure 3: The Use Case Diagram for Proposed Technique

V. SIMULATION RESULTS AND DISCUSSION

The results of the proposed approach are drawn in the MATLAB tool which provides us the effective solution for Multiple Human detection in the video. Even though there are various works has been carried out so far the proposed research work strands unique with its desire to provide an excellent results for the different kinds of the videos considered [6-8]. In this research work first the BLOB analysis is applied then applied the Kalman filtering along with Euclidean distance provides more effective results with minute number of false detections. The main advantages of this proposed work is provide an efficient algorithm which is easy to implement and contains less complexity in detecting the human presents in the video [12-13].

The first input video under the consideration is a good quality video of the duration 15 seconds and the memory size is 25MB. The video taken is from jewelry shop which consists of 3 persons with sitting in the shop watching the jewels. The identification of human result its grey scale image representation of a video frame is as shown in below Figure.4 with the background subtraction. The figure.4 describes the identification of persons based on the hand movements. Figure.5 describes the human identification based on the face and the leg movements of the person [16-18].

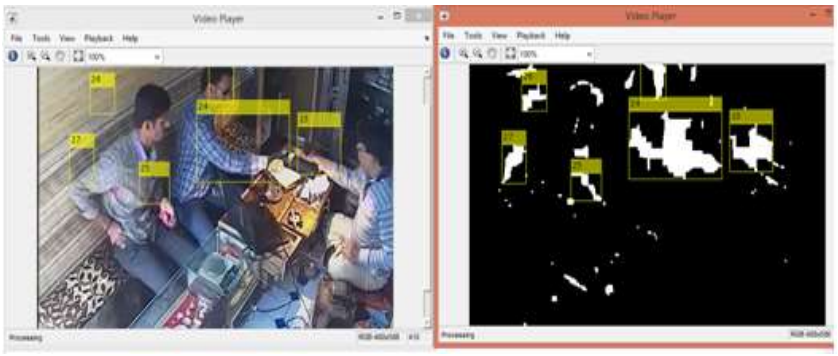

Figure 4: Human identification based on Hand Movements

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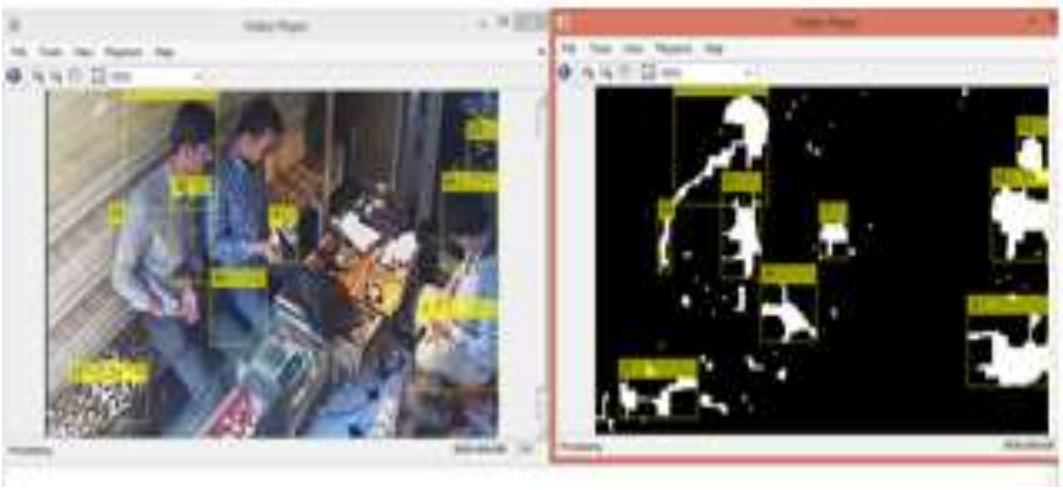

Figure 5: Human Identification based on Face and the Legs of the Human

The accuracy of the proposed technique described in Figure.6. This accuracy of this proposed work is represented in the output graph which is plotted against number of frames identified with human and total number of frames and drawn with the help of five different input video from different sources by varying the size of the video along with different background. An average accuracy of 90.5% has been achieved, where each of the video frames varies from 150 to 1500 and for each of the video accuracy varies from 82% to 95% in identifying the human [19-21].

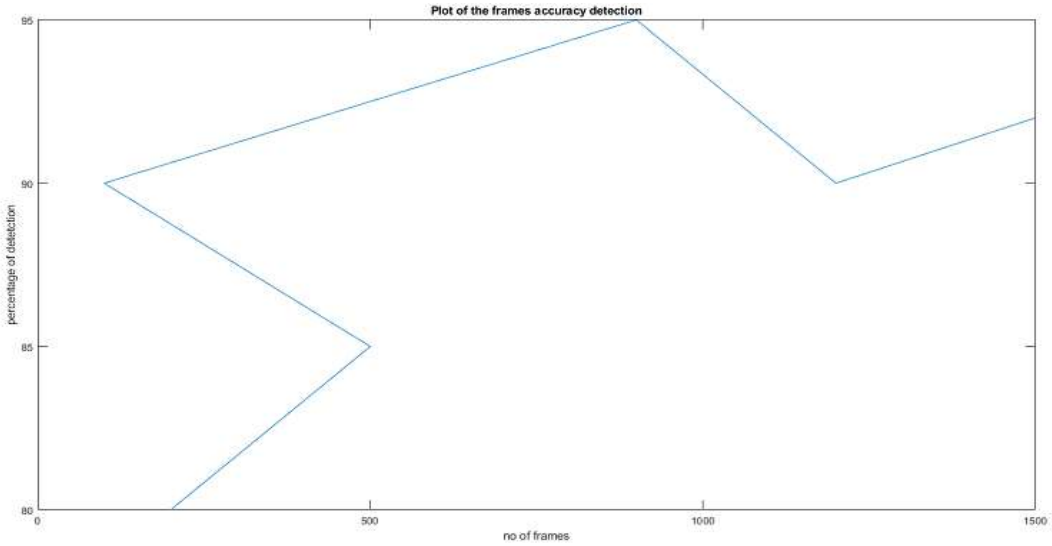

Figure 6: Accuracy of the Proposed Number of Frames vs. Percentage of Detection

The graph is plotted by considering the axis (X, Y) generates a 2-Dimentional plot for the line for the data obtained from Y vs. The values presents in X.

- If both the considered variables are vectors, then the length between both the variables will be equal. Then plot the graph againstY versus X.
- If both the considered variables are matrices, then the size between both the variables will be equal. Then plot the graph against function of variable Y versus function of variable X.
- If anyone the considered variables are defined as vector and the other is defined as matrix, then the defined matrix must contain all the dimensions in such way that they should be in equal length. If the row of a matrix contains equal length then graph must be plotted for each of the matrix against each of the vector.
- The total number of identified in the matrix considered for blob analysis and the filtering processing provides the number of frames percentage against the blob detected.

VI. CONCLUSION

This section concludes the human identification with Histogram Specification and Kalman filtering with Euclidian distance techniques can be presented. During this human identification process the input video frame pixels are applied with various pre-processing methods. The subtraction of background method is applied to remove background unmatched objects. All the moving objects will be detected in background subtraction method by keeping the background of the video frame stable and constant. Then the Histogram Specification with the kalman filtering approach is applied, where Blob Analysis technique for modelling then followed by kalman-filter technique is applied where different positions of humans are identified based on the Calculation of Euclidian distance calculation using the correlation matrix. In the future the scope is to implement the Human identification based of his theft actions using multiple cameras, when the person's activities found doubtful the he is identified as the theft and alarm must be generated to identify the theft, this provides accuracy in tracking results in an efficient manner by considering the videos captured with different position and fields using the Raspberry Pi hardware.

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Optimal placement of DSTATCOM in Electrical Distribution System

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Abstract

Currently the electrical energy demand is rising faster way in developing countries like India. As a result, more distribution losses and low voltage profiles in the large and complex electrical distribution systems (EDS). Studies observed that nearly 10-15% of the total generated electrical power is fed on as I2R losses at the stage of distribution level. The consumers voltages have reduced when moved away from the substation and such consumers contribution in distribution losses is more based on associated connected load of consumers. In addition to that voltage stability decreases and maximum loadability margin also reduced in the distribution lines. Subsequently, it will be imperative to improve the capacity of power transmission in EDS. The planning and optimization of compensating device and Distributed Generation (DG) are estimated to improve the reduction of energy losses and beautify the consumer voltage profile in the EDS. The recommended approaches introduce with planning and optimization using simple and fast load flow solution for optimal placements and optimal sizes of the Distribution Static Synchronous Compensator (DSTATCOM) with different optimization methods.

Keywords: *EDS, D-STATCOM, ITLBO.*

1. Introduction

Generally, the radial distribution networks have high R/X ratio, which causes high line losses in the system and it leads to affect the system stability. So many researchers approximated that the distribution system power loss is high compared to transmission system. From the consumer point of view, the power loss reduction is one of the important issues to improve the overall efficiency of the power delivery [1]. Reactive power compensation is one of the best ways to reduce the losses in the distribution system. The shunt capacitors and serious voltage regulators are traditionally used for reactive power compensation in the distribution system. But these devices cannot able to provide the reactive power continuously and they have very slow response. In addition to that the shunt capacitors produce oscillation in the distribution system when it combines with inductive circuits [2].

Now a days the application of FACTS concept such as DSTATCOM has been applied for distribution system for line loss reduction, voltage profile enhancement, power quality improvement and load balancing etc., Compare with other reactive power compensation devices, DSTATCOM has many features, such as low power losses, less harmonic production, high regulatory capability, low cost and compact size. The primary function of DSTATCOM is to supply reactive power in the distribution system in order to reduce the line losses, power factor correction and voltage profile enhancement.

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DSTATCOM is predicted to play significant role in the radial distribution systems due to the increasing power system load.

Optimum allocation of DSTATCOM maximizes the load ability, power loss minimization, stability enhancement, reactive power compensation and power quality enhancement [8]. To determine the optimal location and sizing of DSTATCOM has a considerable impact in radial distribution system. In appropriate placement in some situations can reduce the benefits and even endanger the entire system operation. Only a few research works were done in the area of DSTATCOM allocation [3].

No work done in the literature to focus on the power loss reduction along with system voltage stability improvement reduces the voltage deviation, improve the LLM and decrease the loss allocation to consumer [4]. This work proposed various indices based on the power losses, voltage deviation, voltage stability, LLM and consumer loss allocation. Proposed a generalized multi objective function which can use in any of the planning optimization to improve the EDS performance [5].

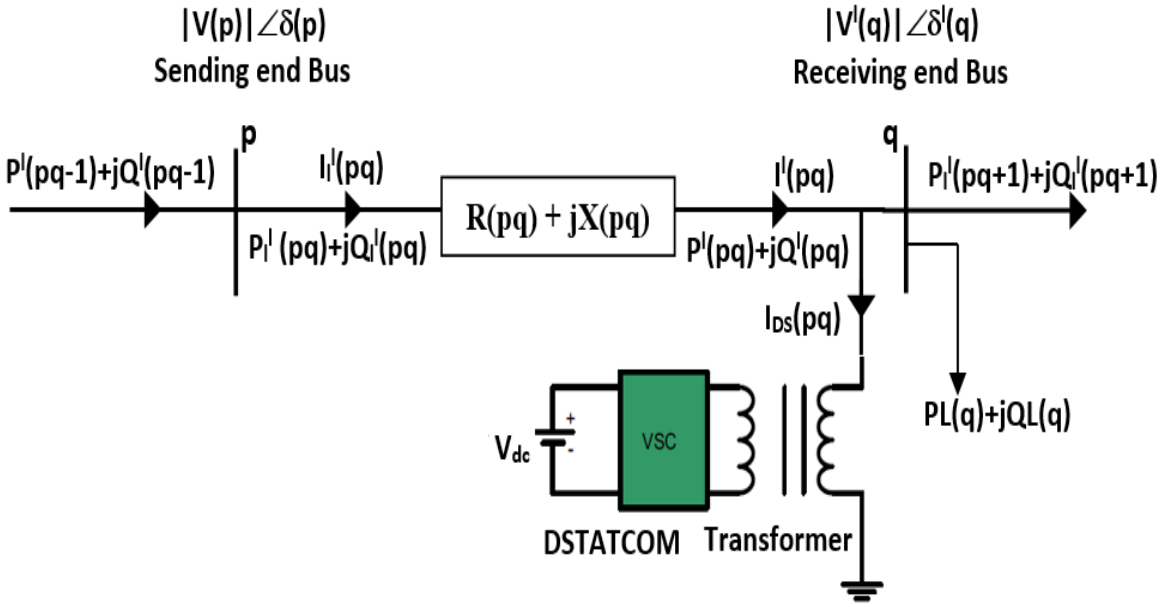

Figure.1: Equivalent circuit model of EDS of a typical branch pq with DSTATCOM

A new approach is investigated to find the optimal location and sizing of DSTATCOM with an objective function of minimizing the total system power losses by including the voltage stability, voltage deviation, LLM and loss allocation to consumer. Improved Teaching Learning Based Optimization algorithm is used to find the optimal location and sizing of single and multiple DSTATCOM. The proposed work is tested on 33-node and 69-node EDS. The obtained result shows that optimal placement and sizing of DSTATCOM in the EDS effectively reduces the total power losses of the system and also improve the performance of the EDS.

2. Various Impact Indices for the Multi-objective Problem

For the planning and optimization of EDS, the multi-objective formation includes six individual objectives that are transformed to related impact indices in or to make the analyze all objective simultaneously with simple analysis. Following are the indices proposed to handle the planning and optimization EDS problem effectively.

2.1 Index for Power losses based on available load (IAPL and IRPL)

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The system operates at maximum performance represent as reduces the losses. In this case, the real and reactive power loss indices are defined as follows respectively [6].

$$IAPL = \left(\sum_{pq=1}^{br} P_{loss}(pq) / \sum_{q=1}^{nd} PL(q)\right) \quad (1)$$

$$IRPL = \left(\sum_{pq=1}^{br} Q_{loss}(pq) / \sum_{q=1}^{nd} QL(q)\right) \quad (2)$$

where

$\sum_{pq=1}^{br} P_{loss}(pq)$ is total APL in kW

$\sum_{pq=1}^{br} Q_{loss}(pq)$ is total RPL in KVAr

$\sum_{q=1}^{nd} PL(q)$ is total active load in kW

$\sum_{q=1}^{nd} QL(q)$ is total reactive load in kVAr

Planning and optimization of EDS will decrease the total network losses, which means near zero values of IAPL and IRPL.

2.2 Index for Deviation of bus voltages (IVDI)

The system voltage deviation index (VDI) is defined with respect to eqn. above equations for EDS. The index for the voltage deviation is the system voltage deviation index only as shown below

IVDI= VDI (3)

The decreasing value of IVDI refers to the improvement of voltage profile as well as voltage regulation at the nodes. Any planning and optimization of EDS will decrease the system voltage deviation index and make it zero value of IVDI.

2.3 Index for consumer loss allocation based on total APL (ICPL)

The loss allocation to consumer far away from the substation is high with the proposed PLAM . It is needed to observe the consumers with high loss allocation burden and any allocation method should always give the best to reduce their loss allocation. The index is developed to observe the maximum loss allocation consumer based on the total system APL.

$$ICPL = \max_{q=1\ to\ nd}\left(CP_{loss}(q) / \sum_{pq=1}^{br} P_{loss}(pq)\right) \quad (4)$$

Where

$CP_{loss}(q)$ is the loss allocation of qth consumer

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For any planning and optimization, it is accepted to reduce the burden of high loss allocation to the customer and ICPL should reach near to zero and loss allocation to most of the consumers will decrease.

2.4 Index for VSI (IVSI)

The VSI gives a significant detail about the voltage stability of the radial distribution systems. In this approach, VSI is taken as the decisive factor which variation of VSI value indicating the system voltage stability during of any planning and optimization in EDS. The index of VSI is defined as

$$IVSI = \min_{q=1\ to\ nd}\left(VSI(q)\right) \quad (5)$$

The intensity of stability can measure the distribution system using the IVSI and thereby necessary action, possibly taken if the index indicates the instability condition of the system. The system operates at secure and stable condition the evaluated VSI values are greater than zero, otherwise instability occurs.

2.5 Index for LLM (ILLM)

With planning and optimization of EDS significantly changes the power flow in various sections of the EDS. The maximum loading allowed with the addition of branch LLM is the acceptable limit of branch to avoid the system instability. The ILLM index gives in details of minimum loading of LLM from all branches of LLMs in EDS.

$$ILLM = \min_{pq=1\ to\ br}\left(\frac{LLM(pq)}{LML(pq)}\right) \quad (6)$$

It is needed to increase the ILLM value increase to operate the EDS system with high LLM values and utilize the existing lines for handling the future load growths.

3. Flow Chart for DSTATCOM Placement and Sizing using ITLBO Algorithm

To solve the optimal location and size of the single and multiple DSTATCOM problem in EDS, ITLBO is applied to minimize the MOPI function eqn. (7) [7]. Initially, ITLBO algorithm parameters (such as number of generations, population size (i.e. number of learners), number of teachers and number of subjects), the number of DSTATCOMs locations and according to that sizes, constraints and the system specifications, including the bus and line data, should be considered as inputs of the ITLBO. The ITLBO algorithm based MOPI is given by

$$MOPI = w_1.IAPL + w_2.IRPL + w_3.IVDI + w_4.ICPL + w_5.\left(\frac{1}{IVSI}\right) + w_6.\left(\frac{1}{ILLM}\right) \quad (7)$$

The location of DSTATCOMs can be chosen as any integer number between 2 and the maximum number of system nodes (as 1 is the substation) and size of corresponding location DSTATCOM changes from 5 kVAr to less than or equal to total reactive load of EDS. The variables for optimization are the location of the DSTATCOMs and sizes of imaginary DSTATCOMs powers.

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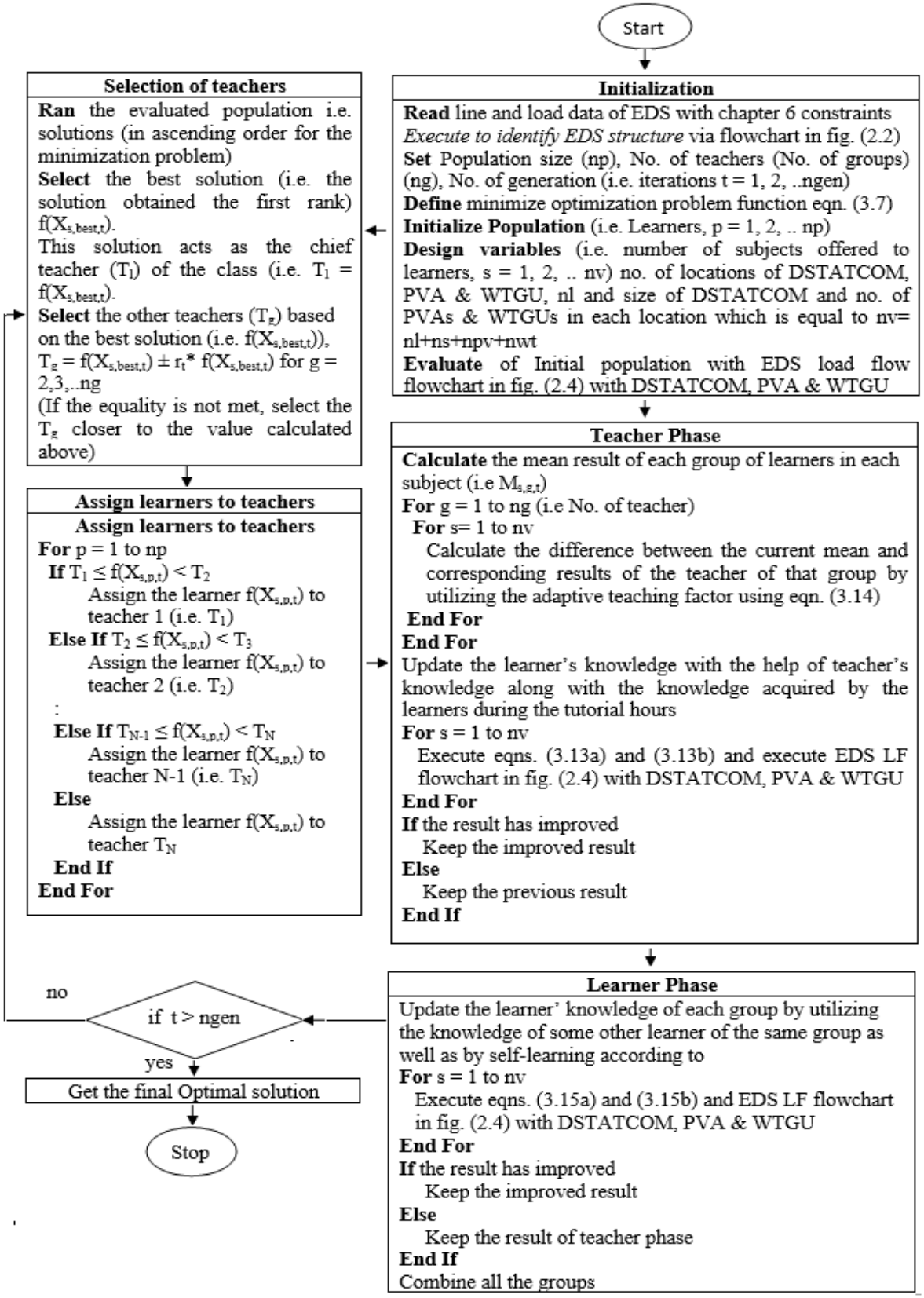

Figure.2: Flow chart for DSTATCOM, PVA and WTGU Placement and Sizing using ITLBO

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4. Conclusion:

In this work, the utilization of the ITLBO procedure for solving the DSTATCOM location sizing problem for minimizing the system MOPI function with different number of DSTATSOMs has been considered. In this proposed method a generalized MOPI function developed and which is used to search the optimal location and size of DSTATCOM. DSTATCOM location and sizes can be found by using ITLBO among a large number of combinations by optimizing the objective function. The present approach reduces the power loss and improves the bus voltage accurately and effectively in the EDS to enhance the minimum LLM and reducing the consumer loss allocation.

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Feeder Protection From Over Load Situationsthrough IoT

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ABSTRACT

A bus bar in an electrical power distribution refers to bulky segments of copper or aluminum that carry out electricity within a switchboard, distribution panel and substation. In this task, bus bar can be protected from the over current condition. Mechanical instruments disappointments have numerous causes and one of the primary causes is over burden. The crucial of the distribution transformer is anticipated to work at assured particular current, if that current passing through that feeder is more than the rated then instantaneously the feeder may damaged because of over load, through this projected work we are departing to defend the bus bar from heavy load condition. In this work, more loads are applied to the circuit to produce high current. So that the current will be increased. At whatever point the over current happened the circuit will be tripped. Here, one relay is utilized which will control through our microcontroller to trip the circuit. Whenever over load is occurred relay will trip the whole circuit and buzzer will on control through our microcontroller to indicate over load. Whenever over load occurs micro controller automatically triggers the load to OFF and data will alert through IoT.

Index Terms *–IoT, Buzzer, Fault, Feeder Protection, Fuse, Microcontroller, Over Load, Relay and Smart Grid.*

1.INTRODUCTION

In electric power distribution, a programmed protection of over burdenof distribution network is an electrical circuit breaker equipped with an instrument that can naturally close the breaker subsequent to that it has been opened owing to a fault. Programmed over-burden securitysystems are used in coordinated protection schemes for overhead line power distribution networks. These circuits are horizontal to momentary faults such asoverload and short circuit faults. A transient fault roots open the breaker contacts or gust the fusewith conservative circuit breaker or fuse, disabling the line awaiting a technical person could physically close the breaker or substitute the blown fuse. But a programmed overload protection system will make quite a few pre-automatic attempts to or bring back to healthy or strengthen the line.

In order to reduce the problem many design techniques can be found in literature [I],[II],[VII],[IX]. One of them is commonly used feeder protection &relay converters [III],[VII]. The power of a proposed design is very effective and reliable manner.

The upheaval has bring in the present world by Internet of Things (IoT) supported technology behind its innovatory in the pasture of PC and web. In this manner we can utilize the derivation of IoT innovation inside the grid. In distribution network, a modified programmable over-burden

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safeguard system which is an electrical switch secured with a component that can lacking human intercession shuts the breaker after it has been unlocked owing to a fault. These networks are mostly laying face down to the transitory faults such as overload or short circuit faults. With mainstream fuse or breaker switch, a fault will open the breaker or blow the fuse. Thus immobilizes the line turn over a specialist can physically replace the gusted fuse or shuts the electrical switch i.e., breaker on. Be that as it may, the overload protection system can create numerous preprogrammed attempts consecutively to boost the line or recover the original network. The preliminary protection of feeders with fault clearing time as described is drawn in Fig. 1.

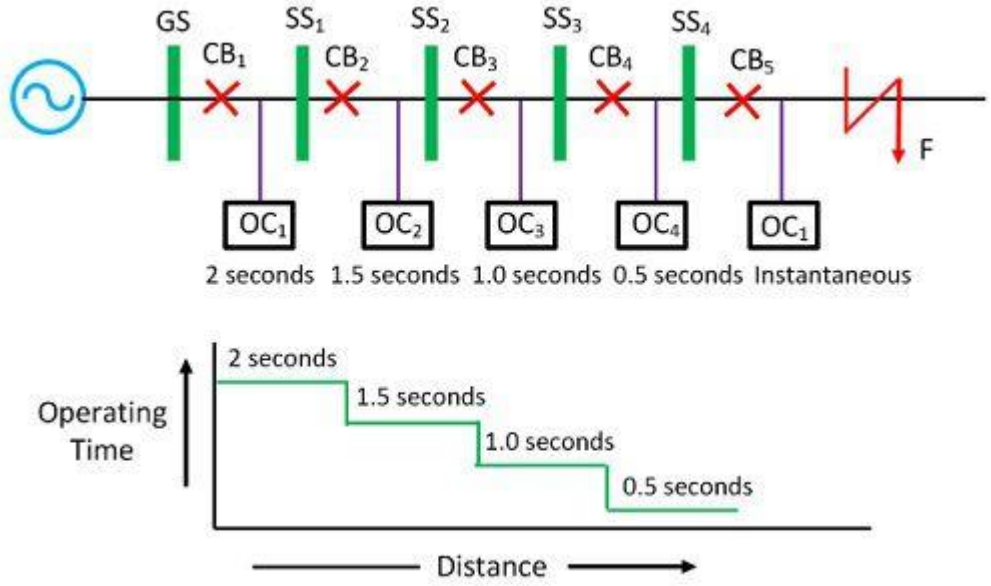

Fig. 1 General Representation of protection of Feeders

If the fault has been cleared then breaker circuit of the computerized over-load security system will keep on secured and power supply continues working. Today the world is moving quickly towards the more equipped and efficiently organized smart grid structure by subbing the present overworked proficiency with the smart grid technology which is illustrated in Fig. 2. So we can utilize both the information so as to make the near power system more functional and efficient. Smart grid and IoT is a portrait wonderful mixture of two, which will bring about upgrade of the current network configuration with feeders.

An embedded scheme is a combination of programming and equipment to play out to perform a devoted task. A portion of the fundamental devices utilized in embedded items are Micro-controllers and Micro-processors. Microprocessors are frequently referred to as general purpose processors as they merely recognize the efforts, process it and give the output. Interestingly, a microcontroller acknowledges the data as inputs as well as controls it, interfaces the data with a variety of devices to control the data and thus finally gives the output.

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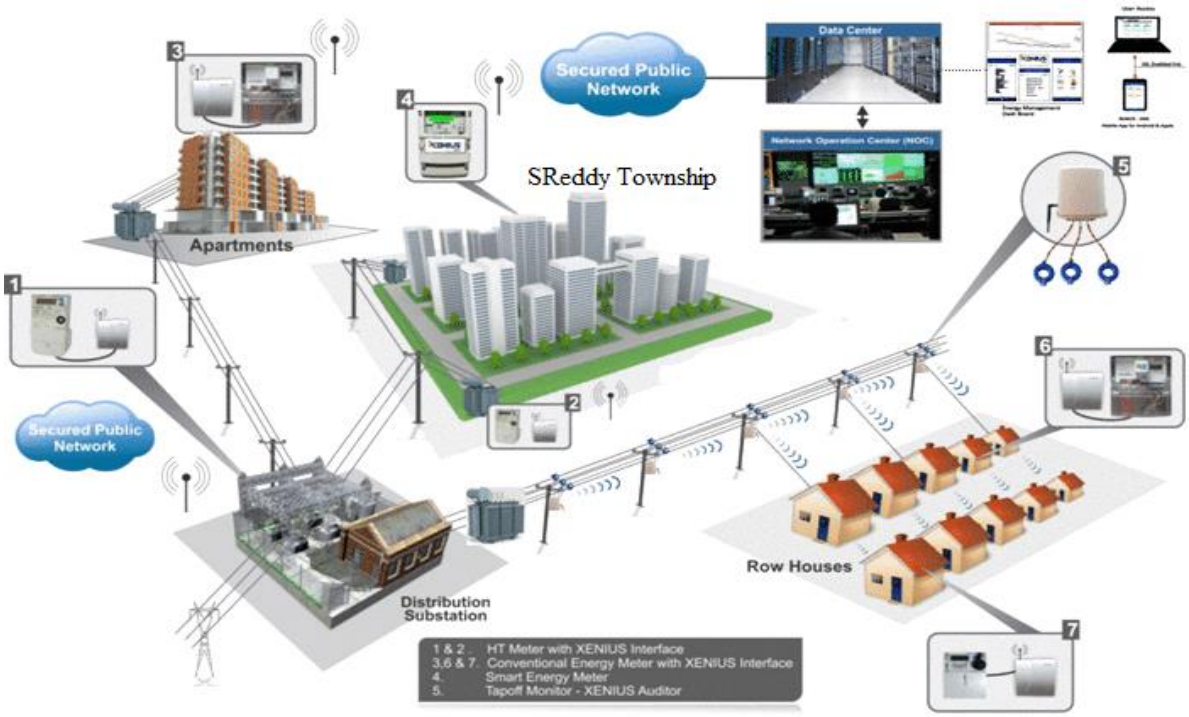

Fig. 2 Feeders with Smart Grid

2. TRADITIONAL SYSTEM

In existing power feeder network, load current is escalating in environment so it will directly pressure to the customers equipments and end user side end users. The protection of total system of Parallel Feeders as shown in Fig. 3.

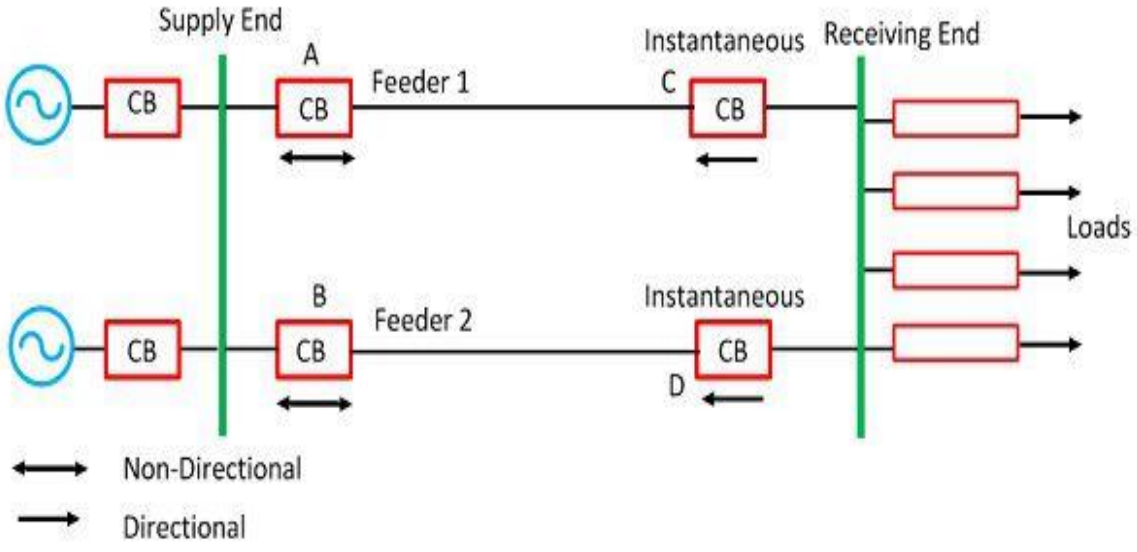

Fig. 3 Protection of Parallel Feeders

The equipment is associated in end user side will be collapse due to flow of over currents in the feeder streams. There is no precise controller is mounted on power lines for fault identification. The existing network will not be able to identify the faults like feeder overloading which reasons the load balancing problem of feeders for the reasons that of chances of failing the equipment owing to huge heavy load current.

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3. IMPLEMENTATION OF PROPOSED SYSTEM

Here, Arduino used as a controller. If current sensor is sensed on the buzzer which will be displayed on LCD. Web server updated using IOT module and trip the relay bulb is OFF. POT is used if Voltage increased that time load will off. In order to implement, the system code is shown in Fig. 4. After sensing the fault, the microcontroller will sent signal to overload entity to trip the relay immediately. Also sends SMS through IOT module.

```
#include <LiquidCrystal.h>
#include <stdio.h>
LiquidCrystallcd(6, 7, 5, 4, 3, 2);
int buzzer = 13;
int relay  = 8;
int FS =A0
int POT   = A2;
void beep()
{
digitalWrite(buzzer, LOW);
delay(1500);
digitalWrite(buzzer, HIGH);
}
void setup()
{
Serial.begin(9600);//serialEvent();
pinMode(POT, INPUT);
pinMode(FS, INPUT);
pinMode(buzzer, OUTPUT);
pinMode(relay, OUTPUT);
digitalWrite(buzzer, HIGH);
digitalWrite(relay, LOW);
lcd.begin(16, 2);
lcd.print("iot feeder over load alert");
lcd.setCursor(0, 1);   //column,row
lcd.print("F:");         //3,1
```

Fig. 4 Representation of pseudo code

The compilation process is given in steps from Fig. 5 to Fig. 7 in a sequential manner.

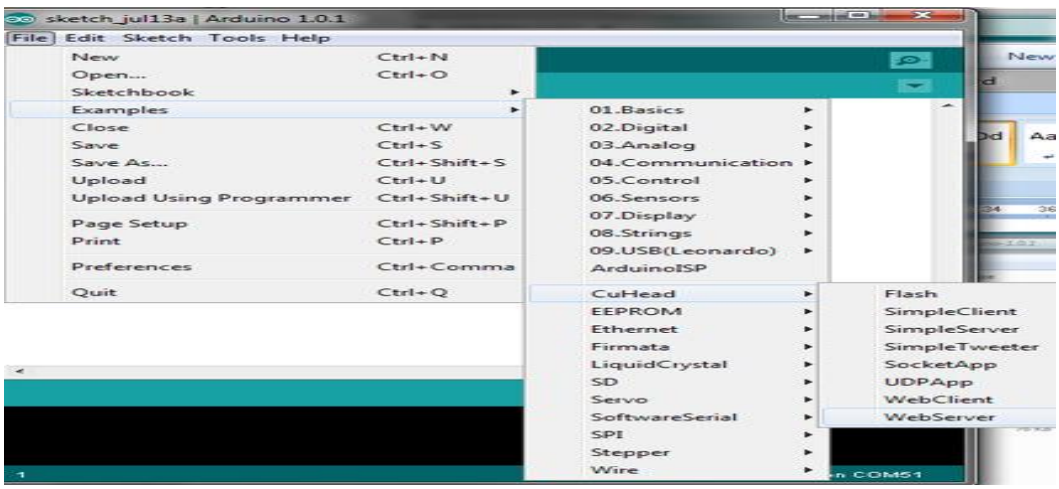

Fig. 5 Compilation Process Step 1

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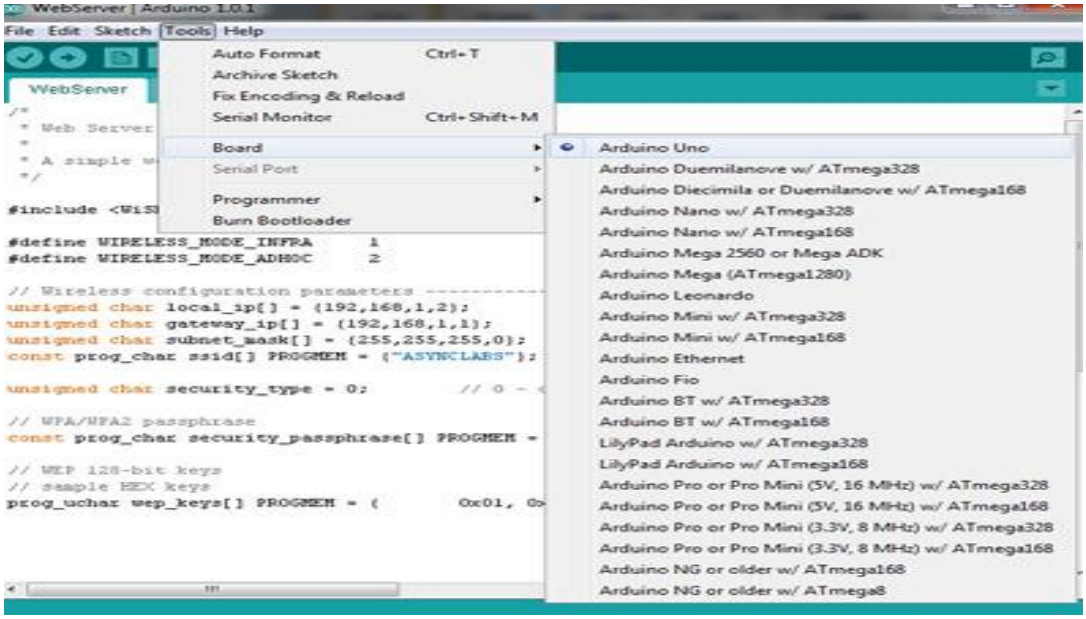

Fig. 6 Compilation Process Step 2

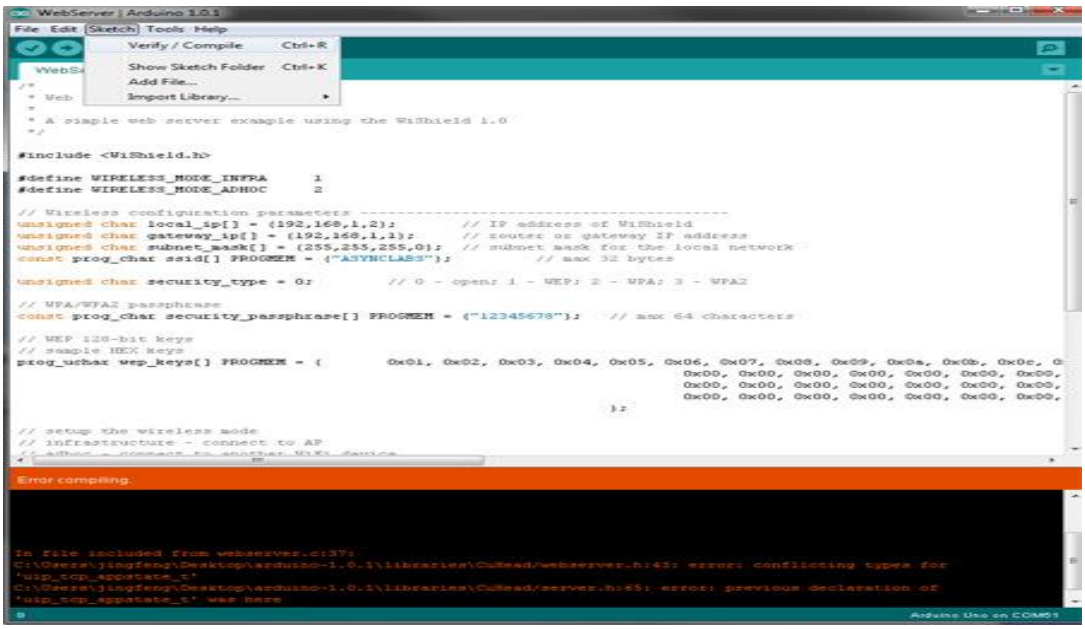

Fig. 7 Compilation Process Step 3

Liquid Crystal Display (LCD)

A schematic diagram of conventional D-flip flop is illustrated in Fig.8.

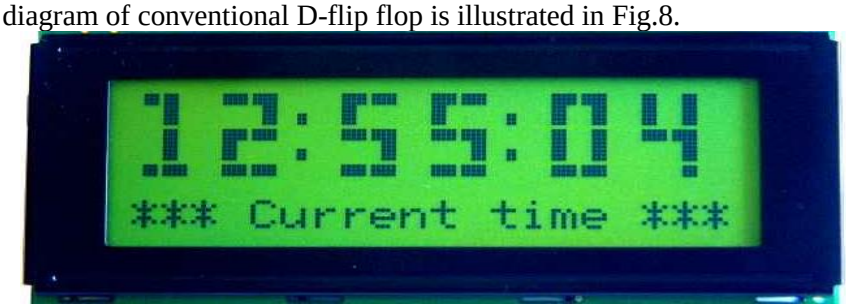

Fig. 8 LCD Display

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The microcontroller ARDUINO UNO is heart of our working model. Feeder protection from overload is the prototype modules which consist of ARDUINO UNO microcontrollers, current sensor, ADC 0808, relay module, 16*2 LCD module, IOT module, Buzzer, Bulb, feeder supply and power supply. The automatic overload protection System circuit has a current sensing unit to detect the over current through the power line through potentiometers POT. A schematic diagram of conventional D-flip flop is illustrated in Fig.9.

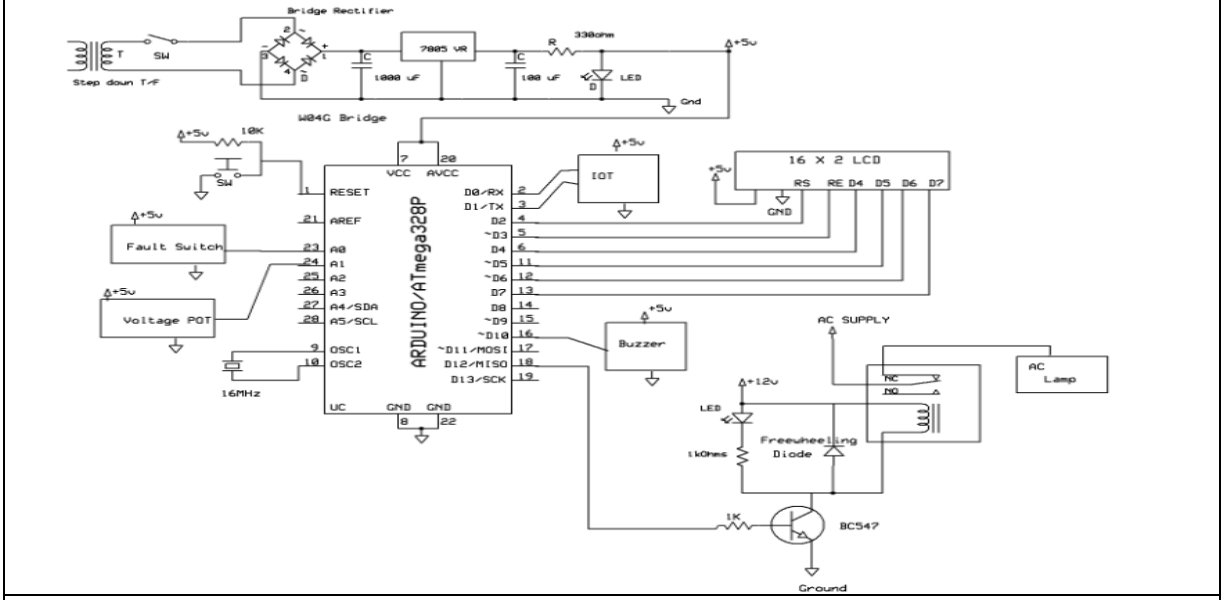

Fig. 9 Architecture of proposed model

The basic two reasons for the over current in a power line are overload and short circuit. So, when these faults occur the gives a signal to the line controller circuit. In this work, to produce high currents, more loads are relating to the network which will increases current. The current sensor in the system is associated in series with the power line and sense the current flow through the power line is to be tripped. To trip the circuit. Here, one relay is used to control through our microcontroller for tripping.

4. WORKING PRINCIPLE

In this section we are going to describe Block Diagram with Arduino for protection which is drawn in Fig. 10. The schematic of working model as shown in Fig. 11.

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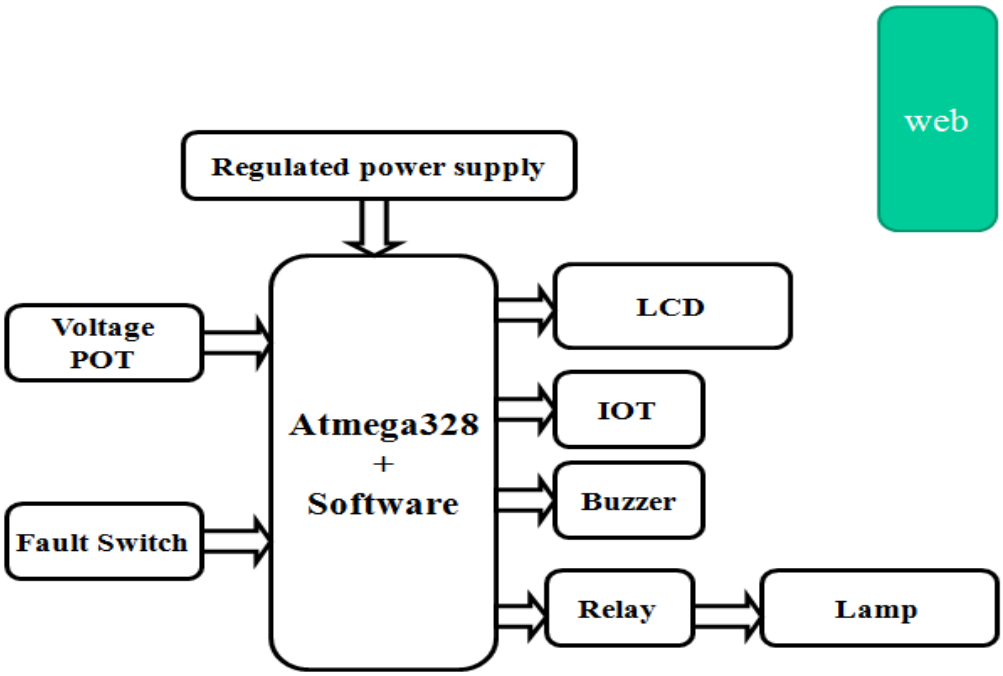

Fig. 10 Block Diagram with Arduino Protection System

Advantages:

- Controls high and low voltage levels
- Fast response
- Efficient and low cost design
- Low power consumption
- Long life

Disadvantages:

- Fast response based on signal for communication.

Applications:

- Industrial
- Power Generation
- SCADA Systems

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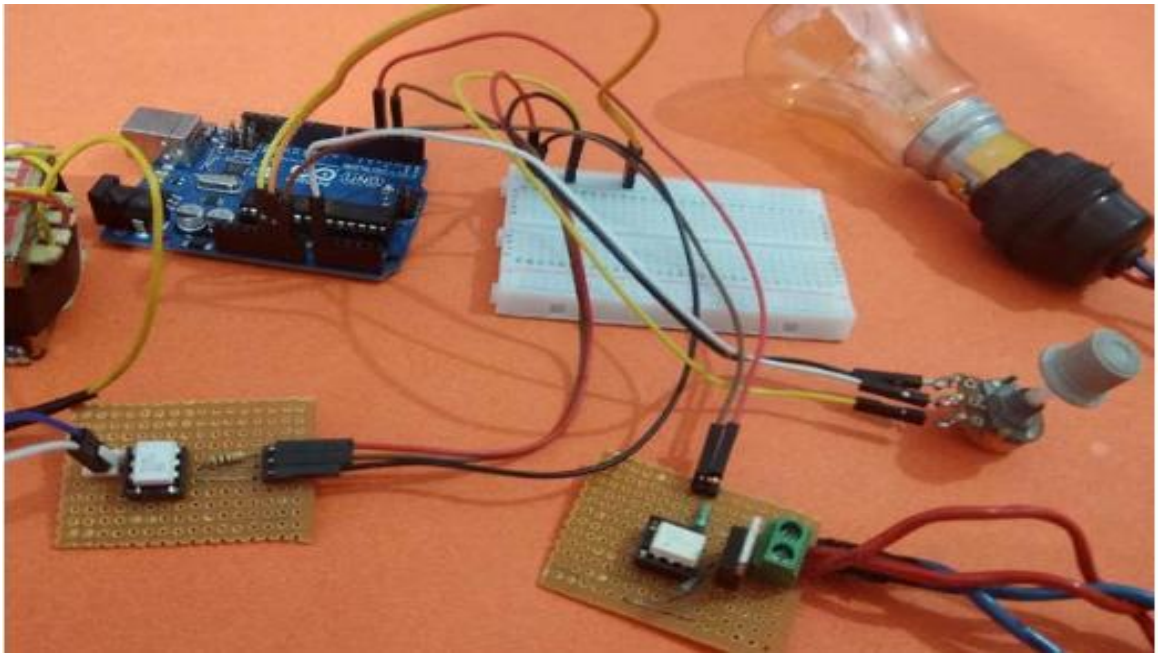

Fig. 11 Schematic of Working Model

5. CONCLUSION

In this work, learned about plan to accomplish sort out and scrutinizing of overload state of feeder lines by estimating the voltage of each line. In this projected work, a system is designed in such a way that, it will supervise and manage the load continuously and that information is send to user mobile number using IoT technology. Today the world is stirring rapid towards the more active and efficient smart grid technology by exchanging the current time worn technologies. The object of this work is to develop the allocation of power, where hitches resembling burden shedding a typical circumstance.

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Modeling of Smart Electric Vehicle Charging Hub

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ABSTRACT

An electrical vehicle charging hub is a charging power gracefully for electrical vehicles. This paper proposes the structure model for a PV based mechanical electrical vehicle which goes about as a wellspring of electric source to charge Electric vehicles (EV). EVs are viewed as the upcoming methods of transportation by 2030. The key drivers for EVs are their high effectiveness and zero carbon discharges. However, EVs are just reasonable if the power used to charge them originates from inexhaustible sources and not from petroleum product based force plants. It is here that the UV light based charging of EV has picked up enthusiasm for late occasions, as it gives a suitable strategy to charge EVs. The objective of this task is to "Develop a profoundly proficient, automated EV charging station which empowers brilliant charging framework for electric vehicles at working environments that is fueled by Solar Energy".

Index Terms *– Electric Vehicles, Photo Voltaic Cells, Sun, UV light, Solar*

1.0 INTRODUCTION

The growth of Electric Vehicles (EVs) is causing a profound transformation in the automotive industry. The differences in the manufacturing process, additional safety concerns, different requirements for the materials involved, and so on have changed the way the car industry operates. These changes are also reflected in different disciplines, such as energy conversion, because power electronics has a fundamental role in both EV traction and battery recharging processes. Several studies on traction have been con- ducted in order to provide lighter and smaller converters, smoother dynamic response, improve the efficiency and reliability of the equipment, which are not excessively distant from the conventional requirements in most motor drive applications. The fast charging process of the batteries, however, implies fundamental changes with conventional high- power applications because, aside from the vehicle, this process also involves the utility grid. In addition, the low-voltage levels of the battery packs increases the complexity, as typically these applications require medium voltage (MV) levels, hence impose a trade- off between the current stress of the switching devices[3].

Solar Power is effectively bridled in the tropic locales in light of the more drawn out daylight encounters contrasted with non-tropic areas. India is fortunately inside the tropics, this means a preferred position to its populace. Indeed, even with all the luck, the principle issue comes in the crew and preservation of these inexhaustible sources in addition to the high and disallowing introductory expenses of funding to set even a little scope sun based station.

This model of structuring a sun based controlled automated electric vehicle charging hub that uses UV light based force as a vitality source is intended to address various issues that standard interior ignition motor vehicles don't. An electric vehicle with a UV light powered charger will be simpler to utilize. It will minimize those unnecessary trips to the gas station for fill-ups. Simply plug the vehicle into the charging station when not being used and it will be powered and prepared for your drive. Above all, it eliminates interior ignition vehicle which are for the most part answerable for ecological contamination

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and causes the green house gases believed to be responsible for the global warming.

2. EV TECHNOLOGY DEFINITIONS

The term EV is often used to designate different vehicle technologies, even though they have some substantial differences. To clarify the concepts used in this proposal the main types of EVs available today are defined as follows [1]:

Hybrid Electric Vehicles (HEV): This technology uses the electric power of batteries to improve the fuel efficiency of their internal combustion engine. The electric power to charge their batteries does not come from any external source.

Electric Vehicle (EV): These vehicles run on a purely electric motor which is powered by batteries. Refueling is done by plugging in the vehicle to the grid. The term battery EV is also used in the literature for this type.

Plug-in HEV (PHEV): As their name suggests, these vehicles can run on gas- line, similar to the HEVs, and recharge their batteries by plugging in the vehicle to the grid, similar to EVs. The result is increased driving range and reduced fuel usage and emissions.

This dissertation is mainly concerned with EV technology, although the same principles apply to PHEVs. For this reason, the remainder of this study exclusively considers the EV family as in Fig. 1.

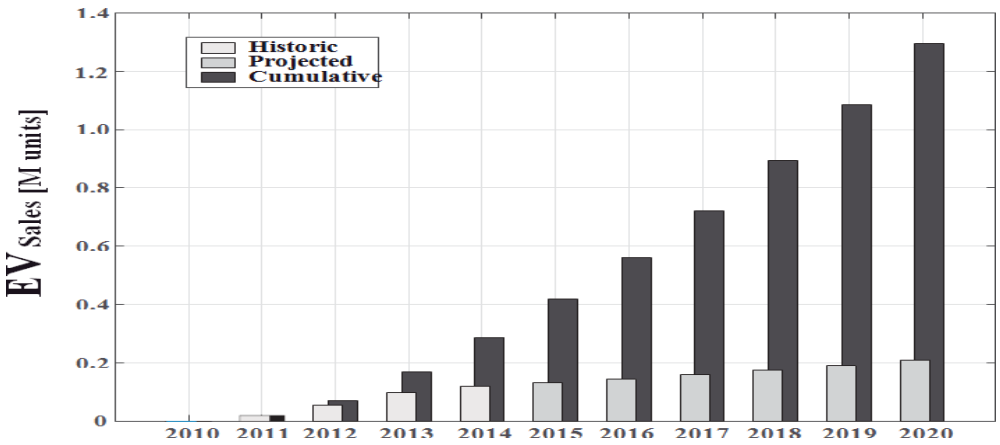

Figure 1 Cumulative and annual historical-projected EV sales across the globe

3. EVS BATTER PACK CHARGING

A significant piece of the activity of the EVs is the reviving of their battery pack. This procedure can be completed in two unique manners: conductively or inductively. The first charging technique utilizes electrical

The subsequent technique utilizes remote power through electromagnetic field coupling, taking out the module rope [2, 3]. This kind of charger has been investigated for Level I and II devices and still a work in progress and would not be talked about in detail here.

On the other hand, conductive charging has just been received by the EV Start-up, including standard EV makers. Contingent upon the rate at which the EV battery is charged, conductive chargers can be commonly ordered into moderate chargers and quick chargers. The customary chargers can revive the battery in 8 hours, while the quick chargers can do this procedure in 30 minutes. More particulars on the power levels, charging times for the accessible charging strategies can be found in some of the existing charging standards.

To control and normalize the conductive chargers a few associations, for example, the Institute of Electrical and Electronics Engineers (IEEE), the Society of Automotive Engineers (SAE), the International Electro technical Commission (IEC), are preparing to manage the utility/client interface.

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4. ELECTRIC VEHICLE

Both, EVs and PHEVs have risen as the most probable replacement to ordinary inward ignition motor vehicles. From the ages, sales of these vehicles have been continually hiking, as appeared in Figure 1 and this expanding pattern is relied upon to proceed in future. The inadequacies of these vehicles must be tackled before they can turn into a genuine option in contrast to transportation.



Figure 2 Proposed PV base Robotic Charging Station Model

The paper intends to create a machine which would diminish individuals from a normal undertaking of charging electric vehicles. An electrical vehicle charging station is a charging power flexibly for electrical vehicles. This paper proposes structure of a model for a Photovoltaic (PV) based electrical vehicle that estimates complete force yield under specific conditions. The connection to MV AC grids of EV RCS it is not a straightforward task because of the particularities involved. Unlike conventional multilevel converter applications, the loads in the system are volatile and present a stochastic behavior, therefore, the control scheme and the balancing techniques need careful designing. To develop a robotic charging station using PV through common bipolar dc bus fast charging architecture that allows the grid integration of several high- power fast charging units. To provide simulation results those verify the proposed architecture and control schemes. To complete the validation of the topics, the implementation of a low-voltage prototype of PV based RCS will for the experimental validation shown in figure 2.

These reasons justify using the concept of the charging station as an enabling alternative for EV fast charging. These stations are similar to petrol stations, meaning that are commercial facilities composed by several off-board high-power chargers located in public places throughout the city (e.g., parking lots, shopping locations or rest stops along highway). In this way, the load is concentrated in strategic points, which can be coordinated with the utility operator (i.e., retrofit distribution and transmission equipment, discourage the demand in congested nodes, medium voltage (MV) connection, and so on). This concept allows the driver to choose its preferred charging method for his vehicle. An additional charging possibility alleviates range anxiety, maximizes the use of EV batteries, and most importantly, provides the EV user a regimen equivalent to that of conventional cars.

5. PROPOSED SYSTEM

This proposed model of designing solar robotic electric charge vehicle for generating energy and charge electric vehicle as portable mode by using Arduino microcontroller we execute this design [2].
It is extrapolated from existing innovation this segment looks at the structure of charging foundation for an electric vehicle with the assistance of PV boards. The proposed framework can be adjusted for neighborhoods and working environments to charge electric vehicles according to the accommodation of the EV client. The significant goal here is to expand the utilization of PV vitality for EV charging by using vitality stockpiling frameworks and limit the vitality trade with the matrix[8].

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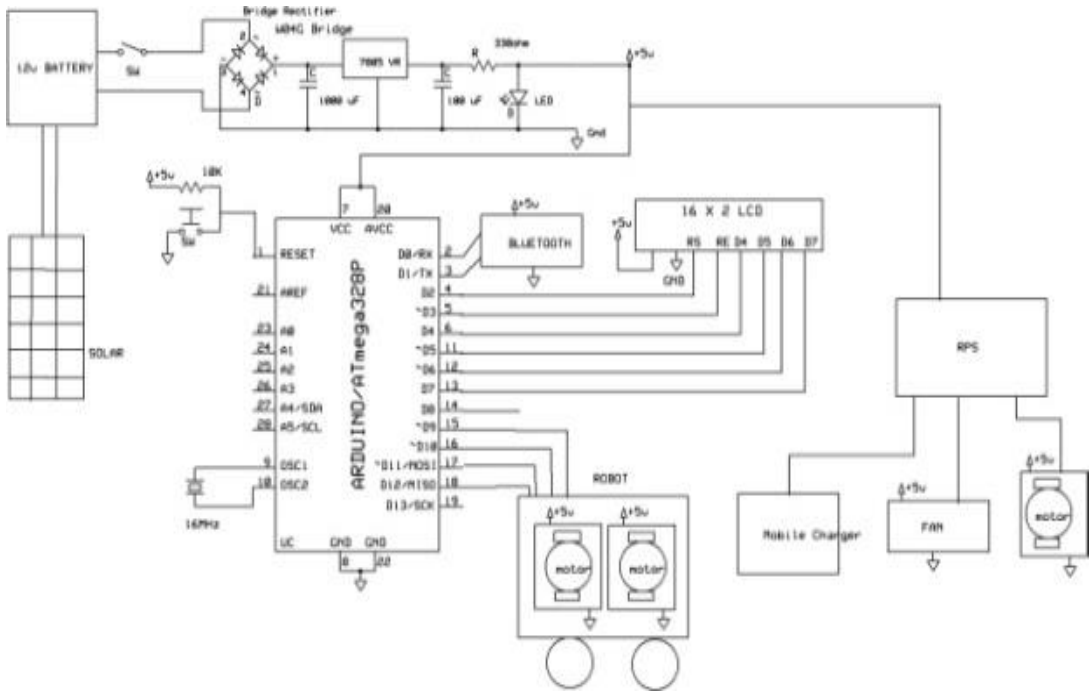

Figure 3 Block Diagram of propose system.

Sun based controlled vehicles have been made accessible to the overall population for more than 30 years; its far reaching or open use then again has been constrained fundamentally because of the current expenses of such gadgets. As sustainable power source is the fate of intensity age, it is essential that it is considered for electric vehicle charging also. PV board based EV charging station is being set up in numerous nations. For understanding the sun based controlled EV charging foundation [4], it is important to understand the current EV−PV framework, which is being used as of now by the businesses or are in the improvement stage by an alternate scholastic establishment. The proposed framework can be adjusted for neighborhoods and working environments to charge electric vehicles according to the accommodation of the EV client. The significant target here is to expand the utilization of PV vitality for EV charging by using vitality stockpiling frameworks and limit the vitality trade with the lattice.

6. ARCHITECTURE

The below picture is the architecture of the proposed system. It shows the connection of each and every part in the circuit and assembly of components in the design. It also shows the model number of the components used in the circuit.

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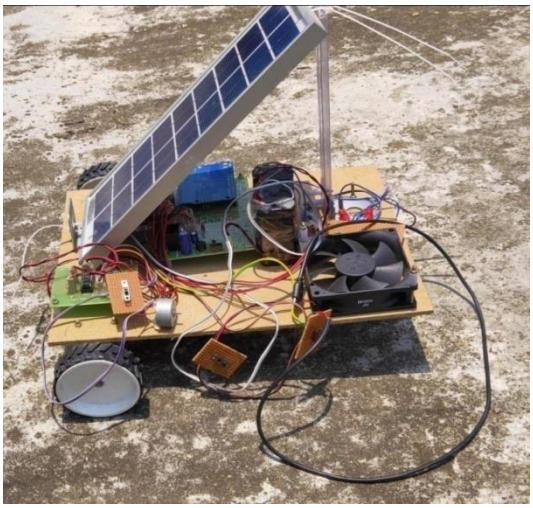

Figure 4 Architecture of proposed system

The below are the different types of hub designs for the proposed system.

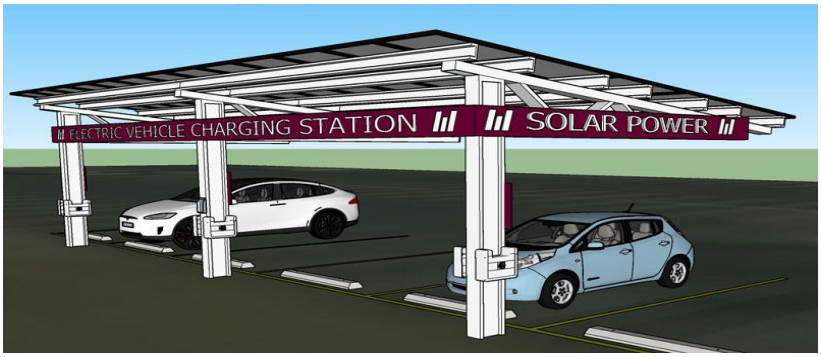

Figure 5 Shelter type HUB

In figure 5 it shows the design of shelter type hub for charging the vehicles. This design can be used as a shelter for the vehicles and also for charging the vehicles.

Figure 6 (a) Demo kit (from one Side)

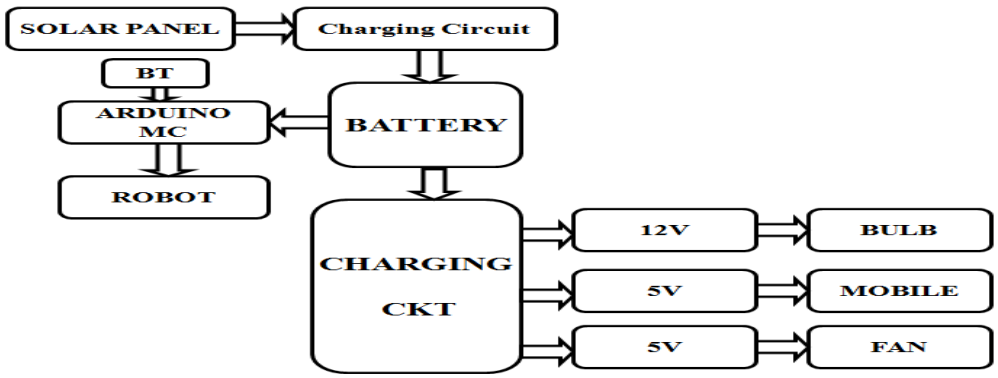

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Figure 6 (b) Demo kit (from another Side)



Figure 7 Filling station type hubs

In figure 7 it shows the design of filling station type. In this design it is like a filling station here we have to charge our vehicle as how we fill fuel.

7. CONCLUSION

As a result of limited oil unique assets, sustainable power sources got basic for our everyday life vitality request. In this viewpoint this venture is proposed to give a productive, appropriate and savvy model of PV based EV charging station. This investigation demonstrates that it is conceivable to execute and advertise Solar PV based EV charging station without framework association in Mode-1. In understanding accessible irradiance and temperature esteems, it can create adequate vitality while battery utilized as reinforcement. Rather than utilizing the matrix power as reinforcement source, vitality stockpiling framework (ESS) batteries are picked so that at whatever point sun oriented force is lacking to gracefully control for charging of EV, ESS takes the control and infuses the important vitality to the charging framework. The introduced model of sunlight based force vitality can be a decent activity for the future apparatuses and usage to be completed around there.

There are a few applications for keen charging like charging from renewable, diminishing charging costs or postponing conveyance organizes redesign. The focal point of existing exploration in this area is to discover better and effective calculations for every one of these applications thinking about them as discrete improvement issues. Decrease in the net expense of EV charging from PV utilizing charging calculations that consolidate sun powered figure, vitality costs, guideline administrations are suggested as expansion of the work conveyed in this proposal.

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An efficient control strategy of shunt active power filter for asymmetrical load condition using time domain approach

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An efficient control strategy of shunt active power filter for asymmetrical load condition using time domain approach

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Abstract

The article describes the current control scheme for Shunt Active Power Filter (SAPF) meant for setting up on a power system. There is also a supplementary function in the active power filter for eliminating harmonics, correct power factor, and asymmetrical balance load studied in this paper. A brief explanation of the execution of the classical current detection algorithms for active power filters provided. After understanding various severe power excellence problems and a range of commission needs a current control scheme put forth. The system gives shortest time delay when compared with other methodologies. A range of commissioning current references, thus, is precisely and efficiently attained by following the suggested current control approach.The proposed system can assured that to achieve a variety of compensation purposes. The simulation outcomes we arrived with MATLAB / Simulink are proof that our method gives outstanding performance apart from being more effective compared to the existing methods.

Subject Classification: *32A50, 43-XX*

Keywords: *Shunt Active Power filter, Synchronous Reference Frame, Instantaneous Reactive Power Theory, Point of standard coupling, Synchronous current detection*

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1. Introduction

Increased deployment linked with those power distributing frames to DC supply/inverter and converter dependent applications, lead to downgrading in power supply networks concerning voltage/current harmonics, power factor besides resonance issues. Modest and cheap passive filters are highly efficient. But, the source impedance decides their performance thereby causing unnecessary problems with the electrical power network [1,2,3]. Moreover, they are also heavy and not suitable for N-LL applications. When there are N-LL current source loads, the best option for downsizing the current harmonics in both low and high power applications is the SAPF [4,5]. Either in series or in combinations of both (unified power quality Conditioners) and hybrid configurations, the Active power filter can be connected [6,7]. Since the current harmonics compensation is the widely preferred one for industrial applications, the SAPF is considered the most popular choice compared to the [8,9] series active filters as they are tiny, versatile, come with more choice and robust. Studies have been conducted on SAPF and thereby leading to new developments and innovations [10].

Figure. 1 shows the primary commission motto for a plant with an N-LL using a SAPF. The SAPF consists of a three phase Voltage Source Inverter (VSI) containing just a dc link capacitor. Where the former one is linked to the load at the Point of Common Coupling (PCC) via the input

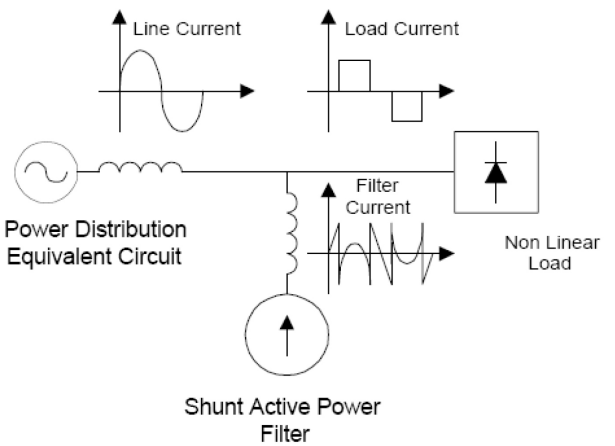

Figure 1

Principle of Shunt Compensation

inductor. Like a controlled current source, the SAPF works, thereby the load harmonic current. A sinusoidal current is obtained from the mains at the PCC. The SAPF will require an active fundamental current part to keep its DC connection capacitor activated at a voltage more significant than the threshold to line voltage. The reference current is not sinusoidal, so receiving a 0 - steady-state error is severe.

2. Principle of Shunt Compensation System

We keep the SAPF in link with the supply grid at Point of Common Coupling (PCC) via filter inductance. While switching the power inverter, harmonics are created, which is suppressed by the filter. We achieve the current harmonic commission by inoculating equivalent yet reverse present harmonic parts at PCC so that the previous alteration is canceled and power quality is also improved [11,12].

The immediate source current is shown in Figure 1.

$$I_S(t) = I_L(t) - I_C(t) \tag{1}$$

The immediate source voltage is

$$V_S(t) = V_m \operatorname{Sin} \omega t \tag{2}$$

The load current has the basic components and current harmonic parts, shown as [3]

$$\begin{aligned} I_L(t) &= \sum_{n=1}^{\infty} I_n \sin(n\omega t + \phi_n) \\ &= I_1 \sin(\omega t + \phi_1) + \left[\sum_{n=2}^{\infty} I_n \sin(n\omega t + \phi_n) \right] \end{aligned} \tag{3}$$

The immediate load power (P_L) can be calculated from the source voltage and load current, and the computation is given as

$$\begin{aligned} P_L(t) &= I_S(t) * V_S(t) = \begin{array}{l} V_m Sin^2 \omega t * Cos\phi_1 + V_m I_1 Sin\omega t * \\ Cos\omega t * Sin\phi_1 + V_m Sin\omega t * \left(\sum_{n=2}^{\infty} I_n Sin(n\omega t + \phi_n) \right) \end{array} \\ &= P_F(t) + P_R(t) + P_H(t) \end{aligned} \tag{4}$$

The given load power has basic active power, reactive power, and harmonic power. From Eq. (4), we arrive the real basic power obtained from the load as

$$P_F(t) = V_m I_1 Sin^2 \omega t * Cos\phi_1 \tag{5}$$

In case the active power filter offers the total reactive and harmonic power, the source current $i_s(t)$ would be in line with the utility voltage and sinusoidal. The triple phase source currents post-commission is given as

$$I_A^* = I_m \text{Sin } \omega t \tag{6}$$

$$I_B^* = I_m \text{Sin } (\omega t - 120^\circ) \tag{7}$$

$$I_C^* = I_m \text{Sin } (\omega t + 120^\circ) \tag{8}$$

We derive the maximum value of the reference current Iref with the regulation of the DC-bus capacitor voltage of the inverter.

3. Reference Current Estimation

In the 3-phase 3 wire scheme, the direct load currents of phase "*a*" "*b*", "*c*" (i_a, i_b, and i_c) can be taken apart into +ve sequence and -ve sequence parts in accordance to the proportioned weigh laws stated by Fortes cue discretely.

$$i_x(n) = \sum_{k=1}^{\infty}\left[I_{1k} Sin\left(\frac{2\pi nk}{N} + \phi_{1k} - \frac{2l\pi}{3} \right) + I_{2k} Sin\left(\frac{2\pi nk}{N} + \phi_{2k} + \frac{2l\pi}{3} \right) \right] \tag{9}$$

It is just the +ve sequence, -ve sequence, active power, and reactive power of the basic current are monitored, and decomposing of the hormonic is unnecessary. Thereby, the current fundamental part is expressed as:

$$i_{x1}(n) = I_{11} Sin\left(\frac{2\pi}{N} n + \phi_{11} - \frac{2l\pi}{3} \right) + I_{21} Sin\left(\frac{2\pi}{N} n + \phi_{21} + \frac{2l\pi}{3} \right) \tag{10}$$

Here, the former component of (2) is directed to the +ve sequence part line with the phase voltage, called as the active power component of the +ve sequence necessary current; the second part of (2) is directed to the +ve sequence component orthogonal to the line voltage, called as the reactive power part of the +ve-sequence fundamental current; the third component of (2) is directed to the -ve sequence part in line with the line voltage, called as the active power component of the -ve sequence necessary current; the final segment of (2) is directed to the -ve sequence component orthogonal to the line voltage, called as the reactive power part of the -ve sequence fundamental

$$
\begin{aligned}
i_{x1}(n) &= I_{11}Sin\left(\frac{2\pi}{N}n-\frac{2l\pi}{3}\right)Cos\phi_{11} \\
&+I_{11}Cos\left(\frac{2\pi}{N}n-\frac{2l\pi}{3}\right)Sin\phi_{11} \\
&+I_{21}Sin\left(\frac{2\pi}{N}n-\frac{2l\pi}{3}\right)Cos\left(\phi_{21}-\frac{2l\pi}{3}\right) \\
&+I_{21}Cos\left(\frac{2\pi}{N}n-\frac{2l\pi}{3}\right)Sin\left(\phi_{21}-\frac{2l\pi}{3}\right)
\end{aligned} \tag{11}
$$

Current.

Where '$Sin\frac{2\pi}{N}n$' is in line with the +ve sequence necessary voltage of phase "a" which finds the exact computing of active and reactive power parts. The system performance is regulated by the low-pass filter [13]. For a range of commission reasons, the separator conveniently gets various constituents that are greater to the algorithm according to the immediate reactive power theory. We created a Phase Locked Loop (PLL) system that is apt for time-domain analysis in an inaccurate utility circumstances. This was adjusted to the regulator effects like gain deterioration, line harmonics, and frequency turbulences. We did the entire incorporation of the PLL in software with no aid from hardware filters at all, as shown in Figure 2.

As mentioned above, we did a complete installation of the PLL in software devoid of hardware filters. If the reference Ude*is 0, the θ^* derived is in sync with the +ve sequence part of first voltage [14,15]. When $u_{de}^*$is not set to zero, there is a fixed phase difference amid the θ^* and the +ve sequence part of necessary voltage, thereby rendering the management of the displacement factor efficiently. Further, this phase variance not going

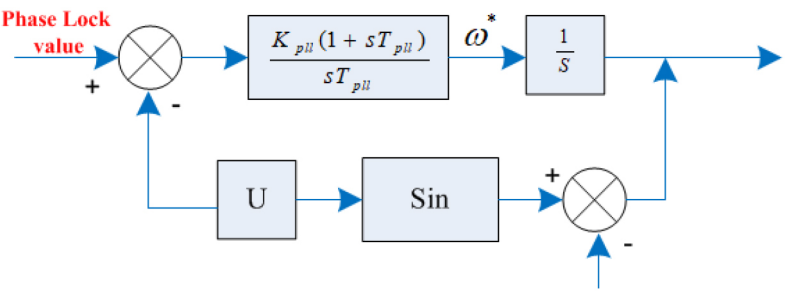

Figure 2

Proposed PLL System

to influence the strength of the chosen harmonics detection [16,17,18]. We gained the phase voltages U_{as}, U_{bs}, U_{cs} from sampled line-to-line voltages. The transformation of the obtained stationary reference frame voltages into voltages U_{de}, U_{qe} (in a frame of reference synchronized to the utility frequency) with the help of the 3/2 and e / s alterations. The angle θ* employed in the above conversions is gained by assimilating a frequency command ω^*. In case of frequency command ω^* is equal to the utility frequency, the voltages U_{de} and U_{qe}, look like dc values relying on the angle θ*.

In our proposed system, we have deployed a PI regulator forgetting that value of θ*(or ω^*) that carries the feedback voltage U_{de} to a commanded value U_{de}^*. Alternatively, the regulator ends up in a rotating frame of reference with respect to which the transformed voltage U_{de} has the desired dc value U_{de}^*. The rotating frame's incidence is similar to the rate of the utility voltage. The Extent of the controlled quantity U_{de} governs the phase difference between the utility voltages and sin (θ*) or cos (θ*).This approach leads to not just the utility frequency ω^* but also lets one to lock at an arbitrary phase angle θ* corresponding to the utility angle θ. The angle Δθ is controlled by the commanded values U_{de}^*.

The phase voltage is stated by per-unit; the base numbers for per-unit value are the peak value of +ve sequence fundamental phase voltage. Then, three-phase voltages can be expressed as $Sin\left(\frac{2\pi}{N}n-\frac{2l\pi}{3}\right)$, respectively. The immediate power of the significant current can be attained by multiplying current $i_{x1}(n)$ by phase voltage. Likewise, the instantaneous power of harmonics can be accomplished by increasing flow. $i_{xk}(n)$ $i_{xk}(n)$ $Sin\left(\frac{2\pi}{N}n-\frac{2l\pi}{3}\right)$ We could observe that the -ve sequence or +ve sequence component has alone part out of which the three-phase sum up to zero. Without any energy storage, we can compensate for this using a compensator. The least frequency constituent is two times the primary frequency; the dc component can be attained by a low pass filter with a limit frequency smaller than two times the basic rate or by a sliding window with *N/2* samples.

$$X_{x1} = I_{11}Cos\phi_{11}+I_{21}Cos\left(\phi_{21}+4l\pi/3\right) \tag{12}$$

with a similar methodology, the below equations can also be obtained

$$Y_{x1} = I_{11}Sin\phi_{11}+I_{21}Sin\left(\phi_{21}+4l\pi/3\right) \tag{13}$$

From equations (6) and (7),

$$\begin{pmatrix} X_{11} & Y_{11} \\ X_{21} & Y_{21} \end{pmatrix} = \begin{pmatrix} I_{11}Sin\phi_{11} & I_{11}Cos\phi_{11} \\ I_{21}Sin\phi_{21} & I_{21}Cos\phi_{21} \end{pmatrix} \quad (14)$$

Where X_{11} and Y_{11} denote the highest values of the reactive power part and active power part of +ve sequence underlying current. X_{11} and Y_{11} are the highest values of the active power part and active power part of —ve sequence primary flow of phase **"a."** Therefore,

$$i_{x11} = X_{11}Cos\left(\frac{2\pi}{N}n - \frac{2l\pi}{3}\right) + Y_{11}Sin\left(\frac{2\pi}{N}n - \frac{2l\pi}{3}\right) \quad (15)$$

$$i_{x21} = X_{21}Cos\left(\frac{2\pi}{N}n + \frac{2l\pi}{3}\right) + Y_{21}Sin\left(\frac{2\pi}{N}n + \frac{2l\pi}{3}\right) \quad (16)$$

$$i_{x1} = X_{x1}Cos\left(\frac{2\pi}{N}n - \frac{2l\pi}{3}\right) + Y_{x1}Sin\left(\frac{2\pi}{N}n - \frac{2l\pi}{3}\right) \quad (17)$$

$$i_{xk} = X_{x1}Cos\left(\frac{2\pi}{N}n - \frac{2l\pi}{3}\right) + Y_{xk}Sink\left(\frac{2\pi}{N}n - \frac{2l\pi}{3}\right) \quad (18)$$

The segregation of different results is composed by Equations (14)–(16). This is achieved based on various compensation purposes generating a range of effects. In case SAPF is deployed to recompense harmonics and the —ve sequence part of the primary current, the +ve sequence constituent of the underlying present i_{x11} can be taken from (9), and the current reference can be given as $i^*_{cx}(n) = i^*_x(n) - i_{x11}(n)$ by deducting i_{x11} from the load current. Post the compensation when the line current is predicted as a regular three-phase necessary current, and the power factor is 1, the active power component of the +ve sequence fundamental current i_{px11} can be drawn by considering $X_{11} = 0$ in (9), and the current reference can be gained as $i^*_{cx}(n) = i_x(n) - i_{px11}(n)$ by deducting i_{px11} from the load current. Likewise, when we set Y_{11} to 0, the reactive power part of the +ve sequence underlying current is derived. The -ve sequence part of the fundamental present is derived from (15). If APF is utilized for compensating the selected order harmonics, we can calculate the by (17). The "active power" part and "reactive power" part of harmonics does not require a division, hence the factors $Cosk\left(\frac{2\pi}{N}n - \frac{2l\pi}{3}\right)$ and $Sink\left(\frac{2\pi}{N}n - \frac{2l\pi}{3}\right)$ can be substituted with $Sin\left(\frac{2nk\pi}{N}\right)$ and $Cos\left(\frac{2nk\pi}{N}\right)$, separately. Followed by

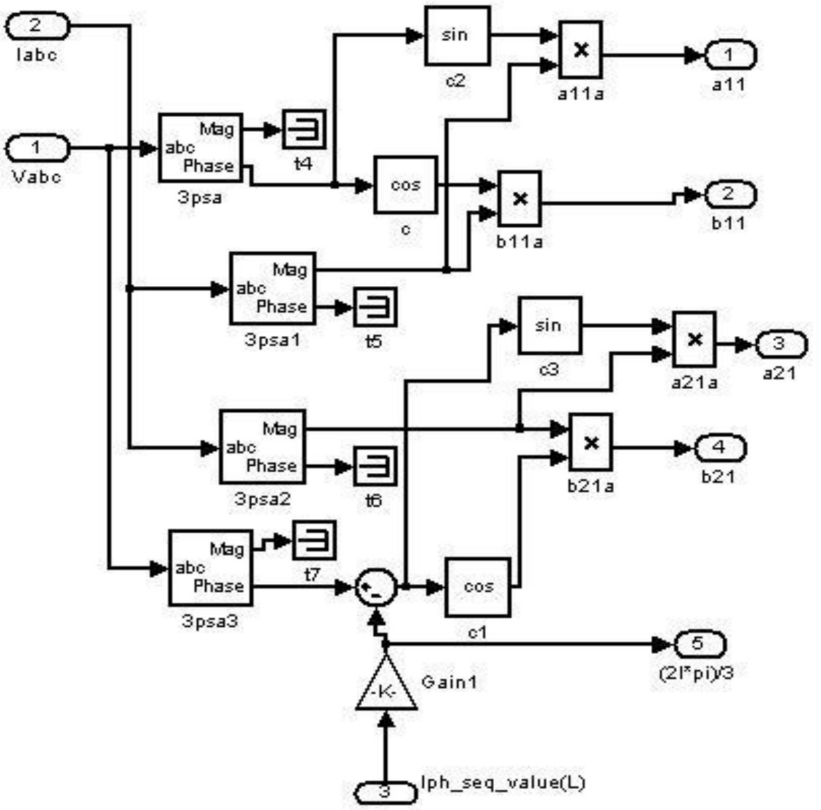

Figure 3

Proposed current control scheme

the simplification of programming. According to the detection methods, various compensation goals could be attained with specific combinations.

4. Proposed Control Scheme

A Phase Loop Lock, a sine wave generator and the separator form the principal constituents of our control scheme. We applied the current control scheme based on the strategy arrived by us for finding the reference recreating current. Figure. 3 shows current control scheme.

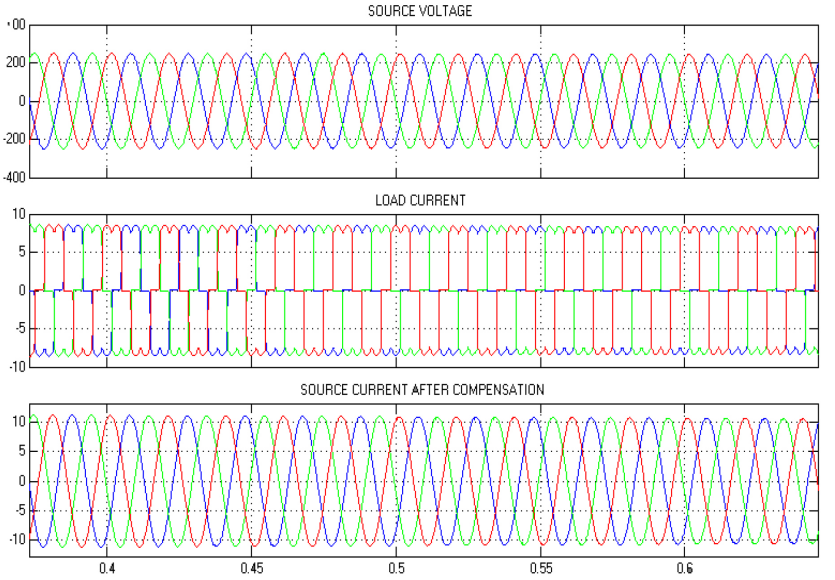

Figure 4

Source voltage, load current and source current after compensation

5. Simulation setup for Sinusoidal, Balanced Source Voltages

The main aim of the recreation is for showcasing the benefits of the SAPF control strategy suggested here. The source voltages are sinusoidal and stable, having a magnitude of 230 V, frequency of $\omega=100\pi$ and the source offers an unnecessary nonlinear load.

The stable and sinusoidal three-phase voltages measured are,

$$V_a = 230 \sin(\omega t)$$

$$V_b = 230 \sin(\omega t - 120^o)$$

$$V_c = 250 \sin(\omega t + 120^o)$$

The bridge rectifier load we incorporated here also dons the role of a nonlinear unbalanced load. To have clarity, we have plotted the simulation results separately. The source voltage, load current, and the source current after compensation depicted in Figure 4 and figure 5 depicts the outcomes recreated using the filter current created by the controller.

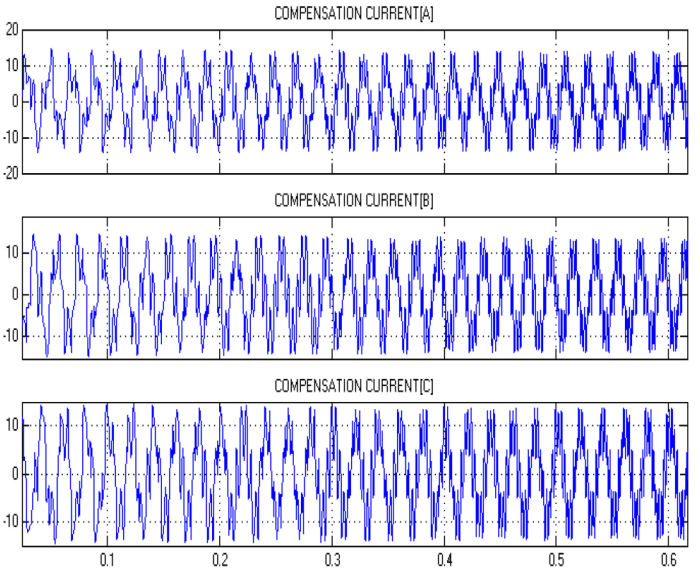

Figure 5

Filter Current

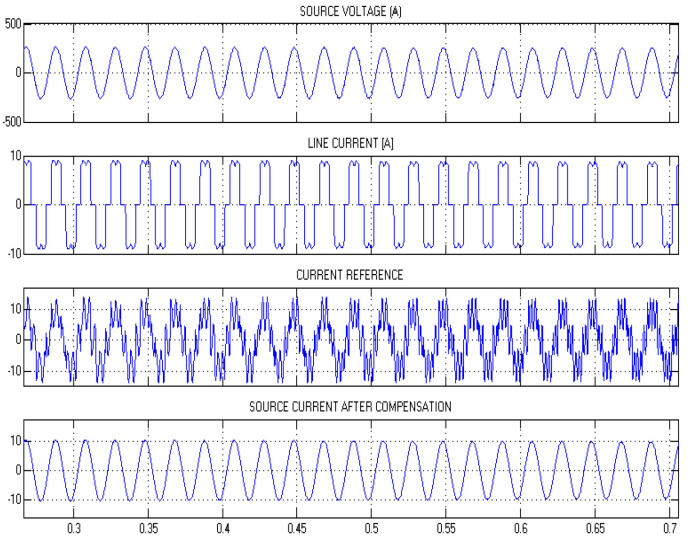

Figure 6

Source voltage, line current, current reference and Source current after compensation for phase A.

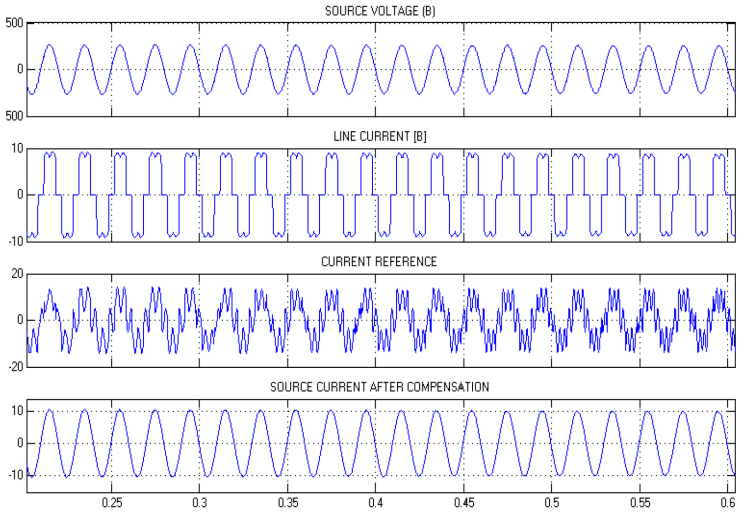

Figure 7

Source voltage, line current, current reference and Source current after compensation for phase B

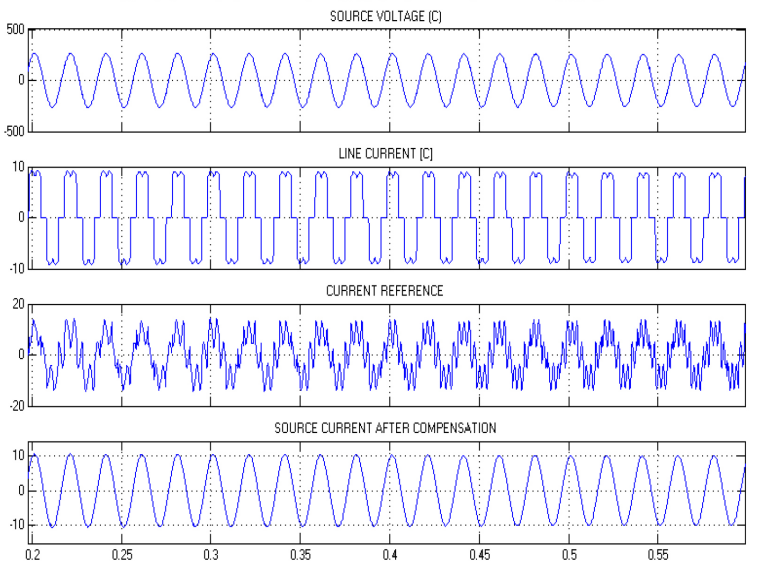

Figure 8

Source voltage, line current, current reference and Source current after compensation for phase C

The inoculation of commission current into the common coupling point in which the compensation of every phase's source currents occurs is shown in Figure 6-10.

The harmonic content of source current before commission is shown in Fig. 9 and implementation of compensated source current by SAPF has shown in Fig. 10.

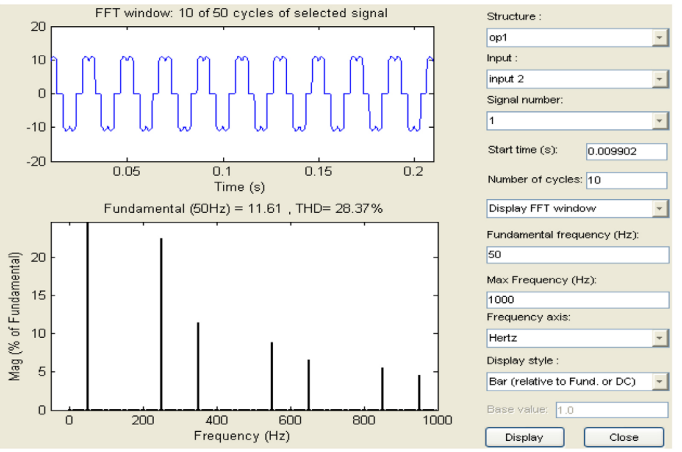

Figure 9

Without Harmonic Compensation

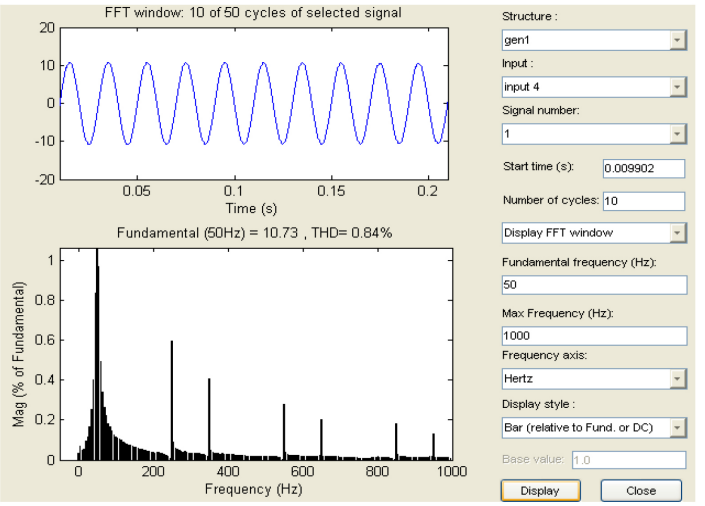

Figure 10

With Harmonic Compensation

Table 1

THD Comparison

CASE	THD %
With no Harmonic Compensation	28.37
Harmonic Compensation	0.84

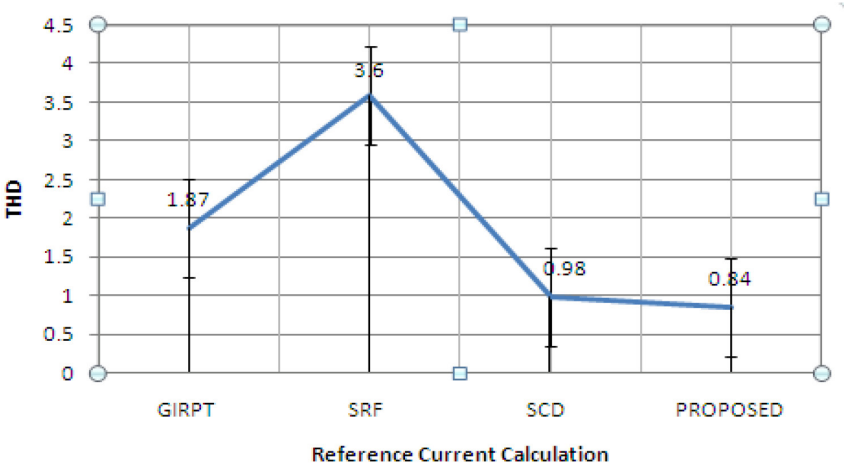

Figure 11

Comparison of % THD

6. Analysis of Simulation Results

The outcomes recreated obtained for a stable state is taken into account. From figure. 8 and figure. 10, we understand that harmonic currents are injected by SAPF into the line so that the input supply is made sinusoidal.

Figure 11 depicts the comparison of THD for the three studied and accessible approaches viz. Generalized Instantaneous Reactive Power Theory-based methods, Synchronous Reference Frame method, and the Synchronous Current Detection methods. Based on the outcomes (Fig. 10 and Fig. 16), we conclude that for stable source voltages, the THD for our approach is considerably lower than of the above-discussed methods. Even the setback as the result of the suggested plan is shy of 50% of the prime cycle; this is subsequently is shy of 50%of DFT and similar to the proposed method in accordance to the IRPT.

7. Conclusion

The outcomes recreated by using our proposed methodology are analyzed against the above-discussed methods. From the comparison we understand that the proposed method has a delay which is just shy of 50% of the prime cycle, this is subsequently is shy of 50% of DFT and also the algorithm created using IRPT. Based on the simulation and comparison studies, we find that the current control scheme proposed here is much superior in terms of affability, fidelity, and ease in operation. Also, as the reference commission currents are calculated in the 'a-b-c' reference setting, reference setting conversion is not needed. Hence, there is reduced complication in understanding the SAPF control circuit. In spite of that, it keeps an excellent filter performance. Post injection of compensation currents by SAPF, we infer that the source currents turn perfect and stay at par with the +ve sequence fundamental source voltages. Hence, the anticipated utility source power factor at the definite sequence fundamental frequency is obtained, and the harmonic currents kept under control. The Total Harmonic Distortion (THD) analysis divulges that our methodology has a source current THD lower than the previous methods. The commission methodology of SAPF put forth is verified via MATLAB/Simulink generating better understanding with the anticipated SAPF targets.

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Analysis of Series Active Power Filter for Harmonic Mitigation and Power Factor Improvement under Non-Linear Load Condition

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Abstract:

This work presents a low-cost approach to power factor correction (PFC) of single-phase diode rectifiers using a series active filter. Comparing with the traditional PFC, the proposed PFC has lower requirements of power device ratings, which leads to lower cost, higher efficiency, and lower electromagnetic interference. It also can eliminate the bulky inductor needed in the traditional PFC. The topology, operation principle, and application issues of the proposed PFC are analyzed in this paper. The control strategy is discussed in detail and simulation results are provided.

Keywords: Adjustable-speed drive, heating, ventilating, and air conditioning (HVAC), power factor correction (PFC), series active filter.

I. Introduction

IN the recent years, more and more variable speed motor drives fed by single-phase utility power are used in residential heating, ventilating, and air-conditioning (HVAC) systems. Most of them are using diode rectifiers with smoothing dc capacitors as the front-end. The diode rectifier draws

pulsed current from the utility line, which leads to low power factor, low efficiency, and high rating requirements to the switching devices. As a result, some standards such as IEC 1000-3-2 have been brought forward to limit the harmonic current of the utility line. To comply with these standards, power factor correction (PFC) is needed. So far, a variety of passive and active PFC techniques have been proposed [1]–[5]. While the passive PFC may be the simplest way in the low power applications, the active PFC are used in the majority of applications for their high performance, compact size, and light weight[6].

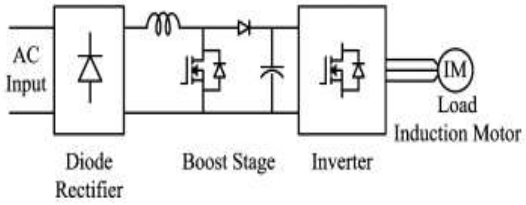


Fig 1: Traditional power factor correction

Fig. 1 shows the most common approach to signal-phase active PFC, where a boost circuit with an additional filter inductor is used to shape the line current[7]. The boost stage forces the dc bus current to follow the line voltage, which results in a nearly sinusoidal line current without phase difference. However, it brings in high dc bus stress, high switching device ratings, high switching losses, and high electromagnetic interference (EMI). In this paper, a new compact, low-weight, low-cost PFC using a series active filter is proposed. Comparing with the traditional PFC, it has lower device ratings, lower cost, lower EMI, and higher efficiency. The inductor needed in the proposed series PFC is also much smaller than those in the traditional PFC, and in the most cases, the line impedance of the utility line is enough for its normal operation[8]-[9]. A hysteresis control strategy, which is simple and easy to implement, is presented to eliminate line harmonics[10]. Simulation and experimental results are given to verify the analysis and demonstrate the control performance.

II. PROPOSED CONVERTERTOPOLOGY

The diode rectifier with proposed PFC for typical residential HVAC is shown in Fig. 2. Because the ac

line is 100 V and low, a voltage doubler is used for rectification, i.e., two capacitors are charged alternatively over one cycle. The output voltage is doubled, resulting in an approximate 250 V dc link voltage (V). The PFC circuit, implemented by a full bridge inverter with an optional inductor, connected in series with the diode rectifier. Since the diode rectifier and the full bridge inverter behave like voltage sources, the line current is determined by the difference among these three voltage sources and the loop inductance, which includes the line impedances and the inductance of the optional inductor.

Although four switching devices are used in this topology, each power device only needs to sustain a low capacitor voltage, , which is limited below 50 V. Thus low-cost, high-efficiency 60-V metal-oxide semiconductor field effect transistors (MOSFETs) can be employed. The voltage rating of each device is only 20% of the voltage rating of the switching device that are used in the boost stage of the traditional PFC. Therefore, even though four MOSFETs are used in the proposed topology, its total cost of switching devices is still less than the cost of the high voltage device in the traditional topology. In addition, the gate drive circuit of the proposed topology can draw power directly from the dc capacitor of the inverter without isolation. A simple charge-pump gate drive circuit powered by the inverter dc capacitor can be easily implemented for each MOSFET. Compared with the high transfer ratio and isolated power supply needed in the gate drive circuit of the traditional boost PFC, the proposed topology can also reduce the complexity and cost of the gate drive signal tremendously.

The EMI problem due to the while switching is also a big concern of the PFC system. In the proposed PFC, the voltage stress on the switching devices is only , which is less than 50 V, while the switching device in the traditional boost PFC needs to switch on and off the whole dc bus voltage, 250 V. Therefore, the EMI interference during switching will be reduced significantly. The voltage distortion brought into the acgrid by the proposed circuit also can be neglected because 1) the inverter dc voltage is relatively low (V) and 2) the line impedance, with the inductance of the optional inductor, are normally far greater than the source impedance, . The simplified equivalent circuit is shown in Fig. 3, where is the total line impedance, . The relationship between the output voltage of the inverter and the state of each switch can be summarized by

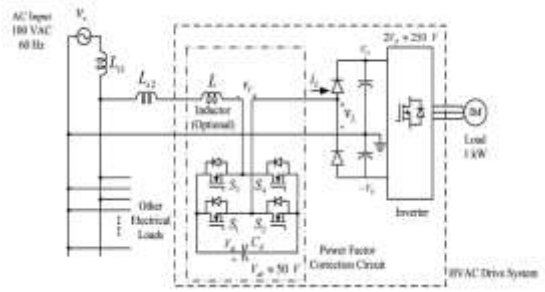


Fig2: Proposed power factor correction converter (PFC).

$$v_C = kV_{\mathrm{dc}} \quad \text{--→(1)}$$

where k is defined as

$$k = \begin{cases} +1, & \text{for } S_1 \text{ is ON and } S_3 \text{ is OFF} \\ 0, & \text{for both } S_1, S_3 \text{ are ON or OFF simultaneously} \\ -1, & \text{for } S_1 \text{ is OFF and } S_3 \text{ is ON.} \end{cases}$$

--→(2)

III. CONTROL STRATEGY

The easiest way to control the proposed topology is to use the hysteresis control, as shown in Fig. 4(a). In this control, the harmonic component of the line current, is extracted by a notch

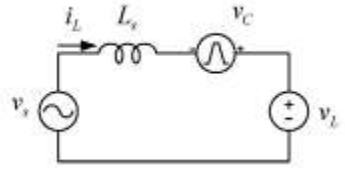


Fig. 3. Equivalent circuit of proposed PFC.

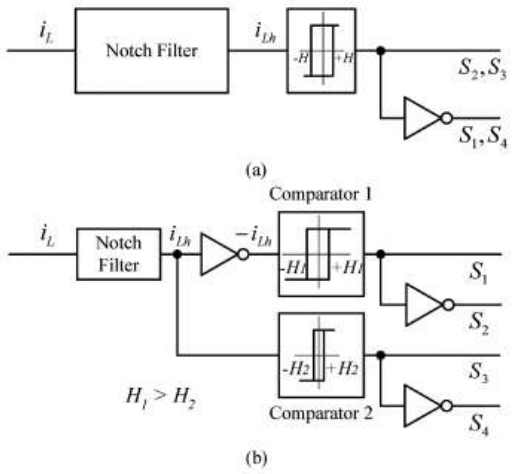


Fig. 4. Hysteresis control.

filter, and fed into a hysteresis comparator. The output of the inverter will switch between and to limit the harmonic current within the hysteresis band. In this control strategy, the zero voltage of the inverter is not utilized, which results in higherswitching frequency and higher switching ripples. In order to reduce the switching frequency and the voltage ripple, the zero voltage has to be utilized.

Fig. 4(b) shows the proposed double hysteresis control, which utilizes the zero voltage output of the inverter. In this control strategy, two hysteresis comparators with different hysteresis widths, H1 and H2, are used. Since the two-phase legs of the full-bridge inverter are symmetrical, we can assume that H1 is greater than .H2

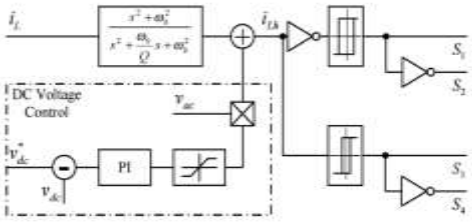


Fig 5: Block diagram of Hysteresis control with PI control

In this control strategy, switches S1 and S2 only switch three times per fundamental cycle. The switching frequency of switches S3 and S4 is approximately half that of the single hysteresis control with the same hysteresis width. Therefore, the double hysteresis control strategy tremendously reduces the switching frequency.

Since the hysteresis control is used to control the switching devices, the switching frequency is not constant. However, it is desirable to estimate the average switching frequency for design purposes

In this circuit, the actual dc capacitor voltage is detected and compared with the reference value, and the error is fed into a PI controller. A sinusoidal signal in phase with the line voltage is added to the harmonic currents extracted by the notch filter. The amplitude of the sinusoidal signal is controlled by the PI controller. By adding the sinusoidal offset to the input of the hysteresis comparator, active power flowing into the capacitor will be changed, thus the dc capacitor voltage can be controlled.

IV. COMPARITVE ANALYSIS OF PFC OF WITH SERIES FILTER AND WITHOUT SERIES ACTIVE POWER FILTER

Simulink diagrams:

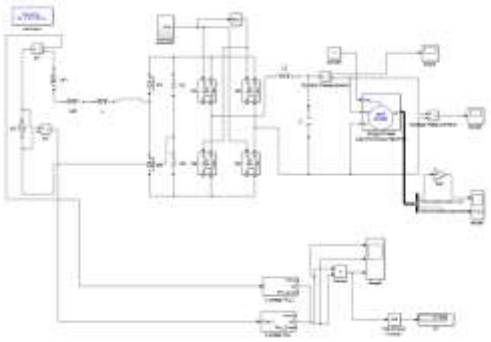


Fig 6: Without Series Filter

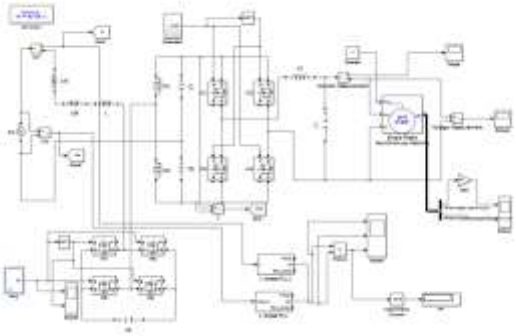


Fig 7: with series filter

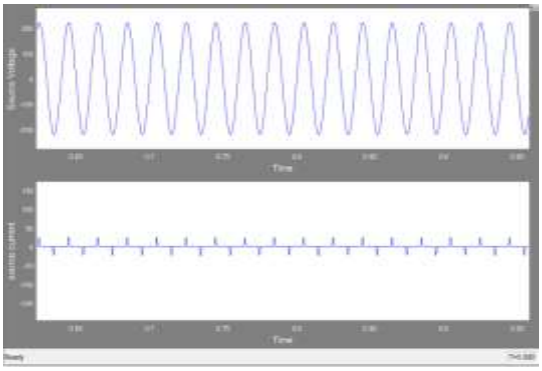
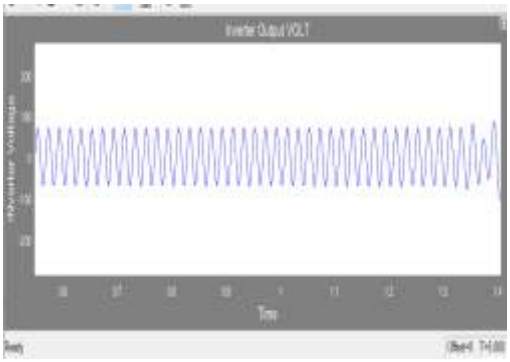
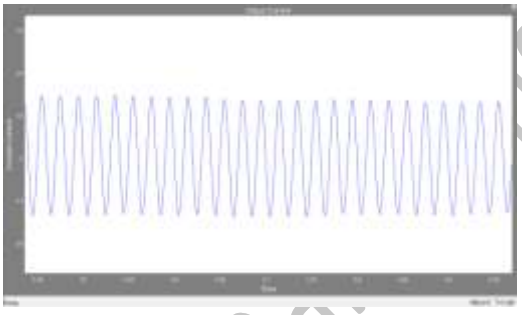


Fig 8: Without series filter Input a)Voltage

b) current





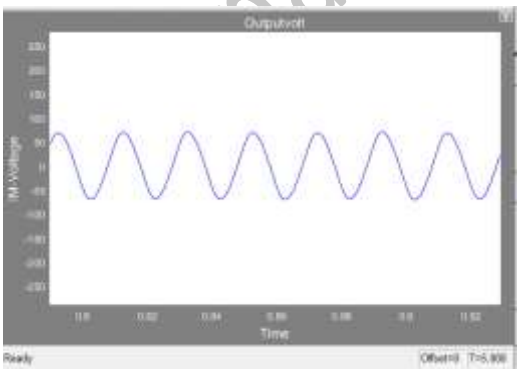
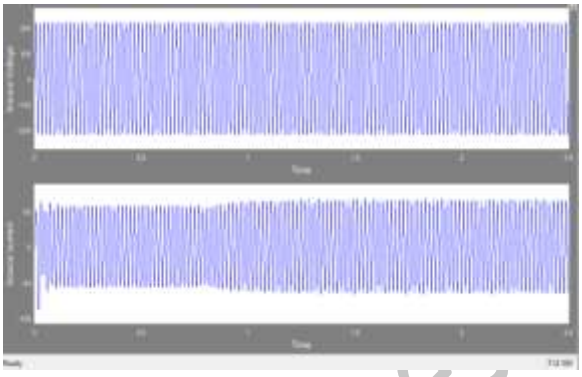


Fig 9) Output voltage a)Inverter b) Induction Motor



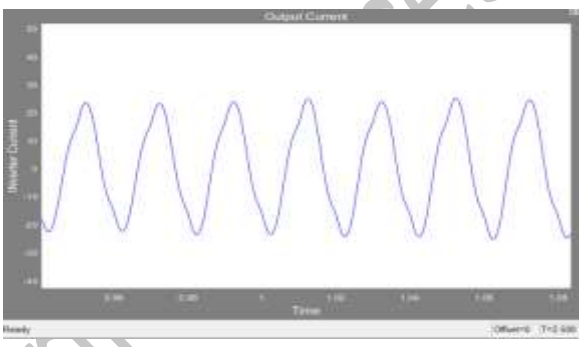


Fig 10) With Series Filter input a) voltage b) Load current c) Inverter Current(after add filter)

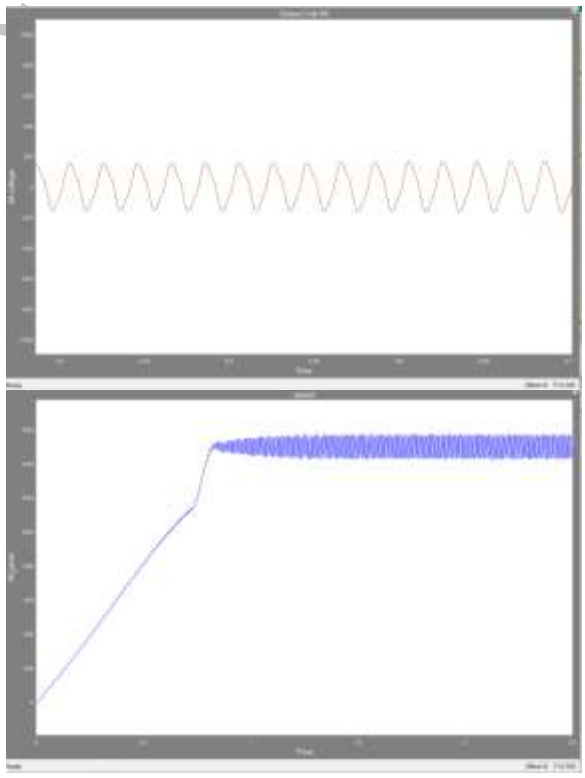


Fig 11) i) with series filter output voltage of IMii) Speed

V. CONCLUSION

A new PFC with double hysteresis control has been presented. The operation principle has been discussed in detail.. It shows that a high power factor has been obtained. Compared with the traditional PFC, the proposed PFC has the following advantages: 1) lower devices rating, which reduces cost, EMI, and switching losses, 2) no additional inductor is required, the line impedance is enough for most cases, and 3) the proposed double hysteresis control reduces the switching frequency significantly, which leads to higher efficiency

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Performance of DC Grid Based Wind Power Generation System in a Micro-grid

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***Abstract*—These works present a structure of DC system base wind power generating system. The proposed of a system is permits adaptable activity of different equal associated wind generators by taking out the requirement for voltage and frequency synchronization. The model prescient control calculation that offers enhanced transient reaction as for the adjustments in the working conditions is proposed for the control of the inverters. The structure idea is checked through different test situations to exhibit the operational capacity of the proposed micro-grid when it works associated with and islanded from the distribution grid, and the results acquire are examined**

***Keywords*—Wind energy, PI Controller, DC/AC.**

1. INTRODUCTION

Wind turbines to diminish the homesteads' interest on the lattice. The Malaysia government is effectively advancing this new idea of collecting wind type energy from electric airing fans in poultry ranches which has been executed in numerous nations around the globe [4]. The significant contrast between the circumstance in poultry ranches and normal wind ranches is wind speed inconstancy. The conversion ability of wind speed in wind cultivates legitimately relies upon the natural and climate circumstances though awind speed in fowl ranches is commonly steady all things considered created by steady speed ventilation fans. In this way, the generation irregularity gives that influence the unwavering quality of power gracefully and power base balance is not predominant in farm ranch wind base energy systems. As of late, the exploration consideration on dc matrices has been resurging because of mechanical progressions in power hardware and energy base storagedevices, and increment in the assortment of dc type loads and the infiltration of dc Distributed energy-resources (DER,) for example, sunlight based photo-voltaic and energy units. Many examination takes a shot at dc micro-grids have been directed to encourage the reconciliation of different DERs and energy storagesystems.

In [5], [6], a dc micro-grid type based wind ranch design in which each of a wind energy transformation unit comprising of a system converter, at high level frequency transformer and a solitary phase ac/dc converter is proposed. Be that as it may, the proposed design expands the system unpredictability as three phases of conversion are essential. In [7], a dc type micro-grid based on wind ranch design in which WTs are bunched into gatherings of four with each gathering associated with a converter is proposed. In any case, with the proposed design, the disappointment of one converter will result in each of the four WTs of a similar gathering to be unavailable.

2. Introduction to Wind Energy

Low voltage DC small scale lattices have been generally utilized for providing basic burdens, for example, server farms and remote correspondence stations. Therefore, it is imperative to guarantee excess and enough energy limit so as to help potential additions in load utilization. This is accomplished by methods for development of the energy storagesystem by including extra distribute.Remaining on head of the structure, he can feel the extraordinary speed up contrasted with being on the ground. Wind power stations are regularly found in a similar spot as huge radio broadcast reception apparatuses. Similarly as the high rise encourages the radio signs to travel farther, the expansion heigh above ocean level speeds up and causes the station to create more power.

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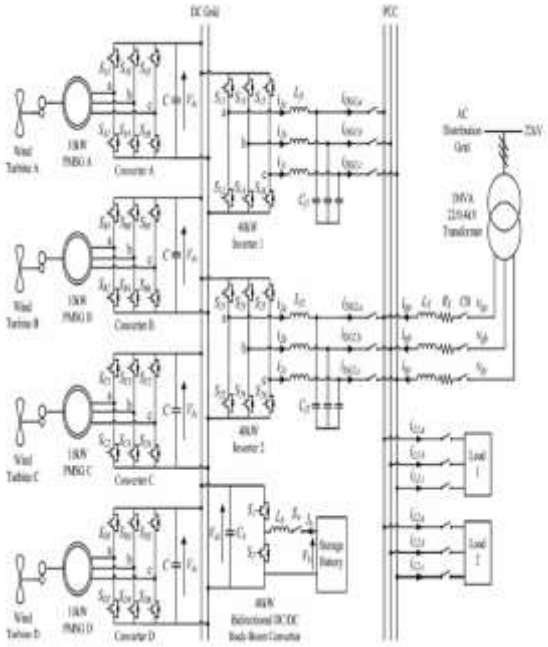


Fig.1 : Block Diagram of Wind System

3. Sinusoidal Pulse Width Modulation

The Sinusoidal Pulse Width Modulation (SPWM) is a notable wave forming strategy in power devices for acknowledgment, a high frequency triangular bearer signal, V1, is contrasted and a sinusoidal reference signal, V, of the ideal frequency. The hybrid focuses are utilized to decide the exchanging moments. The extent proportion of the reference signal (Vr,) to that of triangular sign (Vc) is known as the balance record. The magnitude of fundamental component of output voltage is proportional to modulation index (MI).The amplitude Vr, of the. Triangular signal is generally kept constant. By varying the modulation index output voltage is controlled.

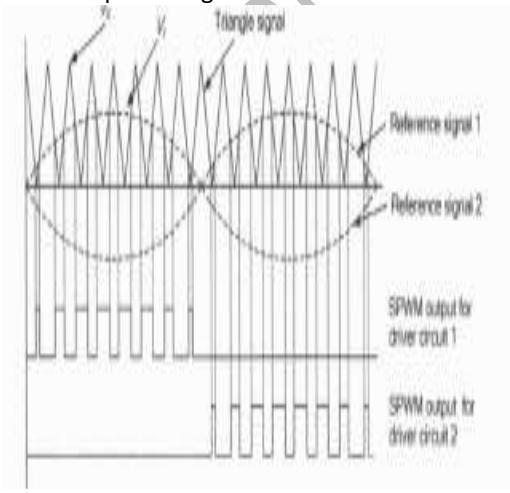
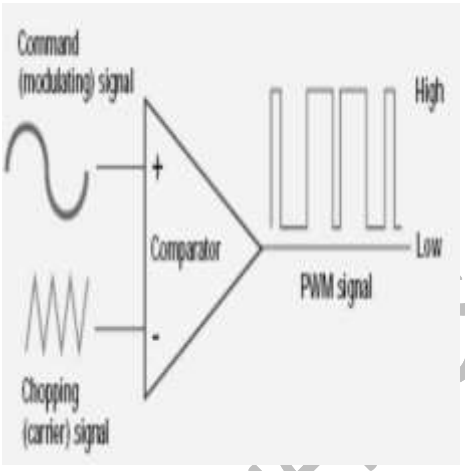
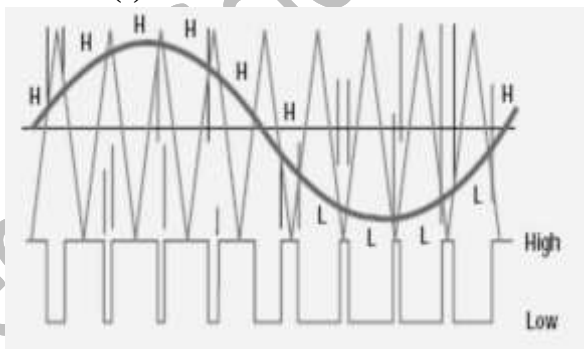


Fig.2: Signals of PWM

The pulse width modulation technique is applied to control the output voltage of the inverter which is also known as variable duty cycle regulation.



(a)



(b)

Fig.4.: Generation of Signals in PWM

The greatness of crucial segment of output voltage is relative to MI.The adequacy Vr, of the. Triangular sign is commonly kept steady. By fluctuating the adjustment file output voltage is controlled. The pulse width balance procedure is applied to control the output voltage of the inverter which is otherwise called variable obligation cycle guideline. Generation of the ideal output voltage is accomplished by looking at the ideal reference waveform (adjusting signal) with a high-frequency triangular 'bearer' wave as delineated schematically. Contingent upon whether the sign voltage is bigger or littler than the transporter waveform, either the positive or negative dc transport voltage is applied at the output. Note that over the time of one triangle wave, the normal voltage applied to the heap is relative to the sufficiency of the sign (accepted steady) during this period. The subsequent cleaved square waveform contains a copy of the ideal waveform in its low frequency segments, with the higher frequency segments being at frequencies of a near the bearer

frequency. Notice that the root mean square estimation of the air conditioner voltage waveform is as yet equivalent to the dc transport voltage, and consequently the absolute consonant mutilation isn't influenced by the PWM procedure.

Simulation work

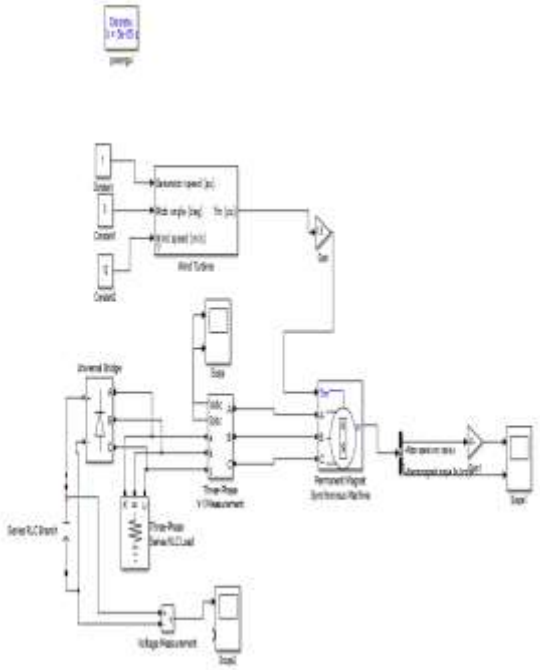


Fig.5 : Simulink design of wind turbine ac to dc converter

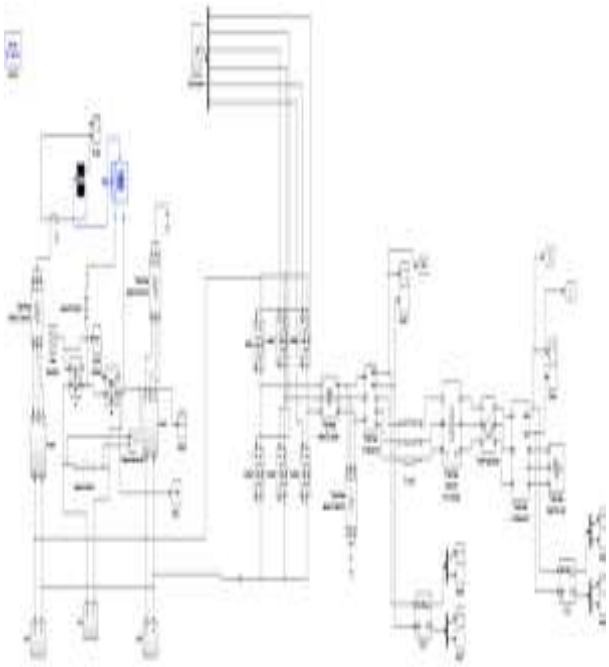


Fig.6: simulink diagram of wind based microgrid.

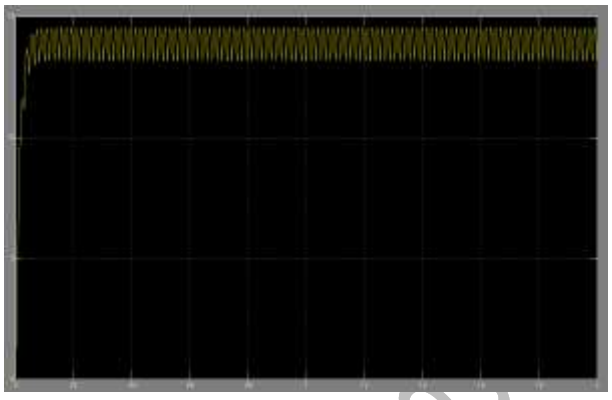


Fig.7: Controlled VSI output voltage

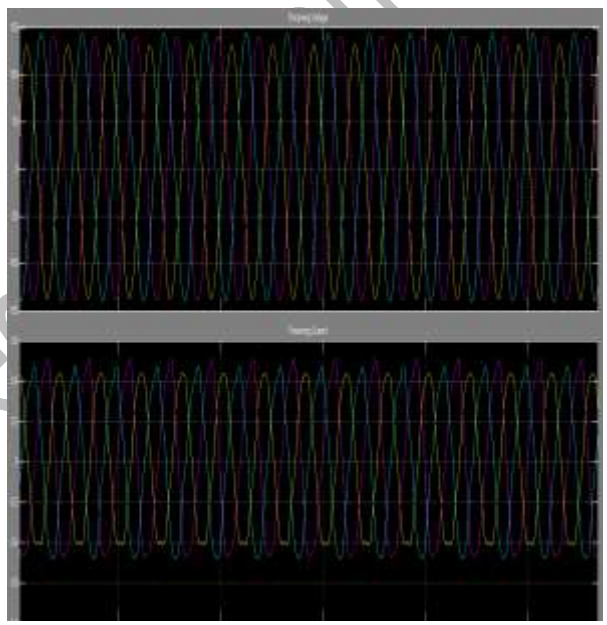


Fig.8: Controlled VSI output Current

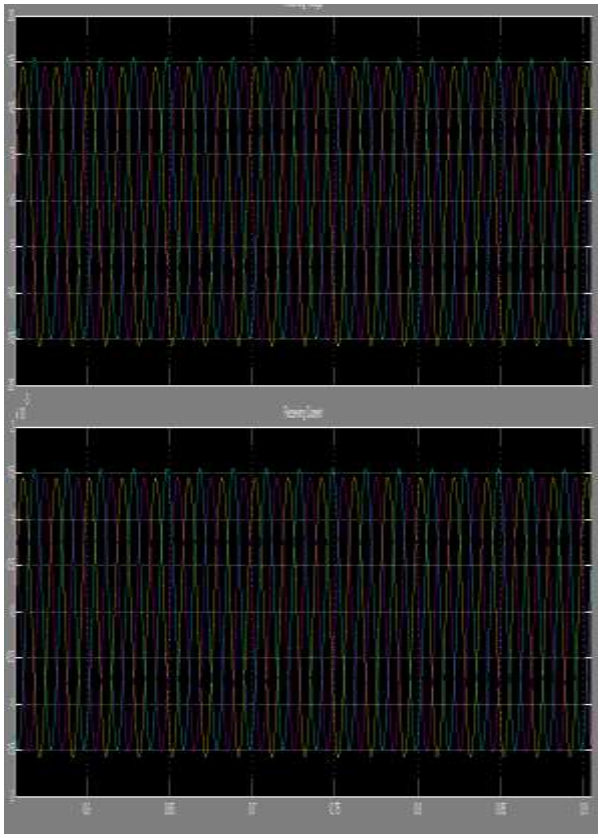


Fig.8 :Load side A) voltage b) current

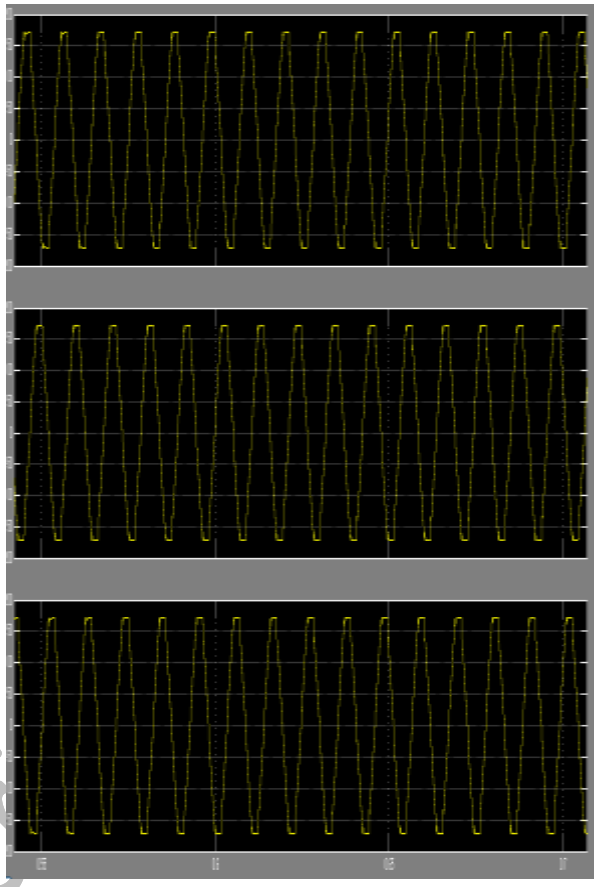


Fig.10: Wind output voltage

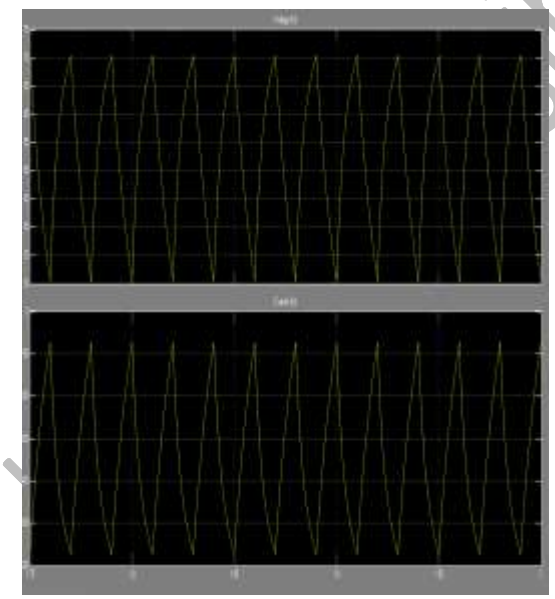


Fig 9: Baterry outputs a) voltage b) current

Conclusion

In these work, the plan of a dc micro grid based wind power generation system in a micro-grid that empowers equal activity of a few WGs in a poultry ranch have been introduced. When contrasted with regular wind base power generation system, the proposed micro-grid engineering disposes of the requirement for voltage and recurrence synchronization, in this manner permitting the WGs to be turned on or off with insignificant aggravations to the micro-grid activity. The plan idea has been checked through different test situations to exhibit the operational ability of the proposed micro-grid and the simulink results has indicated that the proposed technique idea can offer expanded adaptability and unwavering quality to the activity of the micro-grid. Be that as it may, the proposed control configuration despite everything requires further trial approval since estimation problems because of problems of the voltage and current sensors, and demonstrating blunders because of varieties in genuine system boundaries, for example, conveyance line and transformer impedances will influence the exhibition of the controller in down to earth usage.The recreation

results got and the examination acted in this paper fill in as a reason for the structure of a dc system based wind power generation system in a micro-grid.

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Speed Control of AC Motor

Y Sudha, P Pooja, K Rama, P Shweta

Abstract*: An enormous number of motors have been using in our daily life ranging from home appliances to industrial machinery. During the last decade, there has been tremendous change industry automation and home automation. Electric motor is always the essential part in home appliances as well as industrial applications in the automation. There is always a need to control the speed of the motor to run the appliances smoothly. Other important part of the appliances is the microcontroller. Microcontroller is always the essential part in all the embedded system applications because of its economical price and easy to customize to any specific need. Electronic devices like thyristors, diodes have been widely used in industrial applications to control the speed of the motor The Objective of this paper is to control the induction motor speed by using triac and zero crossing detector. Usually in many industrial applications speed varying is important to run the process in different stages, this paper demonstrates the mechanism of varying the speed of the AC Motor. The circuit is equipped with microcontroller and the induction motor. Induction motor is controlled by using triac and zero crossing detector by controlling the pulses of input AC signal. Microcontroller input is connected with two input modules that is one increment switch and one decrement switch. Increment switch is used to increase the speed of motor by varying in steps that is already dumped the code in microcontroller and also same for decrement switch. An LCS screen has been used to display the speed of the motor. Touch screen is used to operate the motor.

***Keywords:** Microcontroller, LCD screen, Rectifier, PWM, Embedded systems, AC Motor, Triac, Zero Crossing detector.*

I. INTRODUCTION

The Objective of this paper is, controlling the AC Motor speed by using Microcontroller interfaces with touch screen and the speed displayed on LCD. By using a Pulse Width Modulation method, the motor speed will be controlled from 0% - 100%. If the motor crosses predefined threshold level, system alerts the user with a buzzer alarm. Automation is the widely used term in the electronics field. The research on automation has fetched many developments in the prevailing technologies. Touch screen sensor is one among those technologies, which had tremendous developments. Touch screen haven been using in almost all the embedded applications due to its user-friendly interface. Devices with Touch screen functionality can operate very easily by anyone without much technical knowledge and any assistance from a technician. The contact-less speed measurement method is used to measure the motor. PWM method is used to control the motor speed. By operating the touch screen, user can control the motor speed. The direction of the motor can also be controlled by operating the touch screen. Microcontroller is the control device for the total system. The Microcontroller receives input from touch screen sensor and operates consequently on the motor speed. IR module sends the speed of motor to Microcontroller, which displays it on LCD screen. Whenever the speed crosses the set threshold level, the controller takes the accountability of alarming the buzzer to alert the user. The Microcontroller used in the paper has been programmed using Embedded C language.

II. OVERVIEW

Embedded system, an amalgamation of software and hardware to accomplish a committed task. Some of the main components used in embedded systems are Microprocessors or Microcontrollers. Microprocessors called as general-purpose processors, as they solely receive the inputs, process it and deliver the output. In difference, a microcontroller not only receives the data as input but also handles it, communicates the data with multiple interface devices, controls processed data and thus finally provides result. This paper “Speed monitoring of AC induction motor” using PIC16F876, PIC16F72 microcontroller is an exclusive paper which has object such that home appliances can be controlled by using a touch screen sensor interface. Objective of this paper can also use, to control home appliances like fans, lights, auto washing machines, many more electrical devices and day-to-day life, by interfacing the touch screen sensor hence manual switching mechanism has been eliminated and we can operate any home appliance just by a gentle touch on touch screen sensor.

III. PROPOSED SYSTEM

This paper endeavors a new speed control procedure of single phase AC induction motor. It is available at economical cost; with high efficiency, this drive is proficient of supplying a single-phase induction motor with PWM modulated sinusoidal voltage output. An ARDUINO family Microcontroller is used to control the circuit operation .The device is a substitute for frequently used TRIAC phase angle, control drives. The circuit is capable of supplying single-phase induction motor with inductive or resistive load and with variable AC voltages. It is comparable to TRIAC control, the voltage applied to the load can be changed from minimum to maximum value. Furthermore, a PWM technique has been used and it can be compared with phase angle control, which will be used for TRIAC, which produces considerably low higher order harmonics.

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Since the circuit, aimed at economical cost, medium powered applications, to get the output voltage waveform; it may not need any conservative converter topology . It can modulate mains AC voltage. As related with expensive converter, it needs low in number of active and passive power components. The device endeavored here takes advantage of, economical cost of the phase angle control and the low harmonic content with higher efficiency, which have standard converter topology. The drive accompanies MOSFET with PWM control and load in series with bridge rectifier. This control drive based on this recommended control procedure can be used in consumer as well as industrial products like fans, blowers, and washing machines etc.

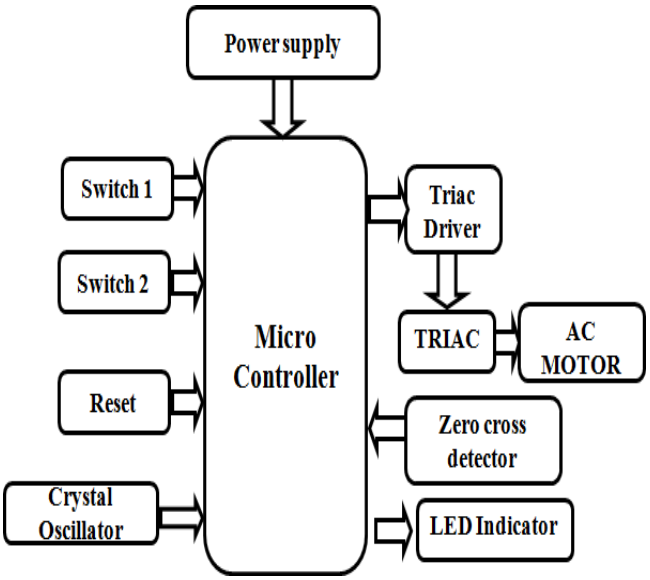

Fig 1 :Microcontroller

IV. CIRCUIT DIAGRAM

The schematic diagram and interfacing of PIC16F876, PIC16F72 microcontroller.

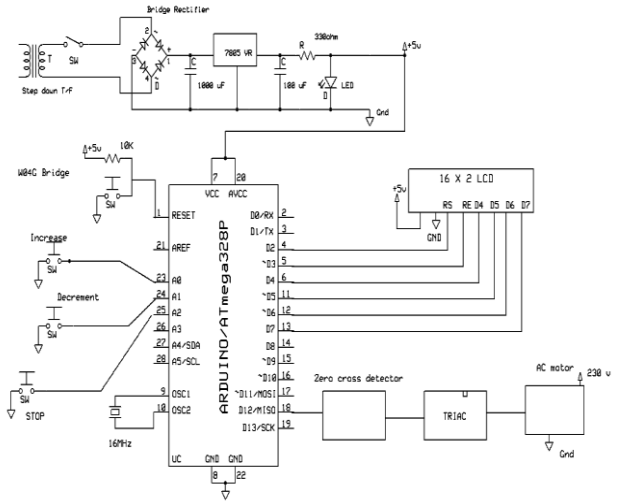

Fig 2 : Interfacing Diagram

The circuit works on the principle of pwm technique for speed control of an induction motor. When we want to increase or decrease the motor this project will be more useful. First to increase the motor increment switch is turned on and it can vary in steps and also when the user want to decrement the speed of motor, decrement switch will be turned on. Both these switches are provided on left of the microcontroller through pins. These speeds are controlled by using TRIAC and Zero Crossing detector connected to the circuit between the microcontroller and the induction motor. Ie The triac will control the pulses of the Ac supply input by using the microcontroller input signal and also zero crossing detector. Advantages And Disadvantages

A. Advantages:

1. This system eliminates electrical shocks when manual switching mechanism Is used.
2. The electrical appliances can be switched ON/OFF just by a gentle touch.
3. Visual and audible alerts using LCD and buzzer
4. Efficient and economical design.
5. Consume less power.
6. Quick response.
7. High voltage devices can also be operated.

B. B. Disadvantages:

1.Touch screen need to be handled carefully.
2.Interfacing Touch screen to Microcontroller is difficult
"Float over text" should *not* be selected.

V. RESULTS

The project " Speed monitoring of AC induction motor" was designed such that controlling the AC Motor speed by using Microcontroller interfaces with touch screen and the speed displayed on LCD



VI. CONCLUSION

Speed control of the induction motors is one of the most trending topics nowadays, through this paper we found a new method controlling the speed by frequency variation of the induction motor by using Arduino Uno, this method shows a smooth control of the speed through control the output frequency by setting a code wrote in Arduino Uno coding language. This code will control the whole operation by changing the Arduino output voltage and this will change the output frequency and voltage of the inverter and as a result the speed of the induction motor will be changed, setting a specific time for each speed, the code can be modified easily to get the desired speeds for different applications, it's an efficient method through the following facts, its consume less power as Arduino can operate by connecting 9V battery only,

the scheme can be upgraded to connect Ethernet shield to control the operation from distant area.

FUTURE SCOPE

Our project "Speed monitoring of AC induction motor" is mainly intended controlling the AC Motor speed by using Microcontroller interfaces with touch screen and the speed displayed on LCD. The input is given by the user using touch screen to micro controller which in turn operates the AC motor speed. The input value from the touch screen to the micro controller will be checked and respective operation of that press will be performed like increasing or decreasing the speed of the AC motor. system can be extended by using wireless Zigbee technology to operate the devices from longer distances.

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MODERN APPROACH FOR DIAGNOSING AND DETECTING FAULTS ON OVERHEAD TRANSMISSION LINES USING ARTIFICIAL NEURAL NETWORKS

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ABSTRACT

The high voltage transmission over long distance is mainly focused on safety and economic. If necessary, to transmit certain amount of power through long area should care about power regulation, efficiency and losses. Any time fault may occur if any deviation in voltage and current reaches above normal range. The faults in power system causes over current, under voltage, unbalance of the phases, reversed power and high voltage surges. Three-phase symmetrical faults are known to be the most severe in a power system due to large fault currents. However, single phase, phase to ground faults are more common faults that occur. If not checked in due time, these faults may grow to symmetrical fault which is uncommon but most severe. Trial and error method is usually practices for detecting the fault location on transmission line. In this method, the supply feeds at the single end at a time by dividing that transmission line into two parts and detect the fault up to that limit. This paper provides a modern approach for detecting a fault and diagnosing overhead transmission lines through the implementation of DWT and ANN controllers. Voltage signals are found from the sending end for each phase, the decomposition using DWT to obtain a detail coefficient of up to 2 stages.

KEYWORDS: BPN, Faults, Transmission line, DWT & Learning Algorithm

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Original Article

INTRODUCTION

In power transmission lines if any deviation of voltages and currents from nominal values or states are normally called electrical faults. At any circumstance, if the operating conditions are normal, the power system equipment or lines carry normal voltages and currents which results in safer operation of the system. Whenever the fault occurs in transmission lines, it may cause excessive flow of currents and make severe damages to the electrical equipments and devices. So, avoiding such kind of damages and protection of switchgear equipment, electromechanical relays circuit breakers, and other protection devices it is necessary to select or design suitable fault detection and diagnosis method.

Fault condition in the Phasor measurement unit is calculated measured input voltages comprises of 2 steps:

- First step authors in have matched degree measurement utilized to classify defective location, as defective buses have low matching degree value systems.
- A mathematical generator was used in second step to evaluate the accurate location of the fault. This method is taken to transmission lines on networks.

ANN provides to detect and diagnose errors. This is a natural or artificial method which these are upon this

design and real functions of the neurons in the brain biological systems. This could receive all the functions: failure identification, error diagnosis and fault position. It's also proposed in a feed forward propagation network for detecting faults. Neural network training is provided with inputs and targets. Hence it is identified that the technique based on ANN can solve the problems that are common in the design of conventional distance relays. Through this method, a final stage of voltage and current being utilized to detect faults using ANN with feed forward neural scheme as the primary approach. Efficiently this approach identifies and classifies electrical power failures. This scheme can therefore easily solve the problems as opposed to non-linear loads. The sample rate for each period is 1KHZ for training ANN results. The method involves two steps in detecting and classifying faults. For the detection of faults, human beings are using six input data of ANN technique and analyze these value systems with pre-fault values obtain sample set. Output of the artificial neural network system is 1 and 0 that both detects presence and shortage of fault. For fault classification, a certain approach selected and 4 inputs of the ANN method, that are A, B, C and G have been utilized. Results of the model are dependent on reliability of the artificial neural network design to identify and recognize faults.

TYPES OF FAULTS

Symmetrical Faults

Attention need for these faults because it makes more damage and interruption on the power transmission.

But it occurs in frequently in the power lines. Another name of this fault is balanced faults (IX, X).

In Figure 1, these faults are classified in to two types

- Line to line to ground (L-L-L-G) and
- Line to line (L-L-L).

Total faults in power line the symmetrical faults estimate only 2-5 percent of system. But these faults occur, the system remains balanced but results in severe damage to the electrical power system equipment also.

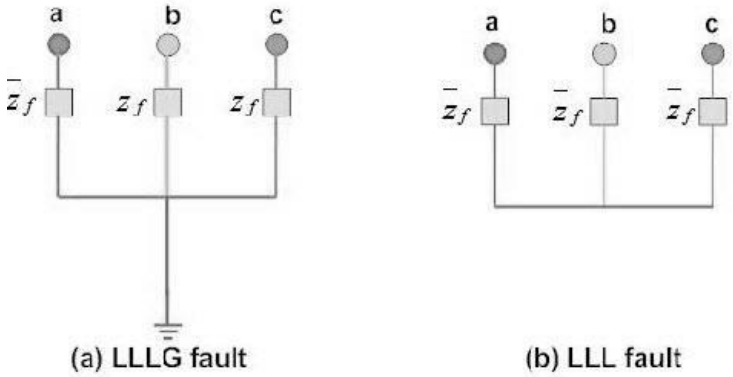

Figure 1: Symmetrical Faults

Asymmetrical Faults

In Figure 2, Asymmetrical faults are common faults occurs in transmission lines and less severe.

The followings are main type of asymmetrical faults

- Line to Ground (L-G),
- Line to Line (L-L), and
- Double Line to Ground (LL-G) faults.

All the above line to ground fault (L-G) is the most common fault and 65-70 percent of faults are of this type.

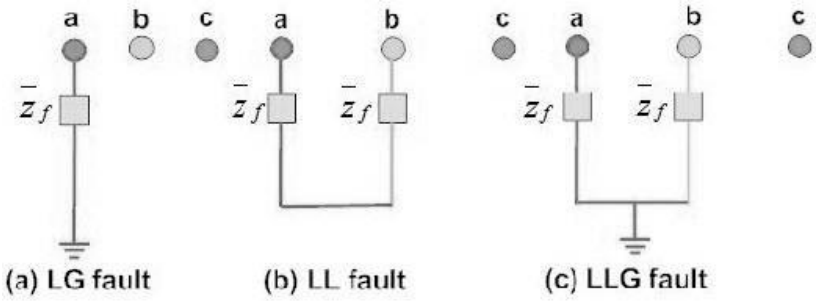

Figure 2: Asymmetrical Faults

MATERIALS AND METHODS

The electrical faults occur because of following weather conditions, equipment failures, human errors and smoke of fires. Once fault occurs it may create over current flow, danger to operating personnel, loss of equipment, electrical fires and Disturbs interconnected active circuits.

Discrete Wavelet Transform

In Figure 3, wavelet transformation, the high-pass filter is being used to evaluate high frequency information of signal and low frequency. Low-pass filter content analyzed. It performs two stages of decomposition. The signal during the first stage was decomposed into cA1 and cD1 with this kind of frequency band among 0-fs/4 and fs/4-fs/2 during which fs is called sampling frequency. cA1 is broken down to give rise to cA2 and cD2 discretely, in the second stage decomposition. The cD2 part band frequency is fs/8-fs/4, and 0-fs/8 for cA2. Upon decomposition the energy can be calculated from the detailed coefficients expressed in mathematical equations as below:

$$E(t_a, t_b) = \int_{t_a}^{t_b} (|y(t)|)^2 dt \quad \ldots\ldots \quad (1)$$

Where,

y(t) represents the signal,

E = Time interval of energy (ta, tb)

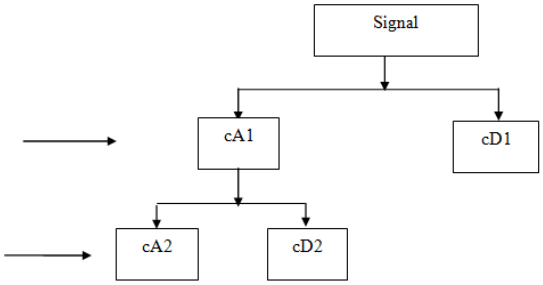

Figure 3: Discrete Wavelet Transform

ARTIFICIAL NEURAL NETWORKS

The Figure 4, network generally comprises of 3 layers, such as input, output, intermediate layer or the hidden layer shown in Fig.4. Each of these layers is made up of artificial neurons form wide network of neurons. Weights assigned the interconnection indicate strength of signal. Depending on the back - propagation algorithm, those weight values are modified.

Voltage and current values for the corresponding 3 stages are dissimilar and remain controlled through the fault category. Fault classification thus necessary a neural network that enables to identify type of fault from trends of voltages and currents produced from principles are calculated after a single terminal, electrical power system's three-phase transmission system. The neural network is calculated by sum 3 input quantities, i.e. the three-phase current etc. Using such six inputs, the neural network remains equipped. The number of total neural network output are in three stages A, B, C and four are grounded on three stage transmission networks. As we discussed protection and prevention of transmission line is most important work in order to safeguard electric the power systems. Hence, detection of faults in transmission lines, classified, and located accurately. Immediate action should be taken in very short duration whenever fault occurs. The proposed methods are based on the use of neural network and implementation of digital signal processing concepts.

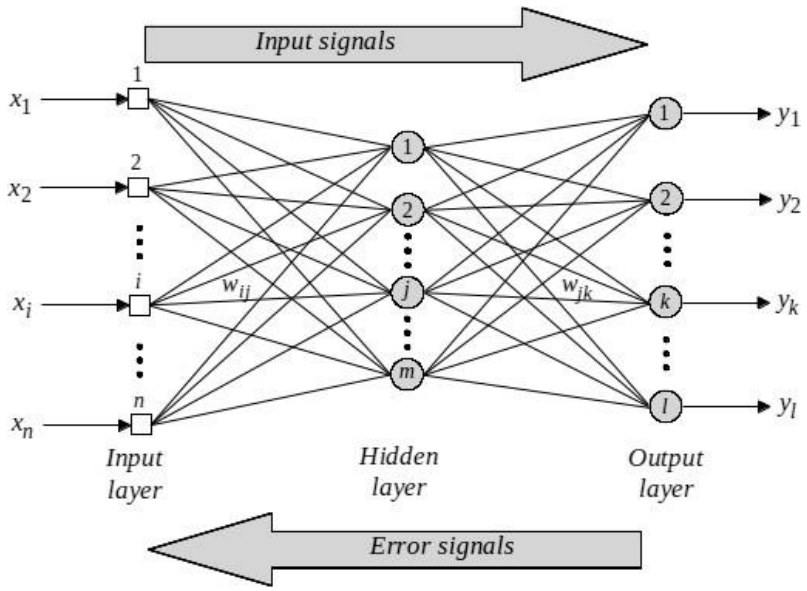

Figure 4: The Structure of BPN

SIMULATION RESULTS AND ANALYSIS

Over long distance power transmission normally high voltages are used. In our country standard voltages are used for power transmission over long distance. Moreover, cost is the main constraint for those transmission in terms of power lines, circuit breakers, insulators and transformers etc. In high voltage transmission those equipments cost are very high in the range above 230 KV. Using low power voltages, it is worth to check whether the required power can be transmitted. The different countries are following some standard voltage rating like 11 kV, 22 kV, and 33 kV for short lines, 66 kV and 110 kV for medium lines and 132 kV, 166 kV, 230 kV and above for long lines. Test data was obtained from MATLAB/ Simulink modeling, using 70-percent sample data and 30- percent testing dataset. Throughout comparison with WT, ANN has contributed to finding solutions with the power system, including such load estimation, error detection, fault diagnosis and structure. WT is also used for this method by converting the currents and voltage signals to find fault, artificial neural network identifies fault depending on the dissolved wavelet transform input signal. The normalized Voltage (v) and Current (i) are used as signals for the fault detection module and those signals samples are used for a fault location classification module. The results are shown in Figures 6 to 13.

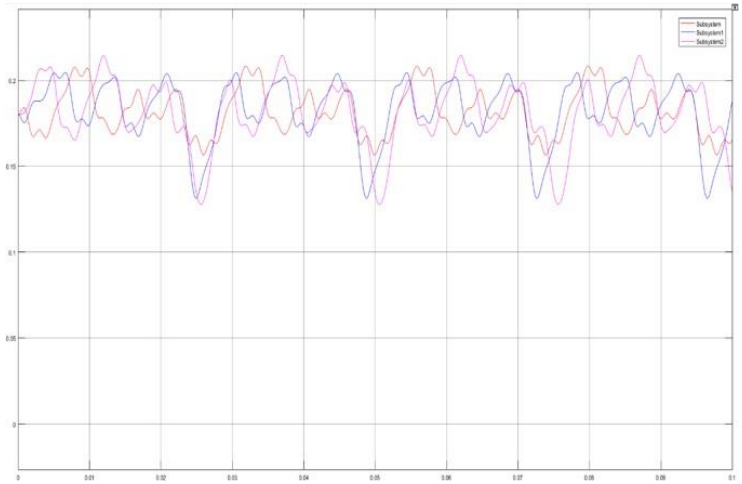

Figure 6: NO Fault

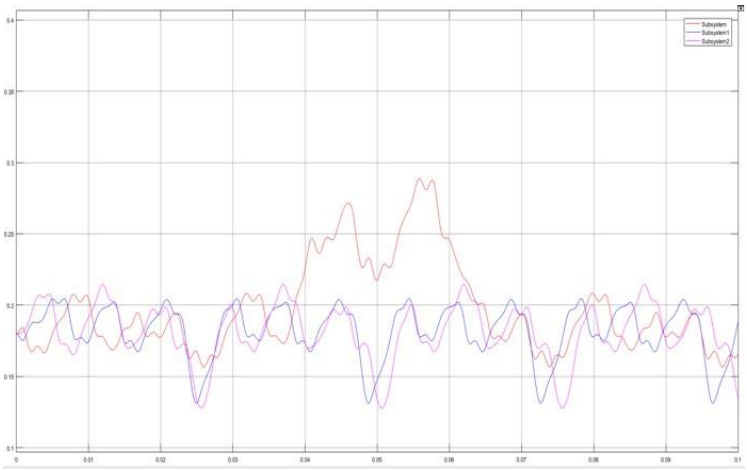

Figure 7: AG Fault

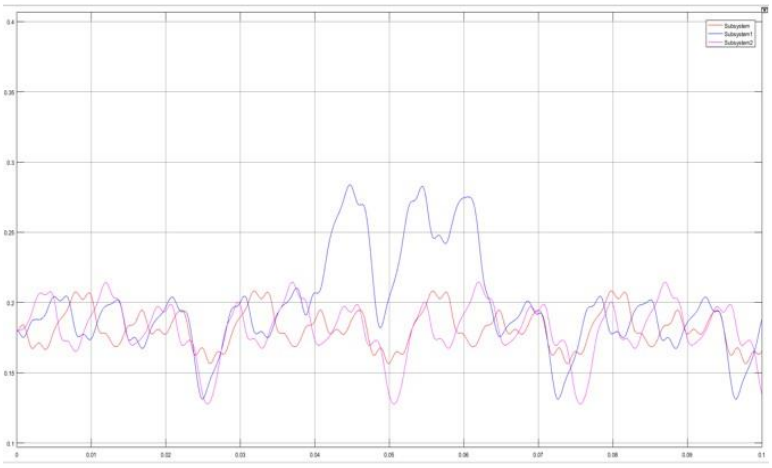

Figure 8: BG Fault

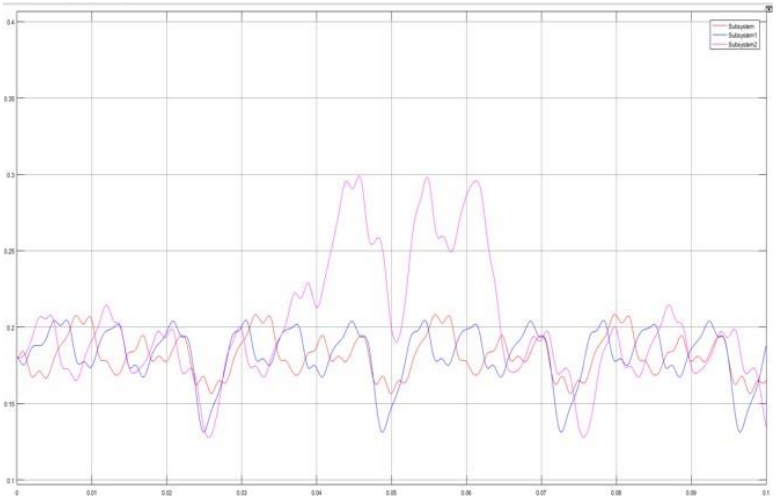

Figure 9: CG Fault

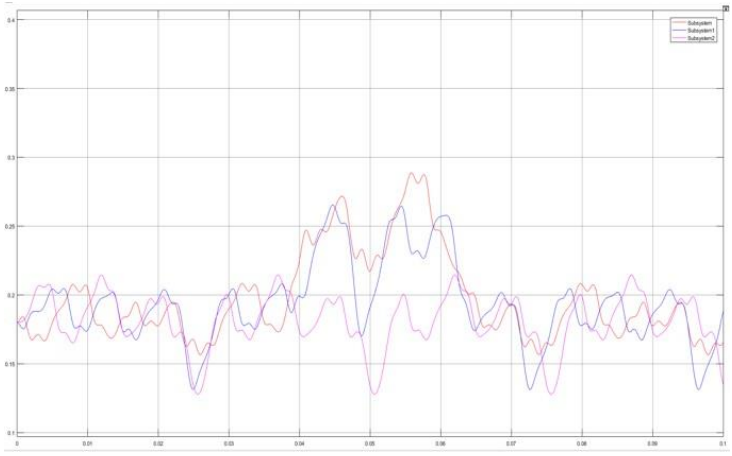

Figure 10: AB Fault

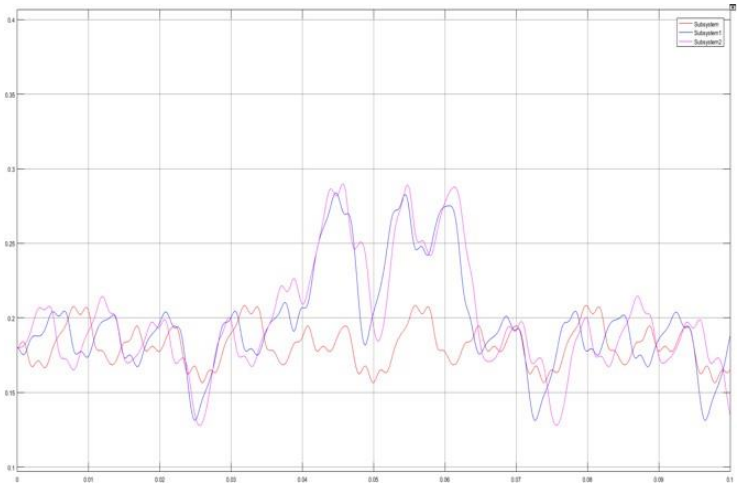

Figure 11: BC Fault

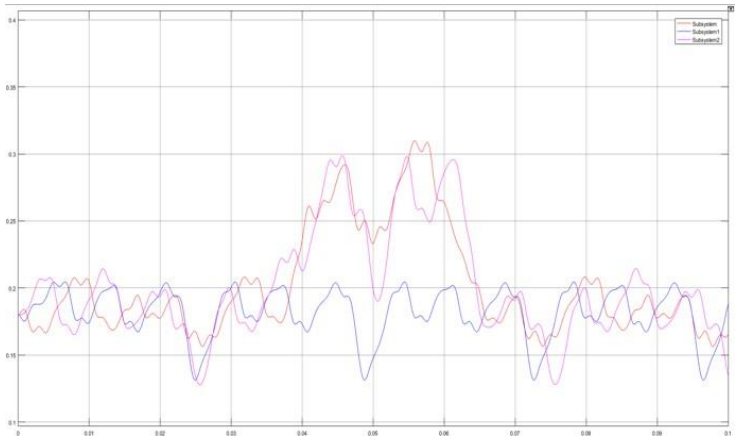

Figure 12: AC Fault

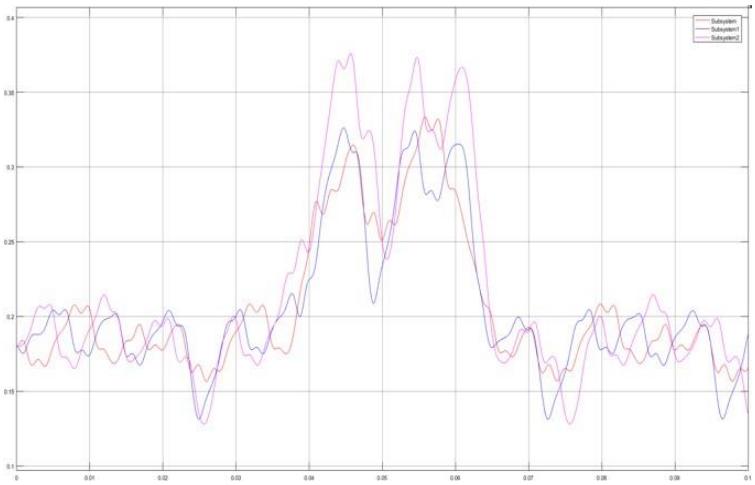

Figure.13: ABC Fault

It is observed from the above results during the fault voltages and currents more oscillations and it takes more time for settled. By using DWT with neural network based BPN technique is used to mitigate the voltage and current harmonics.

CONCLUSIONS

Different Faults are in the transmission lines and are affected by one of the elements that the reliability of the system. If the faults are increased it may reduce the reliable the system. Also it may disturb the service. The result of the experiment illustrates which all have proposed neural networks have achieved the satisfactory performance and are practically implementable. In this work, importance has been placed on the necessity of selecting the correct ANN model to get the maximum network output.

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INTERNET OF THINGS (IOT) IN ELECTRICAL RESEARCH

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Abstract: *The Internet of Things (IOT) fills the gap between the real world and cyber world. This technology enables the world to achieve connectivity between objects by combining physical and digital world; through various objects such as; actuators, processors, sensors which communicate over the internet. It is one of the flourishing technologies in the world. A Distribution Static compensator (DSTATCOM) which is installed in a remote village of Warangal district is interfaced with IOT. In this paper we combine IOT with a DSTATCOM, to keep a check on the power factor and other transmission line parameters remotely. IOT technology is used to monitor the health conditions of the DSTATCOM, with the swift and apt notification feature using Gmail.*

Index Term **- Internet of Things (IOT), DSTATCOM, JAVA Programming, MATLAB.**

1. INTRODUCTION

Internet of Things (IOT) was first invented by Kevin Ashton in 1999. Internet of things is an integrated platform of devices or objects, interconnected to each other through wired/wireless mode and they share information to develop an application. The internet of things dwells in two parts; the first comprises of physical objects i.e. devices, vehicles, buildings and other items. The second part is the electronics, software sensors and network connectivity which are embedded to the first part. These enable the objects to collect and exchange data. The internet of things is an emerging topic of global technological advancements. Consumer products, household appliances and large industrial equipments are connected using this technology [1-2]. It provides connectivity and powerful data analytic capabilities that promise to transform the way we work, live, and play [3]. In the days IOT will become an imperative part of our daily life.

There are the major advantages and characteristics of IOT which can be utilized for the benefit of mankind. IOT is characterized such that everything can be connected to the global information and communication infrastructure [4]. It can be utilized to provide services within the constraints of things, such as privacy and consistency between physical and virtual things. The devices within IOT have different hardware and use different networks but they can still interact with other devices through different networks. It can be used to change the state of a device dynamically. Devices powered by IOT have a unique identity and unique identifier. They have the capability to dynamically adapt with the changing contexts and take actions based on their operating condition. These devices will be integrated with information network for communication purpose.

The IOT is cinch, elementary and uncomplicated, thus many modern day systems utilize this platform for the amelioration of their products. In an IOT based atmospheric environmental

monitoring system, the quality of air in terms of air pollution index can be measured using this system; without the restriction of place and space. The atmospheric environmental measurement device is linked to the environmental analyzer through LTE networks. The analysis is based on C# and DBMS, whereas the user application is implemented in C# Windows Presentation Foundation (WPF). This system is known to measure fine dust, ultra-fine dust and also ozone characteristics [5]. Among many prominent applications of IOT is wireless home automation using MQTT protocol. This system uses multiple sensors which notify the users in several ways for diverse devices [6]. The Application of IOT have also reached the agricultural field, where the concept of IOT based system is utilized to measure the temperature, humidity and water level moisture values of the field; resulting in the improved quality and quantity of the farm yield [7-8]. It is evident that the use of IOT technology in association with the other aspects of science and technology is trending as many embryonic technologies [9].

In this paper DSTATCOM is interfaced with IOT technology to improve power factor and real time monitoring of the distribution line. The calling mechanism of the JAVA program in MATLAB gives accurate results. The use of IOT technology for sending timely notifications in the case of a low power factor; is an efficient system for the monitoring of the health of the DSTATCOM.

2. WORKING OF INTERNET OF THINGS

A device powered by this technology can sense the environment and collect information related to it and transmit it to a different device of same or different networks. The users are entitled to set conditions for the working of the devices and these can be programmed into the device. The device can be actuated to other devices in correlation to the conditions set by the users. The device is designated to receive information from the network and to provide information between two devices of the same or different networks.

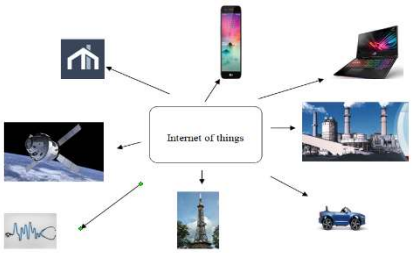

Fig 1 – Architecture of Internet of Things

The basic architecture of IOT is apparent and effortlessly simple. It consists of different layers which are interconnected to give the user the simplest working [10]. The precipitation layer consists of sensor devices. This layer covers and adjusts everything needed in the physical worlds to gain the necessary insights for further analysis. Next in line is the network layer, this layer is a connecting link between the upper and the lower layers. It forwards information from lower layers to the upper layer. This layer works through Wi-Fi, wired LANs and transmits the information between layers. The Middle layer is concerned with service management and storing the lower layer information into the database. This layer enables for follow-up revision and feedback for the lower layers. The application layer is known to manage the IOT applications. It is the frontend layer visible to costumers and used in daily lives. The top most layers is the business layer, it covers the entire IOT applications and service management [11]. It is a sophisticated integration of the architecture of IOT. The layered architecture of IOT provides stability and flexibility to the IOT devices and systems.

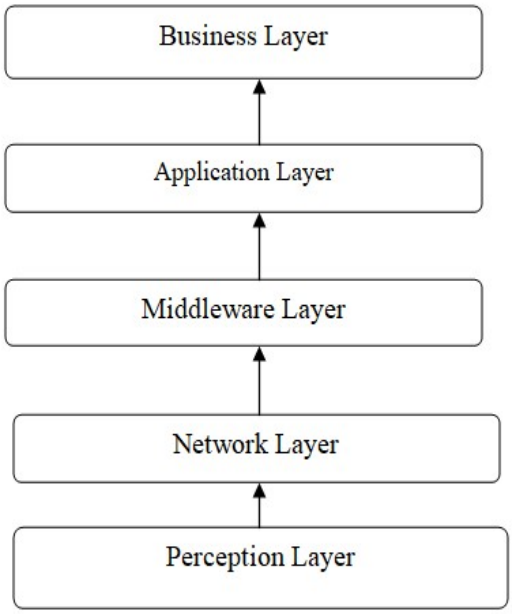

Fig 2- Layered Architecture

3. APPLICATIONS OF IOT TECHNOLOGY ON AN ELECTRICAL DEVICE – DSTATCOM

3.1 DSTATCOM

DSTATCOM is a shunt connected device crafted for power factor improvement, toning source currents and harmonic mitigation in distribution lines. It is meritoriously used in load compensation for balancing unbalanced load currents for various source voltage conditions [12]. In recent years Distribution Static Compensator (DSTATCOM) is the most active device used in distribution lines for easing of power quality hitches like high reactive power compensation, unbalanced loading conditions and low power factor. It be made up of of Voltage Source Inverter (VSI) [13]; controller to stimulate firing pulses for IGBT's in VSI, dc link capacitor and coupled at Point of Common Coupling (PCC) through an interfacing inductor to reduce ripple content in distribution line.

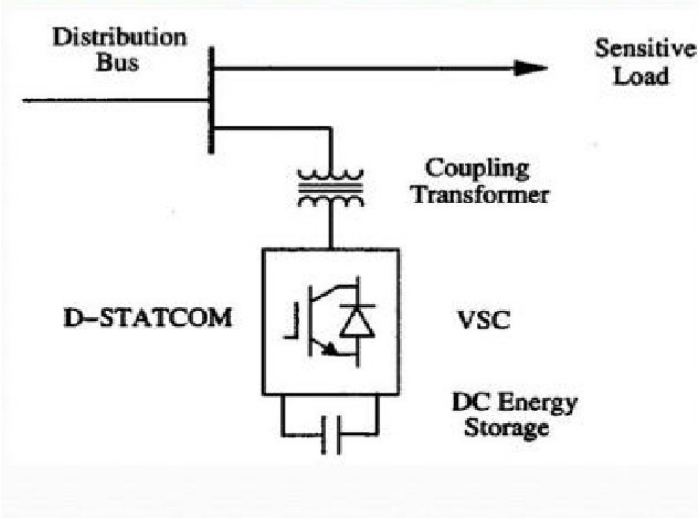

Fig 3 – DSTATCOM Block Diagram

3.2 APPLICATION OF DSTATCOM AND IOT

In this paper IOT technology is implemented to monitor the characteristics, performance and health of the DSTATCOM. A DSTATCOM has been installed in the rural village of state of Telangana, India called, Chandrayangutta. This village is situated in Warangal district, where

heavy motors are a cause of low power factor in the lines. Various power factor problems are analyzed in the considered village. A major issue for the villagers is the monitoring of the device. We aim at merging the two emerging technologies of IOT and DSTATCOM to improve the power factor and real time monitoring of the distribution line. The software is designed to identify low power factor conditions and communicate the same to the user. The communication module uses JAVA programming which is integrated in MATLAB through calling procedure. The interface of IOT with DSTATCOM is studied in terms of performance using MATLAB/SIMULINK, with the help of simulation results. The information of low power factor in the distribution line is collected by the IOT module and an email notification is to be sent to the users Gmail account.

The software is designed to process the low power factor in the DSTATCOM. JAVA Programming is used by the system in integration with MATLAB as a calling procedure.

3.3 THE LOW POWER FACTOR DISCRIMINATION ALGORITHM AS FOLLOWS:

1)Created java project with class DSTATCOM IOT.

2) Created class for Complex Number which holds the real and imaginary values in the form of data type double.

3) Created a utility class to handle arithmetic operations (add, subtract, multiply, square root, inverse, divide) between complex numbers and real numbers which are stored in the form of Complex Number object.

4) Created the static method called calculate Power Factor in DstatcomIot class which takes the Va, Vb, Vc, Ia, Ib, Ic, time, logflag as input in the forms of real and imaginary numbers to calculate Power Factor and returns the p,q,and pf values.

5) Created a map for getter and setter method to store variables like mailsSent, positivePFCount, negativePFCount, prevPF, switchoffTime .

6) MailsSent value prevents sending mails more than
Configured count (ex: send one mail per shut down of system)

7) PositivePFCount, negativePFCount, prevPF, switchoffTime values to prevents sending mails only when power factor reached lessthan desired value.

8) Additionally added a flag to print the input, output values.

9) Used a method called printData to print logs for any additional information required.

10) Created the jar file called DstatcomIot.jar file.

11) Created the javaclasspath.txt file in MATLAB BIN DIR ($MATLABHOME\BIN\) by adding jar classpath as content.

12) Created Matlab function which takes input Va, Vb, Vc and Ia, Ib, Ic.

13) Created statements to call java from Matlab [e.g.: code Extrinsic (“java method”)] and called calculatePowerFactor java method from matalab function by passing Va, Vb, Vc and Ia, Ib, Ic, time, logflag and capture the powerfactor.

14) Using the setValue, getValue method store and retrived the mailsSent, positivePFCount, negativePFCount, prevPF, switchoffTime variables to prevents unnecessary mails.

15) Developed logic for sending a mail when power factor level gets decreased.

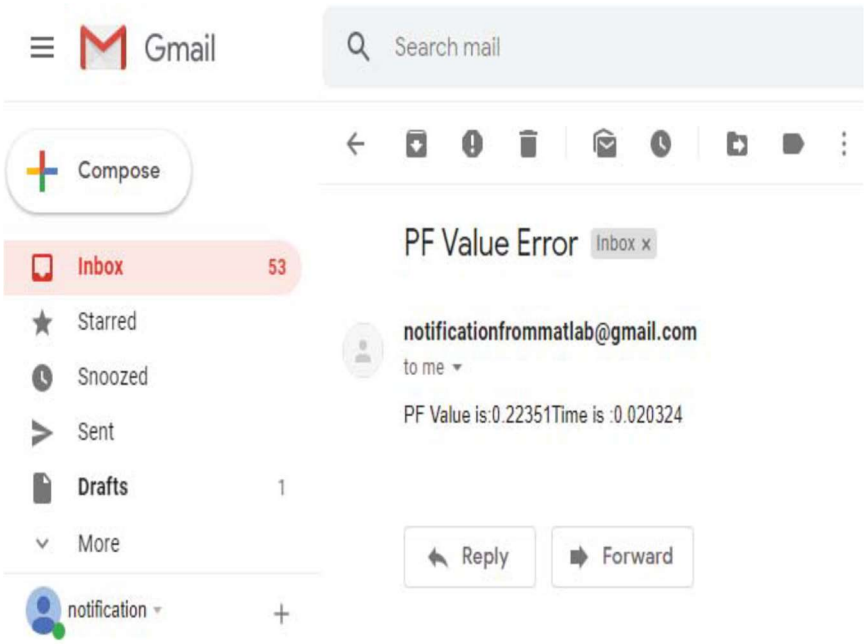

Fig 4 – Low power factor notification 1.

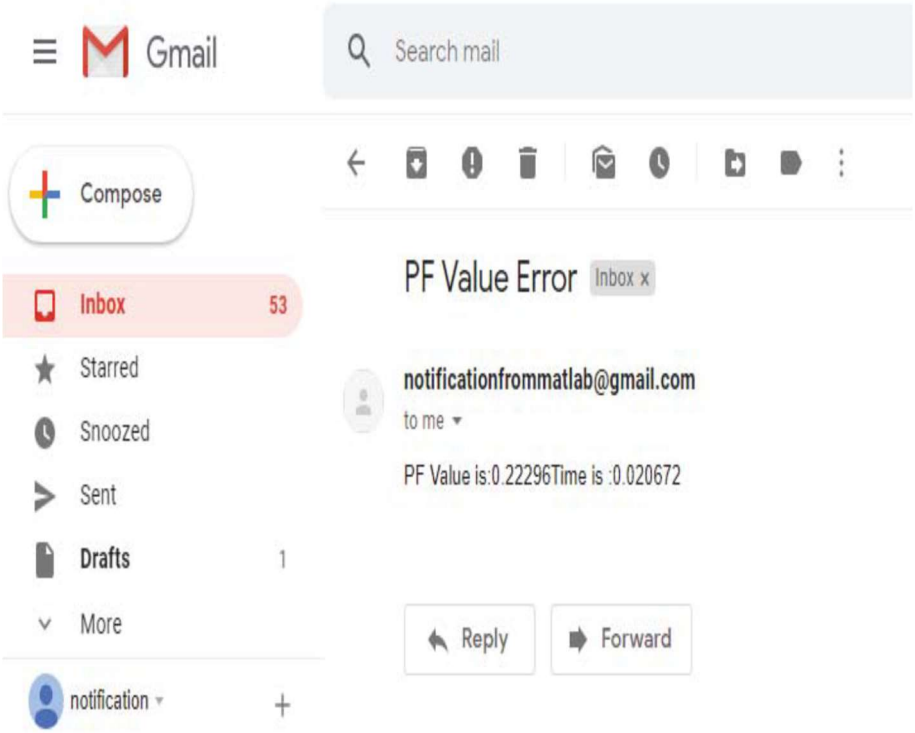

Fig – 5 Low power factor notifications 2.

It is observed that here a metering technology based on IOT is being used to solve this problem. Internet of things provides the connectivity between objects timelessly, seamlessly combining physical and digital world. The IOT based module is helpful in monitoring the results very precisely and it leads to taking necessary actions astutely and on time. Even the minute and very small variations can also be monitored remotely using this IOT technology. The monitoring of

the distribution line is metaphorical to one to one care using this system. The Internet of Things (IOT) represents a step beyond the utilization of conventional technology by increasing the use of wireless technology and provides real-time data acquisition. This system is evident to function without human presence at the site of fault, thus making it tranquil and efficient.

4. CONCLUSION

In this paper the use of IOT for the monitoring and control of an electrical device – DSTATCOM is proposed. This technology can be utilized for the real time monitoring of the distribution lines distantly. The IOT module is supported by the low power factor discrimination and communication module developed using JAVA Programming in MATLAB/SIMULINK. The results have proved that the use of IOT technology leads to monitoring of low power factor conditions. The data acquisition using IOT is very powerful and accurate. The mail sent to the registered user during the condition of low power factor is the most crucial part of the system, as this is responsible for the in-time action of switching on of the DSTATCOM. As, part of our future research we intend to develop a real time prototype; for the evaluation and on ground implementation of this technology. It is evident that the real time monitoring and timely action of the distribution system will increase the efficiency of the whole distribution system. Apparently, it has come to light that IOT is an emerging technology and a powerful tool which has its applications in various fields of work. It can flawlessly be known as a multidimensional technology useful in all works of life.

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AN ANALYSIS OF BIOMETRIC BASED SECURITY ACCESS SYSTEM

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Abstract

In recent years the biometric system lacks in security due to fraudulent access. Old systems relayed on Multi-Spectral Imaging (MSI) for security which is found to be ineffective. The advanced technology in the biometric system to improve security is Image Quality Assessments (IAQ). In the previous system, the Multi-Spectral Imaging (MSI) was implemented in which the usual digital protection mechanisms and enhanced security systems are not effective. A novel software based biometric detection system is proposed here to detect the fraudulent biometric access attempts. It is used to enhance the security of biometric recognition systems. In this system from the original image, 30 image quality features are extracted, the same acquired for authentication purposes. Among various biometric recognition, finger recognition, iris recognition and face recognition are presented by using image quality assessment technique.

Keywords : Biometric, Finger Print, Multiplexer, Image Quality Assessment (IAQ) and Multi Spectral Imaging (MSI)

I. Introduction

Biometric advancements have developed as devices to help ID in a worldwide and versatile society (V). In Fig.1, the term biometrics in the data innovation field alludes to the particular utilization of identifiers or anatomical and social qualities for verification or acknowledgment purposes.

Numerous recognizable proof systems fathom three components:

1) Trait identifiers like Social Security Number, driver's permit number, account number,

2) True to life identifiers like location, calling, training, conjugal status, and

3) Biometric identifiers like a unique mark, voice, iris, face, and walk. Biometric systems, as different uses of example acknowledgment and AI, are influenced by the nature of information (VII).

Thusly, it is essential to quantitatively assess the nature of an example that is demonstrative of its capacity to work as a biometric.

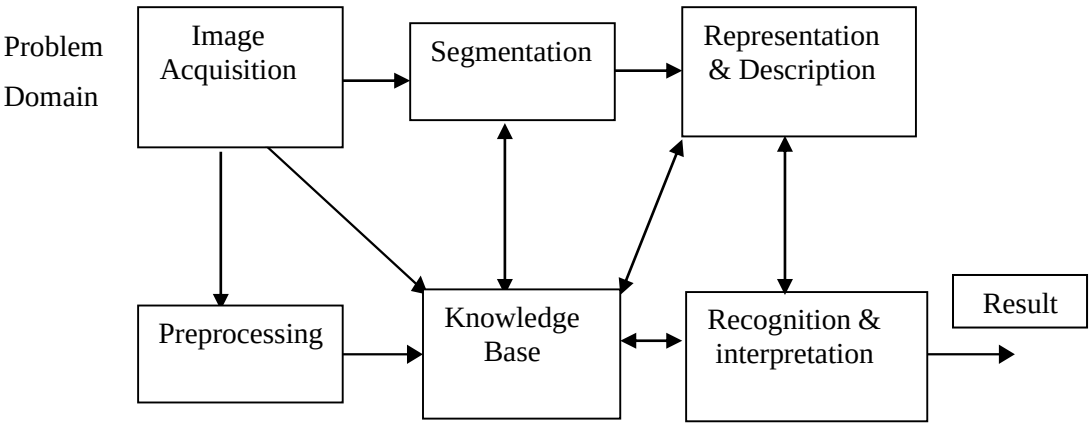

Fig. 1: Basic process of Biometric system

II. Methods

The basic role of a security system is used to present non-repudiable confirmation. Verification suggests that just genuine or authenticated users will access to the physical or sensible assets secured by the biometric system and (ii) impostors are kept from getting to the ensured assets (VIII). While a system can be undermined in various manners, one of the possibly harming assaults is the spillage of biometric layout data. The spillage of this format data to unapproved people comprises a genuine security and protection danger (IX).

Along these lines a model of making a joined details layout is proposed. By utilizing the joined details layout, the total particulars highlight of a solitary unique mark won't be undermined when the database is taken.

In Existing systems of fingerprint recognitions are need the protected datasets (VI). These systems showing the templates of two fingerprint structures, it's easily identified from hackers. The overcome of this drawback the proposed system has dot line templates, so the hackers are not easily identified that. Previous fingerprints output source is a template only. It's not possible for any other usable source. Existing

fingerprint system processes are direction and image wise template creation method. This system is not suitable for twins, some relationship members (III).

Mixing of Finger Prints

This work investigates the chance of blending two distinct fingerprints at the picture level to produce another fingerprint (I). To blend two fingerprints, each unique mark is disintegrated into two distinct parts, viz., the ceaseless and winding segments. After pre-adjusting the segments of each unique mark, the ceaseless part of one unique finger impression is joined with the winding segment of the other unique mark picture.

Direction Map β (X, Y)

The course is particularly characterized in the range 0◦ to 360◦ (modulo 2π). Interestingly, the unique mark edge direction is indistinct from that of a 180◦ pivoted edge (modulo π). Along these lines, the unique finger impression's direction map, signified by θ (x, y), ought to be opened up to a bearing guide, β (x, y). Stage opening up is a procedure used to address a 2π stage hop in the direction map. The opening up process includes or takes away a balance of 2π to progressive pixels at whatever point a stage hop is identified. This procedure continues by beginning at any pixel inside the direction picture and utilizing the nearby direction data to navigate the picture pixel-by-pixel, and doling out a course (i.e., the crossed bearing) to every pixel with the condition that there are no discontinuities of 2π between neighboring pixels. Notwithstanding, the nearness of stream singularities implies that there will be pixels in the direction picture with brokenness of±2π the crossed way and, accordingly, the above opening up procedure will come up short.

Helmholtz Decomposition

The Helmholtz Decomposition Theorem is utilized to deteriorate the decided stage Ψ(x, y) of a unique finger impression picture into two stages. The principal stage, ψc is a consistent one, which can be opened up, and the second is a winding stage, ψs, which can't be opened up yet can be characterized as a stage that displays winding conduct at a lot of discrete focuses in the picture. The Bone's buildup indicator is first used to decide the winding stage ψs(x, y) from the demodulated stage Ψ(x, y). Next the consistent stage, is figured as ψc(x, y)=ψ(x,y)−ψs(x, y). At long last, the separated branch cuts from the past advance are utilized again to open up the nonstop stage. This method needs two separate databases to cooperate. It prompts a decrease in coordinating precision. The client personality may likewise be undermined when both the key and the ensured diminished unique mark are taken.

III. Proposed System

An epic system for securing unique mark protection by consolidating two distinct fingerprints into another personality is proposed. We extract the target positions from unique finger impression, the direction from the other unique mark, and the reference focuses from the two fingerprints. In light of this removed data and our proposed coding methodologies, consolidated details layout is created and put away in a database. In the verification, the system requires two question fingerprints

from a similar two fingers which are utilized in the enlistment. A two-phase unique mark coordinating procedure is proposed for coordinating the two question fingerprints against a consolidated details layout. By putting away the joined details layout, the total particulars highlight of a solitary unique finger impression won't be undermined when the database is taken.

In Existing systems of fingerprint recognitions are need the protected datasets. These systems showing the templates of two fingerprint structures, it's easily identified from hackers. The overcome of this drawback the proposed system has dot line templates, so the hackers are not easily identified that. The previous fingerprints output source is a template only. It's not possible for any other use source. Existing fingerprint system processes are direction and image wise template creation method. This system is not suitable for twins, some relationship members.

Reference Points Detection

In Fig.2, The reference point's location procedure is performed by utilizing complex channels for particular point recognition. Given a unique mark, the principle steps of the reference point's identification are summed up as follows:

1. Compute the direction from the unique finger impression utilizing the direction estimation calculation. The direction is gotten in complex space.
2. Calculate an assurance guide of reference focuses utilizing a convolution administrator, which is the portion for reference focuses identification.
3. Calculate an improved assurance map.
4. Identify a measuring target fulfilling the 2 measures
5. Sufficiency of the matter is a nearby greatest
6. The nearby most extreme ought to be over a fixed limit.
7. Repeat advance (4) till all found.
8. If no target is detected to the unique finger impression in 4 and 5 (e.g., a curve unique mark), find a reference point with the greatest sureness esteem in the entire unique finger impression picture.

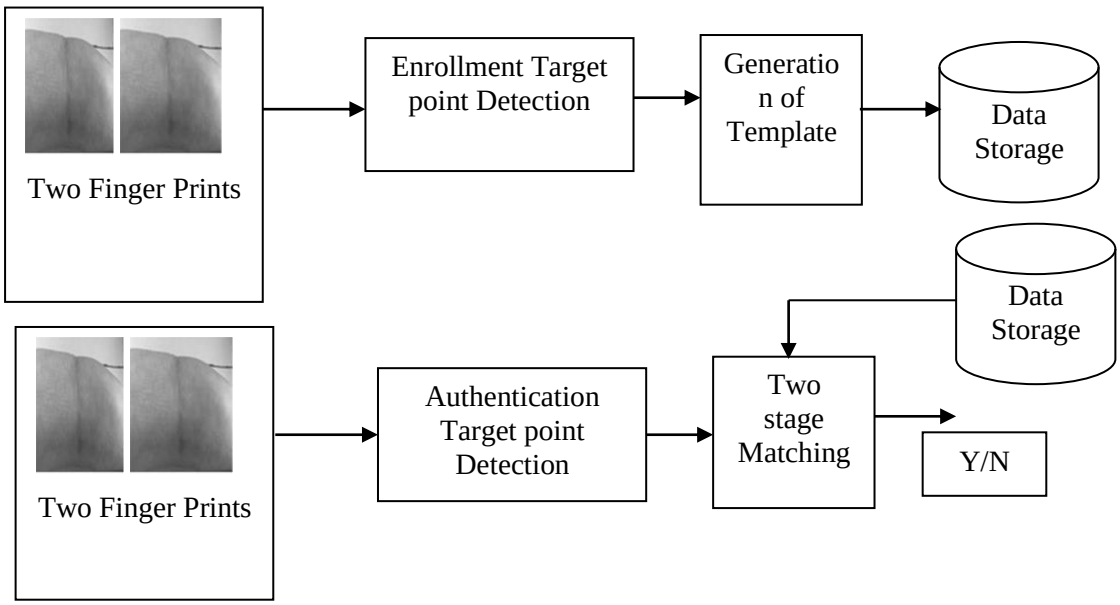

Fig. 2: Proposed system

IV. Results and Discussion

For each unique mark, we characterize the reference point closest to the checked top most circle as the closest reference point for effortlessness. The reference focuses are viewed as really distinguished if the Euclidian separation between the checked top most loop and the closest reference point is under 35 pixels. Something else, the reference focuses are considered to be erroneously identified. Table .1 shows the presentation of the reference focuses identification at various settings of edge, where "No." alludes to the all-out number of reference focuses distinguished among the 250 fingerprints. It tends to be seen that setting T = 7 will accomplish a decent harmony between the exactness and proficiency. By setting 0.5 and T = 7 the normal Euclidian separation between the checked highest circle and the closest reference point is 6.50 pixels.

Table 1: Detection of reference points

	3	**4**	**5**	**6**
Number	1100	610	271	195
True Detection Rate (%)	99.9	99.9	99.9	99.0
False Detection Rate (%)	0.1	0.1	0.1	1.0



Fig. 3: Detection of Target Points in Finger prints

Fingerprint with only one reference point in Fig.3a and the corresponding certainty value map in Fig.3b; fingerprint with two reference points in Fig.3c and the corresponding certainty value map in Fig.3d as shown in Figure 3.Furthermore, by adopting such settings, will only detect one reference point for the majority of fingerprints, which is the loop as shown in Fig. 3a and 3b. In Fig. 3c and 3d illustrate an example with two reference points detected. The reliability of the angle of the nearest reference point (by setting σ=1.7 and T = 7) for each of the 250 fingerprints is measured as follows:

Rotate the imaginative fingerprint from -30 to 30 degrees with 2 degrees per step base on the highest loop distinct before.

Achieve the reference point's recognition for the creative fingerprint and its rotated version. The angle of the nearby reference point of the creative fingerprint is denoted as α0, and the matching angle for each of the rotated versions as αq, where q = -30,-29,...-2,2,4,...30 refers to the degree of rotation.

approximate the degree of rotation for every rotated version by,

$$\bar{q} = \alpha q - \alpha 0$$

calculate the supreme estimation error for each rotated version by,

$$e = \bar{q} - q$$

Calculate the mean and standard deviation of all the rotated versions, which are denoted as ***emean*** and ***estd,*** respectively. Among all the 250 fingerprints, the average ***emean*** and ***estd*** are 1.90 degrees and 2.10 degrees, respectively.

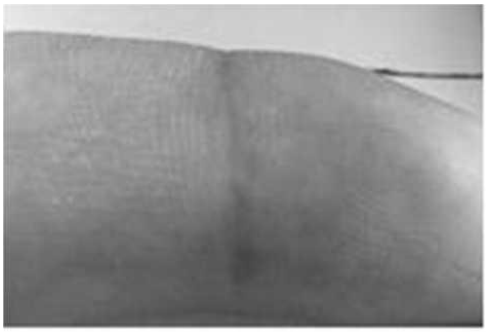

Fig. 4: Original fingerprint

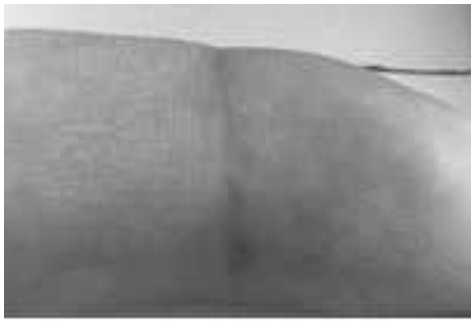

Fig. 5: Trained fingerprint

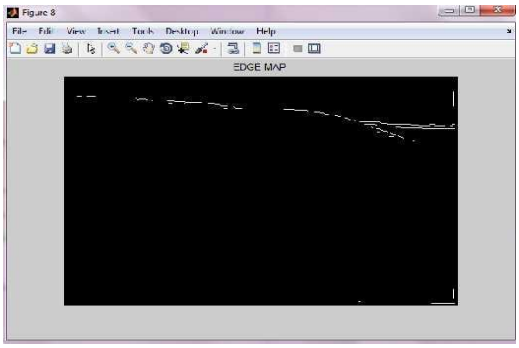

Fig. 6: Edge map of original image

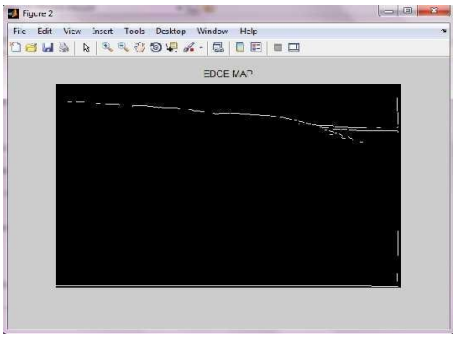

Fig. 7: Edge map of trained image

The original and trained finger prints are shown in Figs 4 and 5. The implementation of an edge map of the original image and trained images are presented in Figs 6 and 7. For over a century, a criminal agent has utilized fingerprints to recognize associates on the premise with proof left at the wrongdoing scene (VIII) (IX). Though unique finger impression was once thought about outwardly, today PCs accelerate the procedure: the computerized fingerprints ID system, presently utilized in most western nations, analyzes follows found at a wrongdoing scene with a large number of putting away unique mark pictures in only a couple of moments. As of late, the police in different German urban communities presented portable, empowering correlation with be made quickly over versatile correspondence systems. Be that as it may, it isn't just criminal agent who utilize such innovation; numerous business gets to control system use distinguishing proof system dependent on biometrics the computerized acknowledgment of people by utilizing conduct or natural qualities. Notwithstanding fingerprints, biometric advancements can utilize a rich assortment of anatomical attributes, for example, pictures of the face, iris or retina, the portrayal of the geometry of the hand.

V. Conclusion & Future Scope

The investigation of the vulnerabilities of biometric systems against various sorts of assaults has been a functioning field of exploration as of late. This intrigue has led to large advances in the field of security-upgrading advances for biometric-based applications. In any case, despite this observable improvement, the advancement of productive security techniques against realized dangers has demonstrated to be a difficult errand. Basic visual investigation of a picture of a genuine biometric attribute and a phony example of a similar characteristic shows that the two pictures can be fundamentally the same as and even the natural eye may think that it's hard to make a qualification between them after a short assessment. However, a few inconsistencies between the genuine and phony pictures may become clear once the pictures are converted into an appropriate component space. These distinctions originate from the way that biometric attributes, as 3D objects, have their optical characteristics (assimilation, reflection, dissipating, refraction), which different materials (paper, gelatin, electronic showcase) or artificially delivered tests don't have. Moreover, biometric sensors are intended to give great quality examples when they interface, in a typical activity condition, with a genuine 3D attribute. On the off chance that this situation is changed, or if the attribute introduced to the scanner is a surprising phony curio (2D, diverse material, etc.), the qualities of the caught picture may essentially fluctuate. These systems additionally use conduct or physiological qualities, for example, a composed mark, voice or the composing design on the console. Such capacity makes an individual sign that can be estimated by biometric innovation.

Conflict of Interest :

Authors decleared : There is No conflict of interest regarding this article.

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Implementation of Hybrid Energy Storage System (Battery/Super-Capacitor) in DC Micro grid

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***Abstract*— Energy storage technology (EST) is an important way to boost the power output of renewable energy production (such as solar and wind energy), but it is difficult for a single energy storage device (ESS) to satisfy the demand for secure grid service. A battery / super-capacitor HESS is proposed according to the configuration and operating characteristics of the current battery / super-capacitor hybrid energy storage system (HESS). The HESS work theory and three working modes (the super-capacitor pre-loading cold stand-by mode, boost mode and buck mode) are studied in detail. The boost mode and buck mode state equations are extracted. To create the small signal equivalent model under the buck / boost mode, the state space average method is used. In addition, the HESS charge and discharge control technique is obtained via the combination of the closed-loop voltage control. In Matlab / Simulink, the simulation model is designed to verify the efficacy of the suggested HESS and its control strategy. The results show that the HESS and its control strategy can ensure good stability and superior anti-interference of the DC bus voltage, and can simultaneously produce large current, increase battery life and improve the technological economy of storage of energy.**

***Index Terms*— Battery, bi-directional DC/DCconverter, HESS, super-capacitor, voltage closed Loop.**

I. INTRODUCTION

With the large amount of renewable energy utilized in the grid, renewable energy power generation (such as solar energy and wind energy) is going to play an indispensable role in the future development of the power system [1]. However, the output power of distributed generation (DG) units are intermittent and random, which brings new challenges to the safe and stable operation of the power system [2, 3]. space, size, weight, changes in transmission, control strategy management etc. Existing on-board Energy storage technology (EST) with the function of "peakcutting and valley filling" is an effective way to solve the power quality of renewable energy generation, and it is also the key technology to ensure the safe and stable operation of the grid [4].The hybrid energy storage system (HESS) has been becoming a hot research topic because it can overcome the limitations of the single energy storage system (ESS) (low power density, low energy density, slow effect speed and short life, etc.) and combine the advantages of both [5]. The ESS is mainly composed of two parts: an energy storage unit and a bi-directional DC/DC converter [6]. A battery ESS can reduce the fluctuation of wind energy output in wind power generation, but the power density of the battery is low [7]. A super-capacitor ESS can realize the storage of regenerative braking energy in urban rail transit, but the low energy density of the super-capacitor may affect the safe and stable operation of the train [8]. An isolated bi-directional DC/DC converter can achieve high power density and current isolation, but when the isolation transformer exists, the leakage inductance and control of the transformer should be considered [9]. Authors of [10] have proposed a high ratio DC/DC converter, which can effectively reduce the voltage stress of the switch. A high-power bi-directional DC/DC converter for distributed photovoltaic power generation has been suggested by [11], which can maximize the solar energy collection capacity.An HESS of a battery and super-capacitor has been presented [12], which effectively combines the advantages of both and reduces the impact of wind energy fluctuation.

However, the HESS is a parallel two independent branches with complex control and poor economy. The application of the HESS in the grid is investigated [13–15]. The results show that the HESS can effectively combine the advantages of a battery and super-capacitor, stabilize the stable operation of the grid and improve the battery life.Based on the study of energy storage requirements for safe and stable operation of a DC microgrid, this paper proposes a battery/super-capacitor HESS, which adopts voltage closed-loop control to improve the voltage stability of a DC bus and the anti-interference performance of the HESS. This paper compares the recovery effect of the HESS and battery ESS on the DC bus voltage to illustrate the advantages of the HESS.

The specific arrangement of the paper is as follows: Section 2 exhibits the topological structure and working principle of the proposed HESS, while section 3 displays the control strategy of the HESS. Section 4 introduces the simulation results and analysis of the system. Finally, section 5 summarizes the article and shows the next work.

II. SYSTEM CONFIGURATION AND WORKING PRINCIPLE

2.1. System configuration

The HESS shares a set of a DC/DC converter, adds a diode D with the function of selective switch, and adds a separate pre-charging circuit as cold stand-by to ensure the normal operation of the super-capacitor. The specific topology is shown in Fig. 1. Among them, UE and UC are the battery and super-capacitor terminal voltages, respectively, and U_d is the DC bus terminal voltage.

2.2. Working modes of the system

The HESS has three working modes: the super-capacitor pre-charging cold stand-by mode, the boost mode and buck mode.

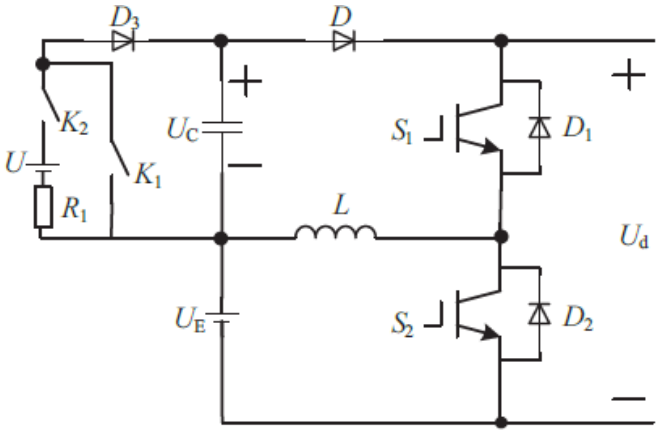

Fig. 1. Structure of battery-super-capacitor HESS

Case 1: the super-capacitor pre-charging cold stand-by mode

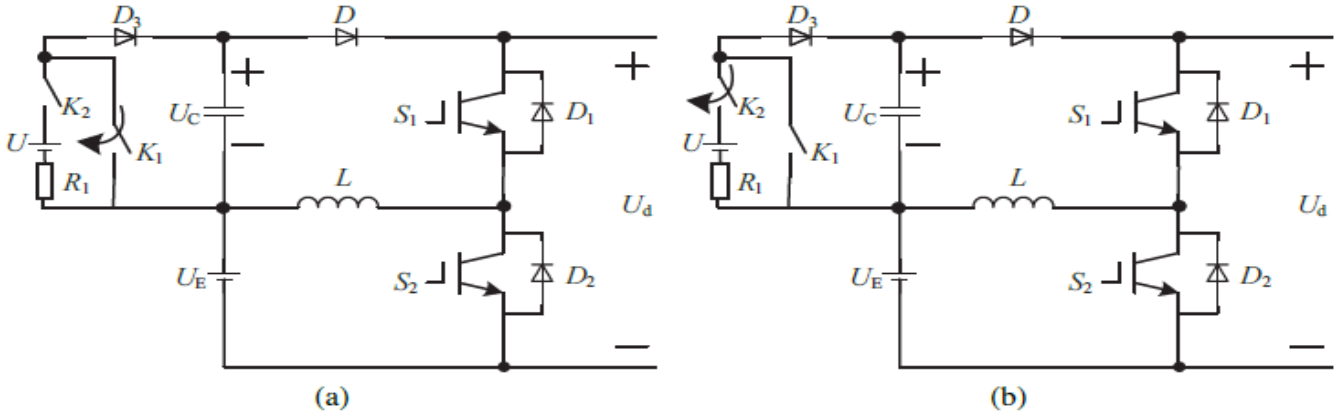

Fig. 2. Equivalent circuit diagram in supercapacitor pre-charging mode:
Working state 1 (a); working state 2 (b)

When the system is in the stand-by state, provided that UC is detected to be in safe working voltage, K1 is closed and K2 is opened. The equivalent circuit diagram is shown in Fig. 2(a). As can be seen from Fig. 2(a), D3 is cut off due to reverse voltage UC, and the super-capacitor pre-charge circuit will not work [16]. Provided that UC is detected to be lower than the cut-off voltage, K1 is opened and K2 is closed. The equivalent circuit diagram is shown in Fig. 2(b). As can be seen from Fig. 2(b), D is cut off due to reverse voltage, and the super-capacitor is in the pre-charge mode.

The super-capacitor pre-charging mode is actually a first-order RC circuit. Power supply U (power supply U is actually introduced from the DC bus voltage to improve the economy of ESS) charges the super-capacitor through discharge resistance R1. Meanwhile, the pre-charge circuit of the proposed topology has been applying the pre-charge of capacitor voltage in the sub-module of the modular multilevel converter.

Case 2: the buck mode

When the DC bus voltage rises, the system operates in the buck mode. Its equivalent circuit diagram is shown in Fig. 3. In buck mode, the anti-parallel diode D2 of switch S2 and switch S1 works alternately.

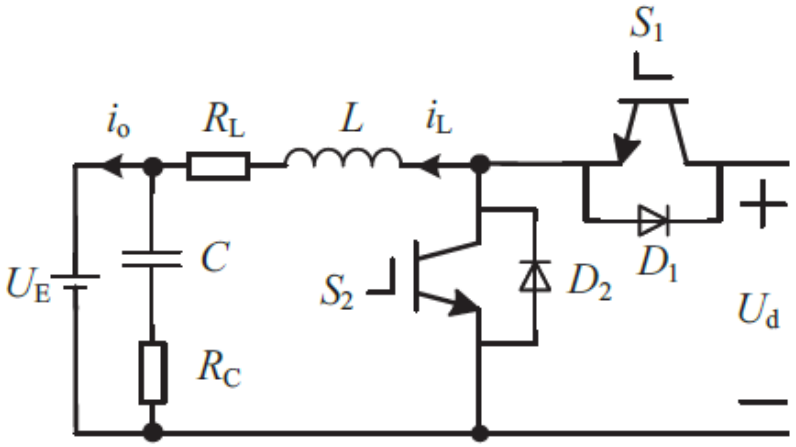

Fig. 3. Equivalent circuit diagram of buck mode

Define switch function *S*:

$$S = \begin{cases} 1 & \text{the } S_1 \text{ or } S_2 \text{ is turned on} \\ 0 & \text{the } S_1 \text{ or } S_2 \text{ is turned off} \end{cases}. \tag{1}$$

According to Fig. 3, the corresponding equation of the state can be obtained as follows:

$$\begin{pmatrix} \frac{di_L}{dt} \\ \frac{du_C}{dt} \end{pmatrix} = \begin{pmatrix} \frac{1}{L} & -\frac{R_L}{L} \\ 0 & \frac{1}{C} \end{pmatrix} \begin{pmatrix} S U_d \\ i_L \end{pmatrix} + \begin{pmatrix} -\frac{1}{L} & 0 \\ 0 & -\frac{1}{C} \end{pmatrix} \begin{pmatrix} U_E \\ i_o \end{pmatrix}. \tag{2}$$

According to Equation (2) and the state space average method [17], the corresponding average equation can be obtained:

$$\begin{pmatrix} \frac{\mathrm{d}i_{\mathrm{L}}}{\mathrm{d}t} \\ \frac{\mathrm{d}u_{\mathrm{C}}}{\mathrm{d}t} \end{pmatrix} = \begin{pmatrix} \frac{D}{L} & -\frac{R_{\mathrm{L}}}{L} \\ 0 & \frac{1}{C} \end{pmatrix} \begin{pmatrix} U_{\mathrm{d}} \\ i_{\mathrm{L}} \end{pmatrix} + \begin{pmatrix} -\frac{1}{L} & 0 \\ 0 & -\frac{1}{C} \end{pmatrix} \begin{pmatrix} U_{\mathrm{E}} \\ i_{\mathrm{o}} \end{pmatrix}, \tag{3}$$

Where:

$D = t_{\mathrm{on}}/(t_{\mathrm{on}} + t_{\mathrm{off}})$, is the duty cycle of S_1.

Added disturbance:

$$\begin{cases} d = D + \hat{d} \\ i_{\mathrm{L}} = I_{\mathrm{L}} + \hat{i}_{\mathrm{L}} \\ u_{\mathrm{d}} = U_{\mathrm{d}} + \hat{u}_{\mathrm{d}} \\ u_{\mathrm{E}} = U_{\mathrm{E}} + \hat{u}_{\mathrm{E}} \\ u_{\mathrm{C}} = U_{\mathrm{C}} + \hat{u}_{\mathrm{C}} \end{cases} . \tag{4}$$

By substituting Formula (3), the small signal transfer function of control-voltage can be obtained through the Laplace transformation:

$$G_{v\mathrm{d}1} = \left. \frac{\hat{u}_{\mathrm{E}}(s)}{\hat{d}(s)} \right|_{\hat{u}_{\mathrm{d}}(s)=0} = \frac{U_{\mathrm{d}}(s)}{LCs^2 + R_{\mathrm{L}}Cs + 1} . \tag{5}$$

Case 3: the boost mode

When the DC bus voltage decreases, the system operates in the boost mode. Its equivalent circuit diagram is shown in Fig. 4. In the boost mode, the anti-parallel diode D1 of switch S1 and switch S2 works alternately.

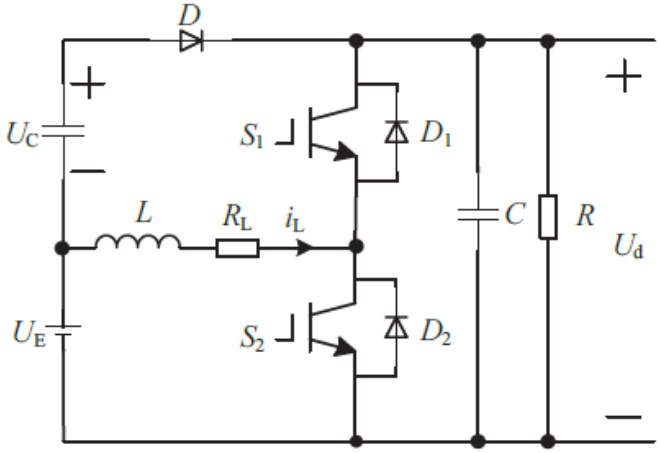

Fig. 4. Equivalent circuit diagram of boost mode

According to Fig. 4, the corresponding equation of the state can be obtained as follows:

$$\begin{pmatrix} \frac{\mathrm{d}i_{\mathrm{L}}}{\mathrm{d}t} \\ \frac{\mathrm{d}u_{\mathrm{d}}}{\mathrm{d}t} \end{pmatrix} = \begin{pmatrix} -\frac{(1-S)}{L} & -\frac{R_{\mathrm{L}}}{L} \\ \frac{1}{RC} & \frac{(1-S)}{C} \end{pmatrix} \begin{pmatrix} U_{\mathrm{d}} \\ i_{\mathrm{L}} \end{pmatrix} + \begin{pmatrix} \frac{1}{L} \\ 0 \end{pmatrix} U_{\mathrm{E}}. \tag{6}$$

According to Equation (6) and the state space average method, the corresponding average equation can be obtained:

$$\begin{pmatrix} \frac{\mathrm{d}i_{\mathrm{L}}}{\mathrm{d}t} \\ \frac{\mathrm{d}u_{\mathrm{d}}}{\mathrm{d}t} \end{pmatrix} = \begin{pmatrix} -\frac{(1-D)}{L} & -\frac{R_{\mathrm{L}}}{L} \\ \frac{1}{RC} & \frac{(1-D)}{C} \end{pmatrix} \begin{pmatrix} U_{\mathrm{d}} \\ i_{\mathrm{L}} \end{pmatrix} + \begin{pmatrix} \frac{1}{L} \\ 0 \end{pmatrix} U_{\mathrm{E}}, \tag{7}$$

Where:

$D = t_{\mathrm{on}}/(t_{\mathrm{on}} + t_{\mathrm{off}})$, is the duty cycle of S_2.

By substituting Formula (4) into Formula (7), the small signal transfer function of control- voltage can be obtained through the Laplace transformation.

$$G_{\mathrm{vd2}} = \left.\frac{\hat{u}_{\mathrm{d}}(s)}{\hat{d}(s)}\right|_{\hat{u}_{\mathrm{d}}(s)=0} = \frac{U_{\mathrm{d}}(s)\left(D' - \frac{R_{\mathrm{L}} + sL}{RD'}\right)}{LCs^2 + \left(R_{\mathrm{L}}C + \frac{L}{R}\right)s + \frac{R_{\mathrm{L}}}{R} + D'}, \tag{8}$$

where: D`= 1-D

3. CONTROL STRATEGY

The energy management of the HESS mainly depends on the control strategy of a bi-directional DC/DC converter, that is, the charge and discharge of a battery and super-capacitor bank are realized by controlling the bi-directional DC/DC converter. It is the core of control to keep the voltage of the DC bus constant. In this paper, the voltage closed-loop control is used to make the DC bus voltage stable at the rated voltage quickly. The way to generate the control pulse of the bi-directional DC/DC converter is mainly composed of complementary pulse width modulation (PWM) and independent PWM. The difference between them is whether the driving signals of S1 and S2 are complementary. In order to improve the stability of the system, the independent PWM mode is used.

The bi-directional DC/DC converter control strategy of the HESS consists of two parts: a logic judgment unit and a voltage closed-loop control unit. The specific control block diagram is shown in Fig. 5. When the voltage U_d suddenly rises (such as locomotive braking process), the difference ΔUd1 between the reference voltage U^*_d at the DC bus and the actual value Ud, then the theoretical duty cycle d'_1 is obtained through PI and the limiting link, and then the current actual duty ratio d1 is obtained by combining the independent PWM mode. At this time, the HESS works in the buck mode, S2 is off, S1 is in PWM. When the voltage U_d suddenly drops (such as the starting process of the locomotive), the difference ΔUd_2 between the reference voltage U^*_d at the DC bus and the actual value U_d, then the theoretical duty cycle d'_2 is obtained through the proportional-integral (PI) and limiting link, and then the current actual duty ratio d_2 is obtained by combining the independent PWM mode. At this time, the HESS works in the boost mode, S1 is off, S2 is in the PWM. The PI is used to realize the tracking control of U_d at the DC bus to U_d ref.

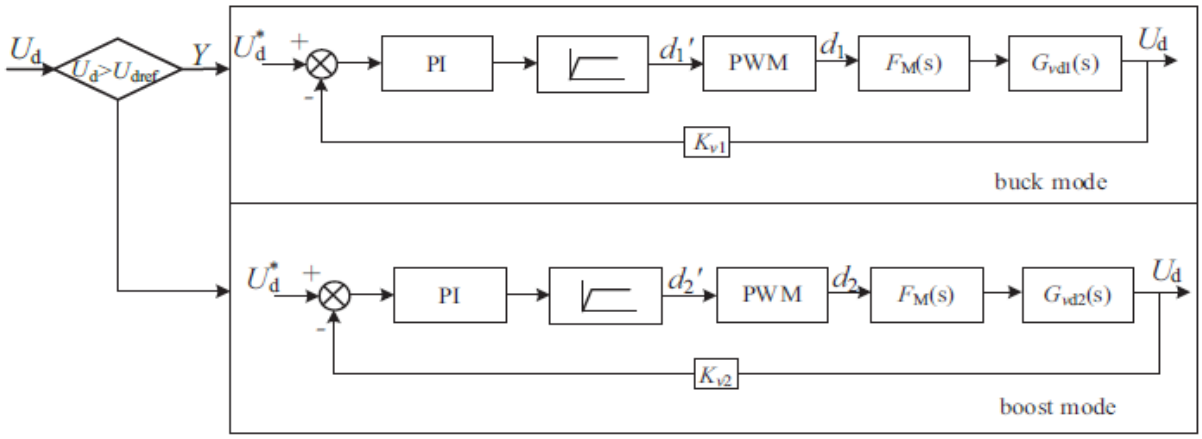

Fig. 5. Control strategy block diagram of bi-directional DC/DC converter for HESS

3.1. Simulation results and discussion

In order to verify the effectiveness of the HESS and its control strategy, Matlab/Simulink scientific computing environment was used to simulate, and the main simulation parameters of the system are shown in Table 1. Fig. 6 shows the pre-charge waveform of the super-capacitor when the discharge depth of the super-capacitor is 50%. From Fig. 6, it can be seen that when the super-capacitor voltage is detected to be reduced to 24 V or below, the super-capacitor pre-charging circuit is activated to Charge the super-capacitor. At 600 ms, the super-capacitor voltage reaches 47.2 V, and the power supply will be restored to the normal working voltage. Meanwhile, the pre-charge time of the super-capacitor is within a reasonable range [18].

Table 1. Main simulation parameters of the system

Parameter name	Symbol	Value	Unit
Battery voltage	U_E	48	V
Super-capacitor voltage	U_C	48	V
DC bus voltage	U_d	120	V
Inductance	L	8.2×10^{-5}	H
Discharge resistance	R_1	6.94×10^{-5}	Ω
Output capacitance	C	3.76	mF

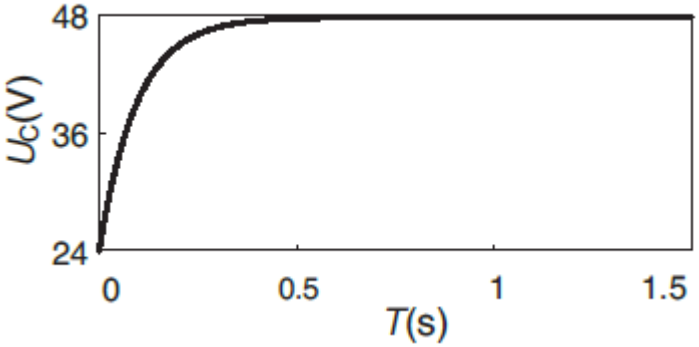

Fig. 6. Pre-charging waveform of super-capacitor

Case 1: no load disturbance

When the DC bus voltage suddenly decreases (such as the moment of motor start, etc.), the system works in the boost mode. Fig. 7 shows the waveform of the DC bus voltage *U*d of the HESS and the battery ESS in the boost mode when the DC bus voltage is reduced to 90 V. It can be seen from Fig. 7 that under the HESS, the maximum voltage *U*d at the DC bus is 134.1 V, and the *U*d stability value is 120 V; the system overshoot is about 11.6%; the system regulation time is 0.95 ms; the voltage ripple is about 0.73%, less than 2%. Under the battery ESS, the stable value of the DC bus voltage *U*d is 123.9 V, the stable value of *U*d is 119.8 V; the system overshoot is about 3.5%; the system regulation time is 1.45 ms. The regulation time of the battery ESS is 34.5% longer than that of the HESS. Therefore, the DC bus voltage recovery effect and dynamic
Performance of the HESS in the boost mode are better than that of the battery ESS.
When the DC bus voltage suddenly increases (such as locomotive braking process, etc.), the system works in the buck mode. Fig. 8 shows the waveform of the DC bus voltage Ud in the buck= mode when the DC bus voltage increases by 150 V. It can be seen from Fig. 8 that under this condition, the stable value of the DC bus voltage Ud is 118.55 V; the system overshoot is about 11.25%; the system regulation time is 0.8 ms; the voltage ripple is about 0.75%, less than 2%.

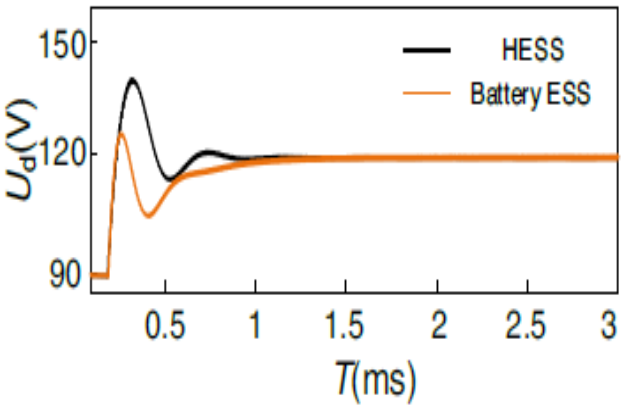

Fig. 7. Waveform of boost mode

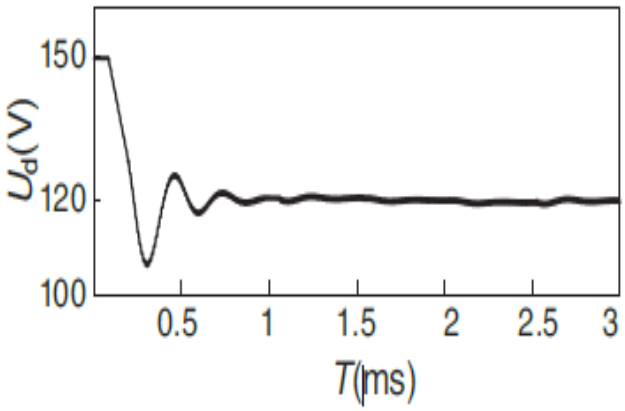

Fig. 8. Waveform of buck mode

Case 2: adding load disturbance

When the DC bus voltage suddenly decreases (such as the moment of motor start, etc.), the system works in the boost mode. A periodic load disturbance is added at 1 ms to decrease the DC bus voltage, and a periodic load disturbance is added at 2 ms to increase the DC bus voltage. Fig. 9 shows the waveform of the voltage Ud at the DC bus of the proposed HESS in the boost Mode when the load disturbance is added. It can be seen from Fig. 9 that the voltage at the DC bus drops to 111.8 V in 1 ms and recovers to 120 V after 0.305 ms; the voltage at the DC bus rises to 129.5 V in 2 ms and recovers to 120 V after 0.385 ms. When the DC bus voltage suddenly increases (such as locomotive braking process, etc.), the system works in buck mode. A periodic load disturbance is added at 1 ms to decrease the DC bus voltage, and a periodic load disturbance is added at 2 ms to increase the DC bus voltage. Fig. 10 shows the waveform of the DC bus voltage Ud in buck mode of the proposed HESS when the load disturbance is added. It can be seen from Fig. 10 that the voltage at the DC bus drops to 114.3 V in 1 ms and recovers to 119.8 V after 0.41 ms; the voltage at the DC bus side rises to 126.3 V in 2 ms and recovers to 119.8 V after 0.39 ms.

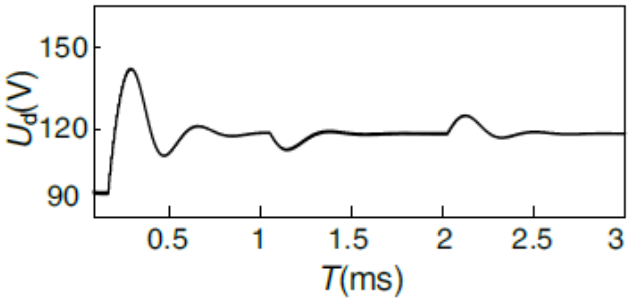

Fig. 9. Waveform of boost mode with load disturbance

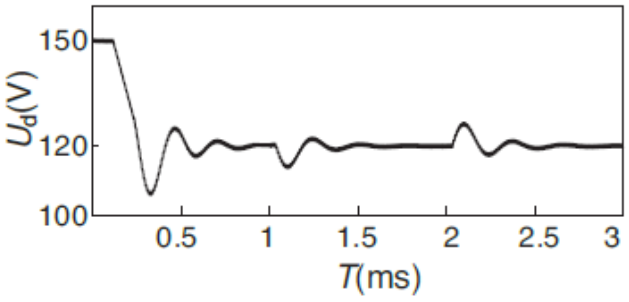

Fig. 10. Waveform of buck mode with load disturbance

4. CONCLUSION

Maintaining a constant DC bus voltage is the first prerequisite for the safe and stable operation of the DC micro grid. In this paper, the HESS and its control strategy are analysed in theory and simulation. The results demonstrate that the HESS and its control strategy can increase the service life of the battery, reduce the size of the battery, and improve the economy of the ESS. Simultaneously, the super-capacitor pre-charge cold standby state and the boost, buck mode work
Independently. The diode D with the function of a selective switch can charge the main power battery, and the super-capacitor pre-charge circuit, as the cold standby, effectively guarantees the performance of the super-capacitor. In addition, the voltage ripple of the HESS and its control strategy is small, while the voltage stabilizing effect and the anti-interference performance is superior.
Finally, the next step is to verify the proposed HESS in practical engineering, and further discuss and analyze the coordinated control strategy of the HESS for a micro grid.

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ARTIFICIAL NEURAL NETWORK BASED POWER QUALITY IMPROVEMENT USING SHUNT ACTIVE POWER FILTER

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ABSTRACT: Artificial Intelligence methods are the latest developments in power quality enhancement. Fuzzy logic and neural networks also include Artificial Intelligence. This paper deals with the artificial neural network application to power quality improvement. This paper presents a study designed to enhance Total Harmonic Distortion (THD) caused by improper utilization of electronic control (PE) devices as well as nonlinear loads. Shunt Active Power Filter is also one of controller which is used to suppress source currents harmonic currents and to offset the reactive power as it has ability to minimize the harmonic problems that nonlinear loads cause. The P-Q Instant Reactive Power Theory (IRP) is used for the removal of the harmonic component. In DC-link controller and for current error adjustments Artificial Neural Network (ANN) were employed. The hysteresis current controller scheme can be used to generate trigger pulses and to controlling voltage source inverter swapping. Artificial intelligence gives better results when compared to the conventional methods. Continuous and effective electricity supply is required for the operation of modern and advanced society today. Simulations are performed in MATLAB environments using toolbox power system.

KEYWORDS: Artificial Neural Networks (ANN), Total Harmonic Distortion (THD), Shunt Active Power Filter (SAPF), Power Quality (PQ).

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I. INTRODUCTION

"These days power electronic converters have wide spread application due to the advanced technology. Such power electronic converters have deeply recognized residential and commercial uses Profoundly, but because of power electronic converters we have come across the power quality issue" [1-2]. The truth that the power electronic converters operates as highly non-linear loads tends to cause this problem. Such highly nonlinear loads interrupt the waveform of power supply that passes device axes, resulting of highly harmonic supply currents and thus reduces input power factor. The major causes of nonlinear systems are un regulated bridge rectifiers and phase regulated converters. consequently, Advanced power electronics appliances used mostly in speed-controlled motor drives, thyristors, grinders, un interruptible power supplies (UPSs) and personal desktops are major cause of voltage distortion at point of common coupling (PCC) as well as power flow in transmission lines [3-4]. They result in Total Harmonic Distortion (THD) from voltage supply far higher than the allowable limit set by IEEE 519 standard of 5 percent.

The easier and cheaper technique for eliminating these harmonics currents is the using of passive filters, but they eliminate specific harmonics and require adjusting to reduce others. The issue is related to the characteristics of resonance compensation for the fixed capacitance, inductance and their huge size. Also used were hybrid filters included both passive and active filters, but these are too costly to implement for harmonic discharge [5]. Therefore, Shunt Active Power Filters (SAPF) will built to solve these issues. The Shunt Active Power Filter aim should be delivering current with same magnitude but in reverse direction, which negates the harmonic currents in the network. In general, SAPF provides harmonious mitigation, reactive power compensation and

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compensation for unbalances, voltage harmonics, current harmonics by improve the power factor. As a harmonic current source, SAPF helps to reduce the harmonic components produced by PE-based non - linear loads.

Recently, due to its accuracy and efficiency, Recent methods like the Artificial Intelligence (AI) are becoming highly widespread. Neurons interconnected show the response depending on the stimulation of the input. The input neurons convert the stimulus to decision as network output. In order to make a decision, data samples are used in an iterative training section, and weights are changed until the expected results are obtained. For efficient service, artificial neural network (ANN) uses algorithms such as recurrent network and Hopfield. ANN adaptability is quicker compared to conventional high-pass filter (HP) control systems and PI controllers. ANN can implement with different approaches based on artificial neural intelligence, where the minimum loss control technique is applied to permanent magnet synchronous motors (PMSM s) which increase motor efficiency and reduce losses. A three-phase SAPF with ANN controller is proposed in this paper, using conventional hysteresis to address the quality of electricity. Using IRP p-q theory, reference signals are calculated. ANN is used to allow the extraction of compensating currents, and its implementation into SAPF's control system makes it stronger and more complex.

II. SAPF PRINCIPLE OF FUNDAMENTAL COMPENSIS

The fundamental principle of compensation for Shunt Active Power Filter that can be seen in Figure 1.

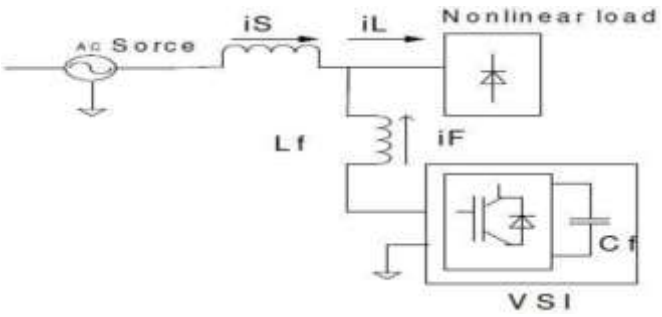

Figure 1: Basic SAPF Principle

Shunt Active Power Filter depending on voltage source inverter is an attractive and efficient way of solve the current emission issues with harmonics and to improve electrical system's power efficiency. The Shunt Active Power Filter by a self-controlled DC bus is directly attached to the distribution systems to minimize harmonic substance, enhance the power factor and keep the network healthy. Figure 1 illustrates the schematic diagram of Nonlinear SAPF Load. The basic concept of SAPF is to inject the harmonic currents produced by a 180degree phase angle load.

For the following reasons Dc link capacitor is being used:

a) To keep a DC voltage at a steady state with a small ripple.
b) To act as an energy-storage function throughout the transient duration to provide real power differential between loads and source.

III.INSTANTANEOUS ACTIVE REACTIVE POWER (PQ) APPROACH

In addition to manage the instantaneous voltages in a three-phase power circuit numerically, this is appropriate to describe such substances with in instantaneous space vectors but rather to optimize the evaluation, The components of the zero-phase series in the three-phase power voltage in this method are better for reducing and recognizing the currents. The basic control algorithm of SAPF was seen in Figure 2.

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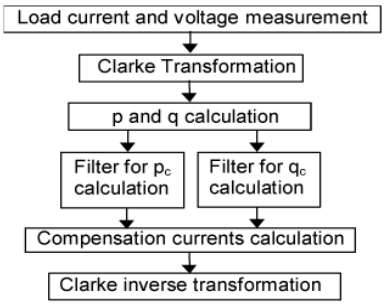

Figure 2: Fundamental Control Algorithm of SAPF based on P-Q Theory

Consider some scheme of A-B-C coordinates where axes A, B and C were also placed along the same plane, and there are $2\pi/3$ rad apart from each other, The A-axis of the instantaneous space vectors, e_A and i_A Their (positive, negative) magnitude and direction change over time. Similarly e_C and i_C are positioned on C-axis e_B and i_B similarly on B-axis. Such space vectors are quickly translated to co-ordinates of α -β as follows:

$$\begin{bmatrix} e_\alpha \\ e_\beta \end{bmatrix} = \sqrt{2/3}\begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix}\begin{bmatrix} e_A \\ e_B \\ e_C \end{bmatrix} \quad (1)$$

$$\begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} = \sqrt{2/3}\begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix}\begin{bmatrix} i_{LA} \\ i_{LB} \\ i_{LC} \end{bmatrix} \quad (2)$$

Both e_α and i_α are both on α -plane, e_β and i_β are both on β - axis and the position of each of their amplitude (negative, positive) varies over time.

A. Instantaneous space variables along α -β coordinates:

On 3-phase circuit, the conventional instantaneous power can be described as:

$$P_L = e_\alpha i_\alpha + e_\beta i_\beta \quad (3)$$

Where p refers to the traditional equations:

$$P_L = e_\alpha i_{LA} + e_b i_{LB} + e_c i_{LC} \quad (4)$$

To measure the active instantaneous power and the reactive power, may assume that instantaneous reactive space vector has been defined.

$$Q_L = -e_\alpha i_\beta + e_\beta i_\alpha \quad (5)$$

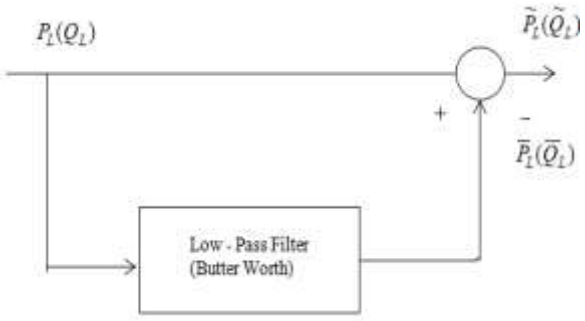

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Figure 3: Diagram of Dynamic Computation

As shown in Figure 2 that space vector becomes position of the imaginary axis and right angles to both the real plane on coordinates α -β, to be in line with the law of the right. Considering that e_β is analogous to i_α and e_α is analogous to i_α and also e_α is right angles to i_β and e_β towards i_α traditional instantaneous power, P_L imaginary instantaneous power Q_L.

Let the ac and dc part of P_L have $\tilde{P}_L$ and $\overline{P}_L$. In similar way let $\tilde{Q}_L$ and $\overline{Q}_L$, excude the corresponding relation respectively

$$P_L = \overline{P}_L + \tilde{P}_L \qquad (6)$$
$$Q_L = \overline{Q}_L + \tilde{Q}_L$$

B. Calculating the currents of compensation

The following expression results throughout the circuit measurement P_L and Q_L, circuit measurement of compensation of reference currents.

$$\begin{bmatrix} i^*_{CA} \\ i^*_{CB} \\ i^*_{CC} \end{bmatrix} = \sqrt{2/3} \begin{bmatrix} 1 & 0 \\ -1/2 & \sqrt{3}/2 \\ -1/2 & \sqrt{3}/2 \end{bmatrix} \begin{bmatrix} e_\alpha & e_\beta \\ -e_\beta & e_\alpha \end{bmatrix}^{-1} \begin{bmatrix} P^* + P_{av} \\ Q^* \end{bmatrix} \qquad (7)$$

Where P_{av} is True instant power equal to loss of active filter, P^* and Q^* are determined by

$$P^* = -\tilde{P}_L \quad Q^* = -\tilde{Q}_L \qquad (8)$$

To determine P* values then We want a high pass filtering setup with a low pass butter worth filter but also that system provides a quantities $\tilde{P}_L$ From P_L and $\tilde{Q}_L$ from Q_L Inside the control circuit design considerations of a low pass filter play a significant function because, as shown in experimental results, different Compensation properties are measured in conjunction With cutoff frequency and filter low pass order. All measuring circuits are multipliers, dividers, and op-amps analogues.

IV.HYSTERESIS CURRENT CONTROLLER

The hysteresis band current control scheme shown in Figure 4 has been shown to be more suitable for all appliance in active power filters of current controlled voltage source inverters. The regulation of the hysteresis band current is characterized by unconditional stability, very quick response and good precision [13].

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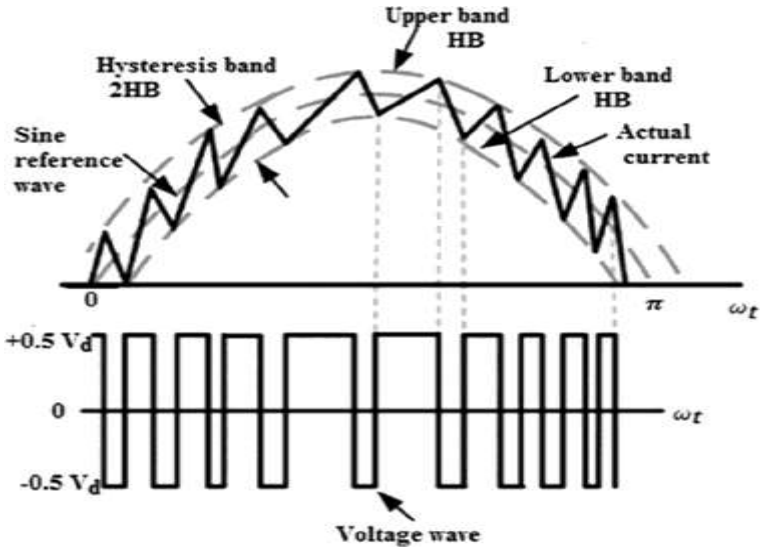

Figure 4: Hysteresis Controller

A. Calculation of the reference signals

Taking into consideration a balanced three-wire system, the p-q IRP method was used for the reference current generation. Currents are determined in IRP p-q theory using the instantaneous time domain factors. Such currents can be further transformed by Clark transformation into three-phase space vectors and two co-ordinates network [10]. We may describe the three-phase quantities for the balanced three-wire network.

B. PWM Signal calculation

The hysteresis band (HB) of the HBCC calculator varies according to Present waveform slope to DC-link voltage (Vdc) And voltage supply (Vs).If the injected current attempts to escape the HB limit, a suitable switch must operate to state ON and OFF, so that the current stays within the HB limit. HBCC thus self-adjusts the HB to fit the designed device. SAPF output is improved by keeping the frequency of the modulation to constant. Control pattern to move the inverter to different check points. The three band phases show the same profile with the variation in phase between them [9].

The corresponding operating switches state the following:

The intial turn is 1 (ON) and the second turn is 0 (OFF)

$HB \geq$ When (iref−imeas)

The initial turn is 0 (OFF) and second turn is 1 (ON)

$HB \leq$ When (iref−imeas)

V. PROPORTIONATE INTEGRAL (PI) CONTROLLER

Inner PI Controller management circuit layout shown in Figure.5. The control method composed some kind of limiter, PI controller but also three-phase sinusoidal waveform generator both for development of reference current and switching signal development. By control of DC connection voltage, maximum quantity of reference currents was measured. That real voltage of capacitor in comparison with a given reference value.

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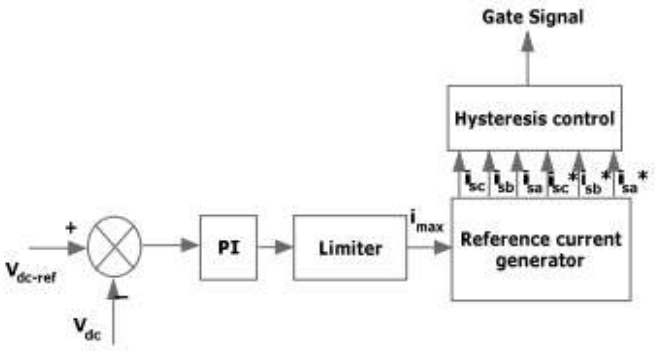
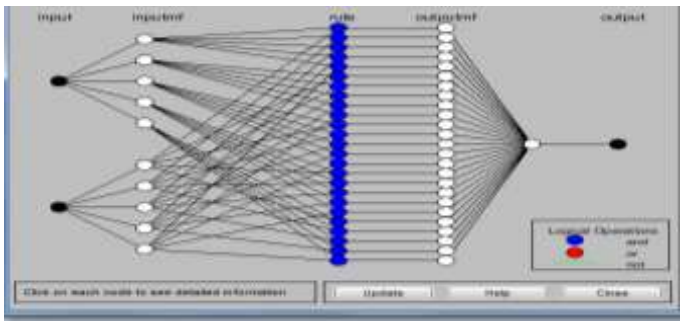


Figure 5: Functional PI Controller

That error value becomes analyzed using such a PI controller that results in the detection of a current reference signal at zero steady loss. That PI controller output signal also known as its source current maximum value ($i_{\max}$), which consists of two layers: (i) The basic real power part of a load current (ii) SAPF reduction element; to maintain a constant mean voltage level for the system. The resulting maximal threshold value ($i_{\max}$) is multiplied by a sinusoidal vectors of the device in step only with corresponding supply voltage which achieve its current relation offsetting. Such predicted reference currents ($i_{SA}^{*}, i_{SB}^{*}, i_{SC}^{*}$) but also actual observed currents (i_{SA}, i_{SB}, i_{SC}) are evaluated by comparing them in hysteresis controller that offers a fault warning modulation method. The whole error signal helps determine a switching action. The supplier / supply current was chosen during the whole entire structure of a control scheme circuit to obey the sinusoidal reference current i_{ABC} within just a fixed hysteretic range. The length of such a hysteresis windows specifies the configuration of source current, the harmonic spectrum and equipment for switching frequency. DC link capacitor voltage is maintained steady and throughout operating period of a converter. Every stage of a converter is inspected in this system Regardless. The lowest switch associated with specific phase is turned further to maximize the current of such a specific section whereas the upper switch of a corresponding converter phase is triggered to decrease the current.

VI. ARTIFICIAL NEURAL NETWORK

Abbreviated as ANN, the Artificial Neuron Network is a programming technique that can easily solve non-linear problems. The algorithm (back propagation) effectively separates its input from each power of relation. Here, the Artificial Neuron Network is the feedforward back-propagation network improving the quality of power. Getting familiar, the network consists of three different levels namely output layers, hidden layers, intermediate layer or input layers. Each one of these layers is made up of interconnected neurons that form a large network of neurons. Depending on the back-propagation algorithm, certain weight values are changed.



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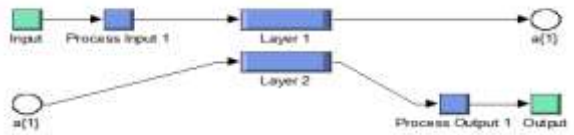

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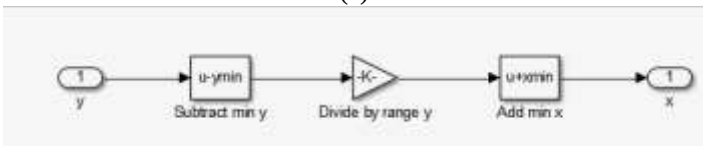
(b)



(c)



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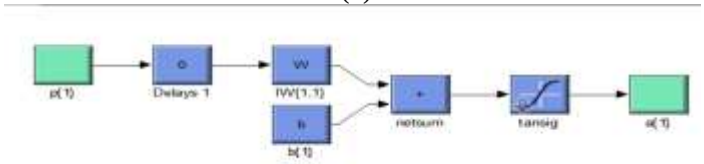

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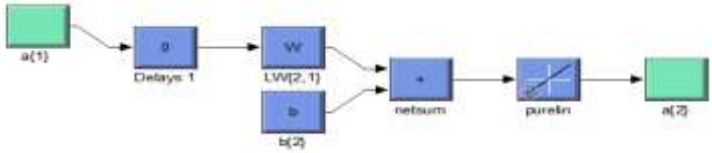

(f)



(g)



(h)

Figure 6: ANN Structure for SAPF (a) Neural Network Model, (b) ANN Fitting Functional Network, (c) ANN Maxima and Minima, (d) ANN Maxima and Minima Reverse, (e) ANN Based layer 1, (f) ANN Based layer 2, (g) ANN Process input 1, (h) ANN Process output 1

The structure of the neural network employed is the following:

Input signal: $x = x_1, x_2, x_3 \ldots X_i$.
Output signal: $y = y_1, y_2, y_3 \ldots Y_n$.
Neuron weights: W= wi1, wi2, wi3..... win.

ANN are divided into three sections, that is structure, training methods and activation function. Every neuron layer is linked to the other and activated only via activation function [11]. Multilayer perceptron (MLP) is also used for harmonic reduction, and as shown in Figure 4 the model consists of three main inputs. ANN has the benefit of easily calculating the harmonic-equivalent Fourier variables [12]. Transfer functions are logsig for layer 1, and tansig for layer 2 or hidden layer. During the first layer number of hidden neurons is 3, as well as 18 in second layer. The output layer depends on the type of data to be analyzed for optimal / desirable results.

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VII. SIMULATION DIAGRAM

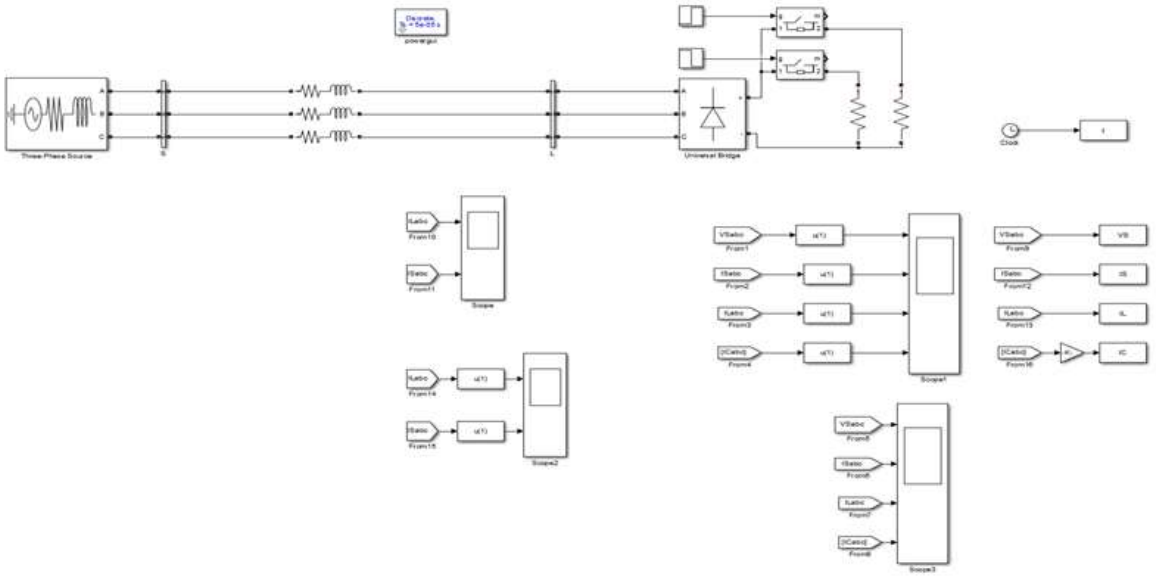

Figure 7: Simulation of System with Non-Linear Load without SAPF

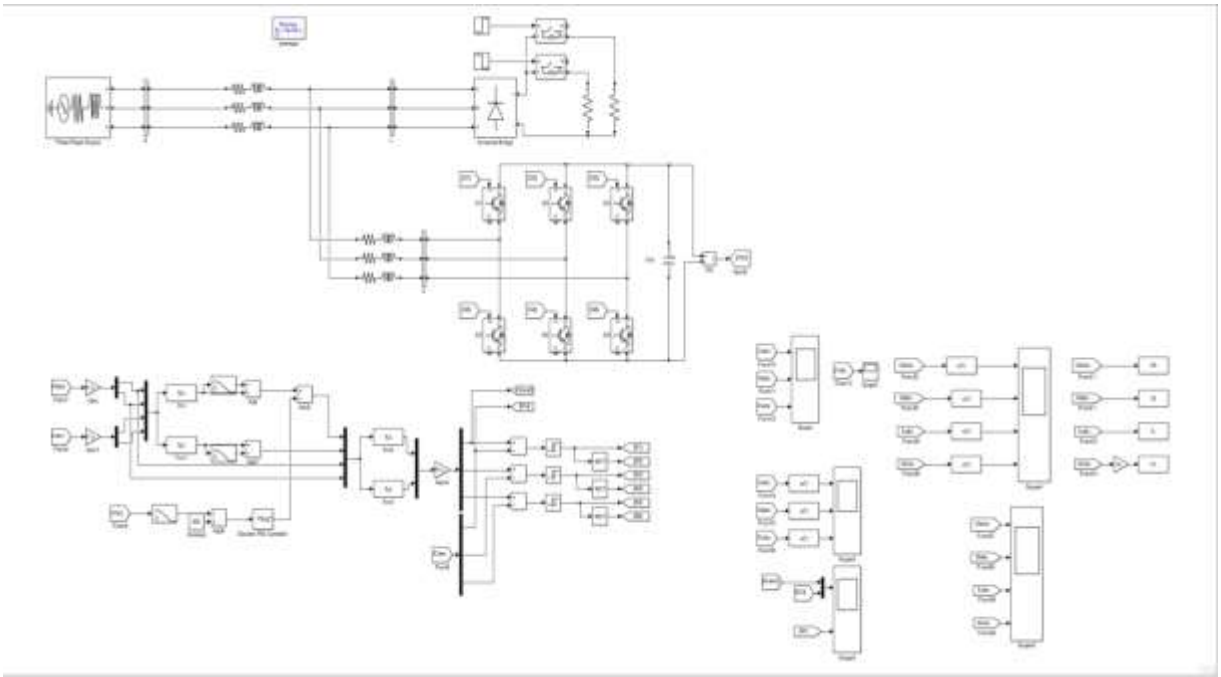

Figure 8: Simulation Diagram of SAPF with PI Controller

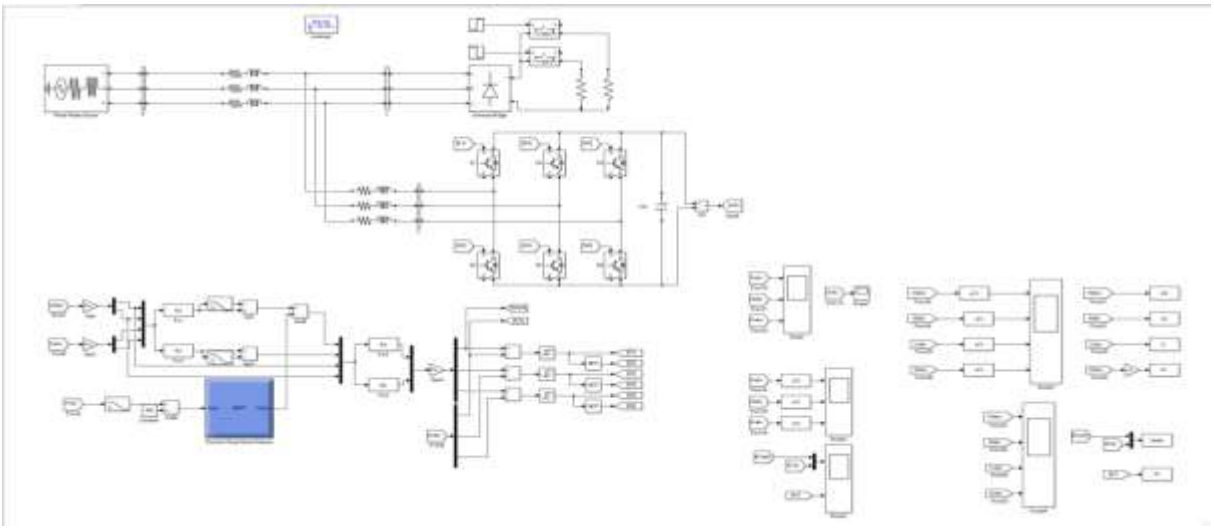

Figure 9: Simulation diagram of SAPF with Artificial Neural Network (ANN)

VIII. RESULTS AND DISCUSSIONS

Table 1: Simulation Parameters

Parameters	Values
Source Voltage (rms)	230V
Frequency	50HZ
Resistance (R)	0.1 ohm
Inductance (L)	1mH
Source Resistance	0.01 Ohm
Source Inductance	1mH
DC Capacitance	1200MF
Intial Load	10 KW
Load increased to	15 KW

The proposed ANN based SAPF is designed but also simulated with MATLAB/ Simulink Tool. Simulation of SAPF is performed with PI Controller and Artificial Neural Networks under dynamic load conditions and the results obtained were compared and checked with IEEE 519 Harmonic standard.

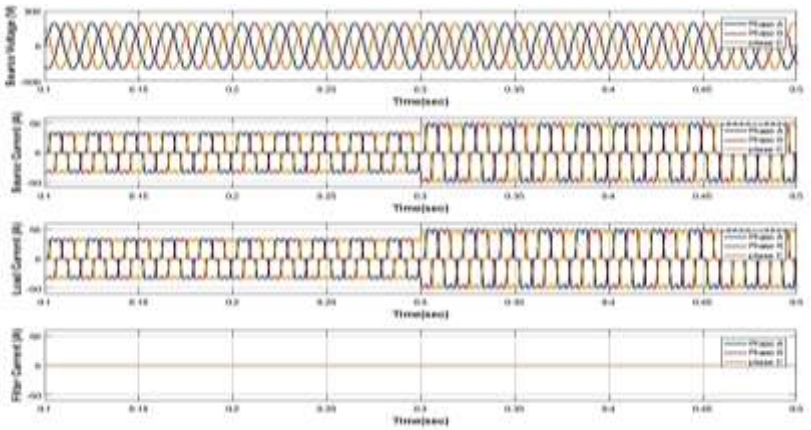

Figure 10: Output waveforms under dynamic load condition without SAPF (a) Source Voltage (b) Source Current (c) Load Current (d) Filter Current

The performance of system without SAPF will be evaluated under dynamic load condition is shown in Figure 10. The Simulation results obtained shows that before load change (up to 0.3 seconds) the current magnitude is less

and at the instant of 0.3 seconds a new load of 5 KW is added to the existing load of 10 KW which increases the magnitude of current.

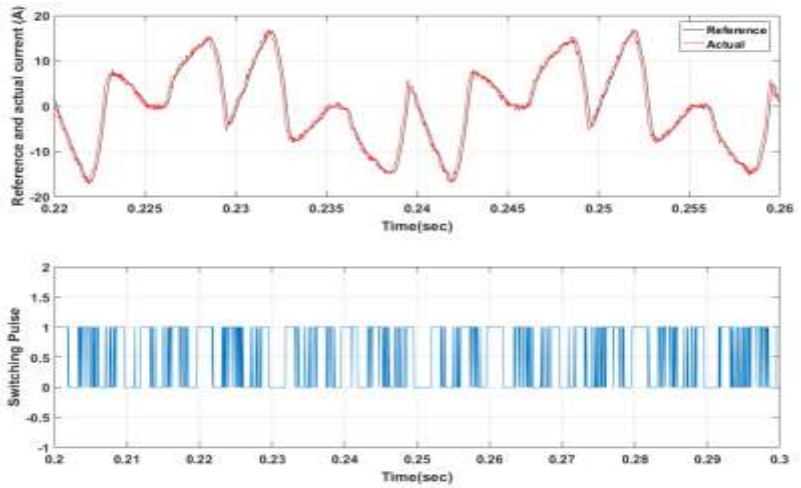

Figure 11: Switching Pulses: (a) Reference and Actual Current (b) Switching Pulses

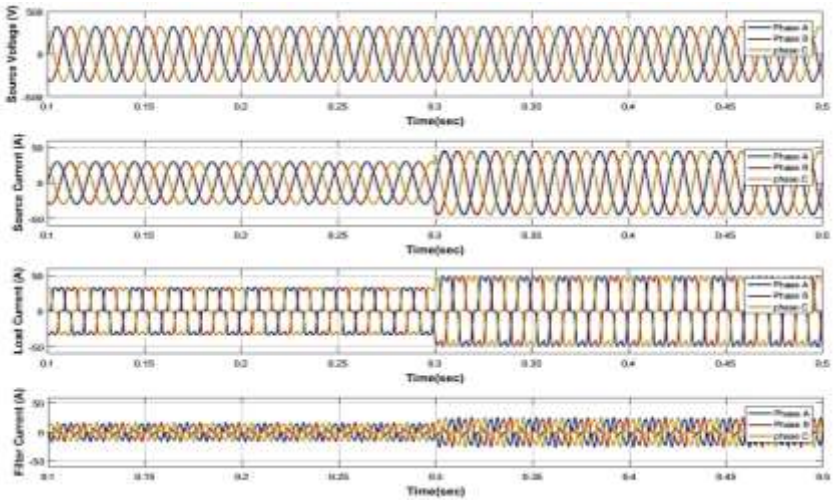

Figure 12: Output Waveforms of SAPF Under Dynamic Load Condition with PI Controller (a) Source Voltage (b) Source Current (c) Load Current (d) Filter Current

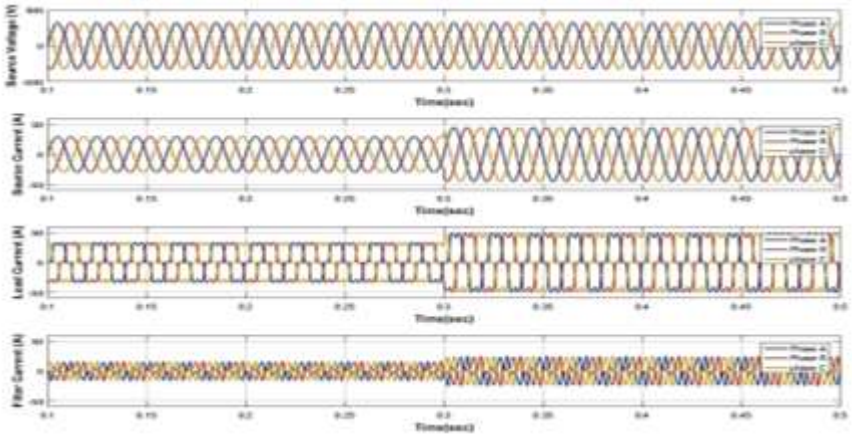

Figure 13: Output Waveforms of SAPF with ANN Control Under Dynamic load Condition (a) Source Voltage (b) Source Current (c) Load Current (d) Filter Current

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The performance of system with SAPF will be evaluated under dynamic load condition with PI and ANN is shown in Figure 12 and 13 respectively. The Simulation results obtained shows that before load change (up to 0.3 seconds) the current magnitude is less and at the instant of 0.3 seconds a new load of 5 KW is added to the existing load of 10 KW which increases the magnitude of current. It is observed the SAPF with ANN control responds quickly to the load change and alters the magnitude of filter current at a faster rate.

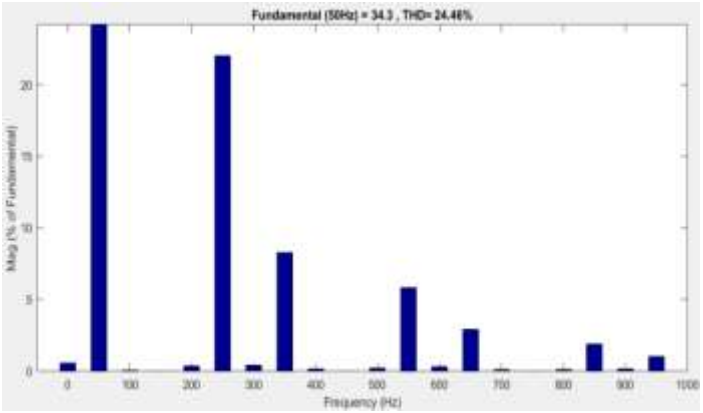

Figure 14: FFT Load Current Analysis without SAPF

The above Figure 14 shows harmonic spectrum evaluation of the load current without SAPF. The % THD is measured as 24.46%.

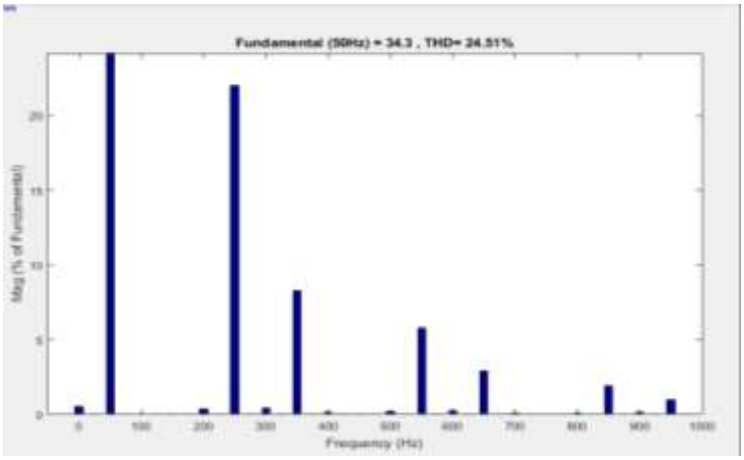

Figure 15: FFT Load Current Analysis with SAPF PI Controller Before Change of Load

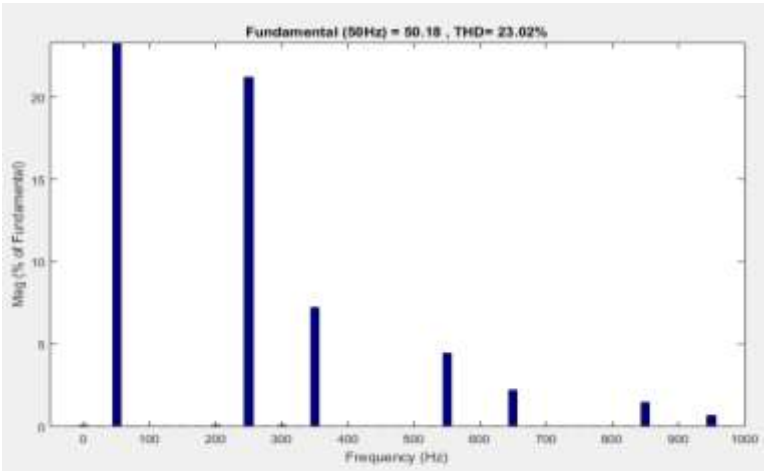

Figure 16: FFT Load current Analysis with SAPF PI Controller after Change of Load

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The above Figure 15 and Figure 16 shows harmonic spectrum evaluation of the load current with SAPF PI Controller during dynamic load conditions. The % THD before and after load change is measured as 24.51% and 23.02% respectively.

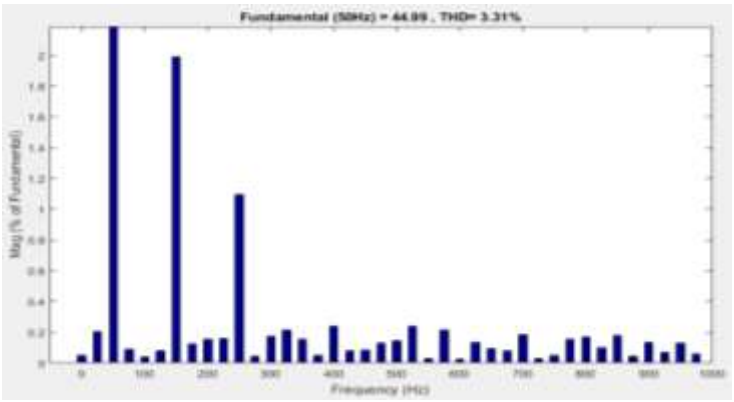

Figure 17: FFT Source Current Analysis with SAPF PI Controller after Change of Load

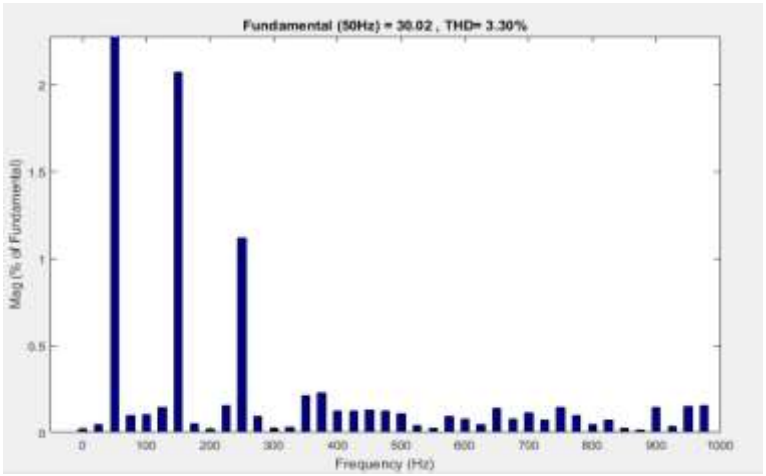

Figure 18: FFT Source Current Analysis with SAPF PI Controller Before Change of Load

The above Figure 17 and Figure 18 shows harmonic spectrum evaluation of the source current with SAPF PI Controller during dynamic load conditions. The % THD before and after load change is measured as 3.31% and 3.30% respectively.

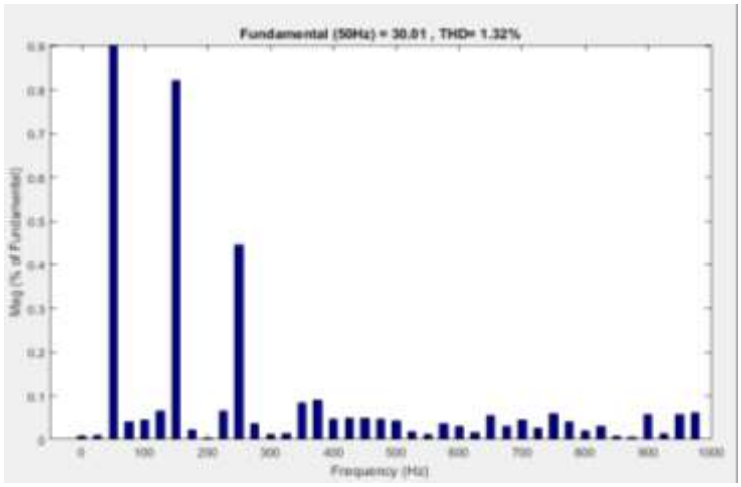

Figure 19: FFT Source Current Analysis with SAPF Artificial Neural network Before Change of Load

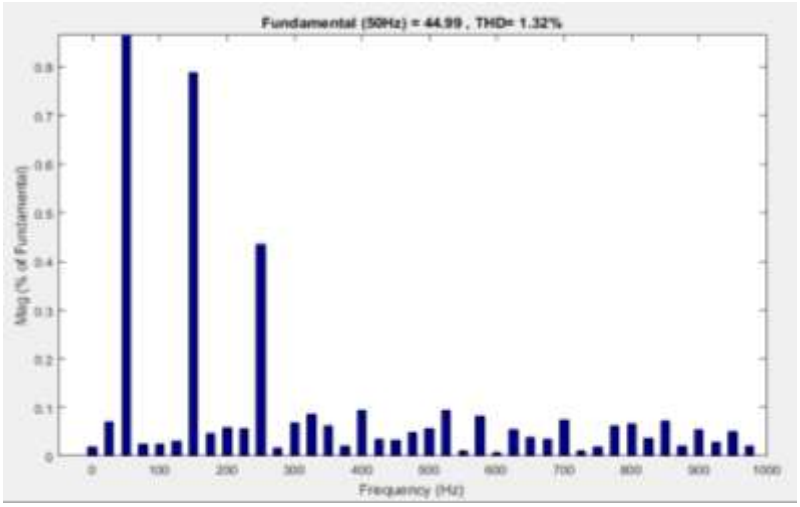

Figure 20: FFT Source Current Analysis with SAPF Artificial Neural Network after Change of Load

The above Figure 19 and Figure 20 shows harmonic spectrum evaluation of the source current with SAPF ANN during dynamic load conditions. The % THD before and after load change is measured as 1.32%.

It is evident from the above results that the Artificial Neural Network get better results when compared to PI controller and Total Harmonic Distortion (THD) level is reduced to 1.32% .

Table 2: Simulation Results

Parameter	Without SAPF	With SAPF			
		Source Current before Load change		Source Current after Load change	
		PI	ANN	PI	ANN
THD (%)	24.46	3.30	1.32	3.31	1.32

IX. CONCLUSION

This paper modifies the SAPF control structure and employs Artificial neural networks. The p-q technique is used to extract reference signals. Artificial neural network the effect is a reducing of THD to sufficient levels. However, the simulation results indicate an outstanding compensation by ANN and are similar to improve harmonic compensation. THD becomes mitigated to that very minimum value, meaning that reactive power but also harmonics produced by a nonlinear load are removed completely.

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LONG TERM FIELD PERFORMANCE ANALYSIS OF 100KWp GRID-CONNECTED ROOFTOP SOLAR PV POWER PLANT

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ABSTRACT: Solar PV system is one of the best substitute in renewable energy at sizable. This paper proposes the long term field performance analysis of 100kWp grid-connected rooftop solar PV power plant installed at B.V.Raju Institute of Technology (BVRIT) at Narsapur, Telangana. The monitored data of the system from five years of continuous operation is used to evaluate the performance. In this paper, the solar PV plant generated energy, performance ratio, capacity utilization factor and efficiency are measured and also compared with the simulation values obtained from pvsyst 6.8.7 software. Performance analysis of the grid connected plant will be helpful in operating, designing and effective maintenance of new grid connected systems. The average estimated energy for five years is 192334.2 kWh, average energy generated is 146616 kWh, average performance ratio is 76.22% and average capacity utilization factor is 16.74%. Here five 20 kW inverters are used for operating the plant whose output is deviated in few months of operation due to maintenance.

KEYWORDS: Capacity utilization factor, Generated energy, Normalized energy, PV plant, Performance ratio, PVSYST, System efficiency.

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I. INTRODUCTION

To meet the energy demands in India sun is one of the substitutes for energy production. The light energy produced from the sun is directly converted to electrical energy by photovoltaic energy conversion principle. The performance of the solar photovoltaic plant is dependent on type of panel technology, environmental conditions such as temperature and humidity, location of the site, seasonal fluctuations, solar insolation, air pollution and module maintenance.

In India the installed solar power capacity is 28464.17 MW as of 31 March 2019. In solar power generation capacity Karnataka stands first with the capacity of 6095.56 MW and Telangana stands second with the capacity of 3592.09 MW.

K. Padmavathi at el., (2013) [1], the performance evaluation of grid connected solar photovoltaic power plant of capacity 3 MWp located in Karnataka. The performance ratio is evaluated for two years; in 2010 it was less than 0.6 from August to November due to high inverter failure losses. The next year, 2011 PR values improved of an annual average value of 0.7 and inverter failure losses were reduced.

Vikas Pratap Singh at el., [2], the data quality check on global horizontal irradiation and tilted global horizontal irradiation to obtain the estimated performance ratio (PR) of the PV plant. The performance ratio is inversely proportional to module temperature which depends on climatic parameters. Plant under standard condition provides maximum power generation with higher performance ratio. Performance ratio is higher in winter season compared to summer or rainy season; the variation is due to thermal losses.

B. Shiva Kumar at el., (2015) [3], simulation values obtained from PV syst and PV-GIS software values are compared, plant is operating nearer to the predicted generation of energy modelling software. Utmost total

energy generation of 10 MWp grid connected solar photovoltaic power plant is in the month of January and nethermost in the month of July (2014-2015). The plant is operating with good amount of PR and CUF.

Robins Anto at el., (2014) [4], the photovoltaic systems integrate power build up units generate harmonics that rely up on operating conditions of structure which impact the quality of power supply, reliable operation, life span of the system components. The efficiency of 100KWp plant is shrinking during the evening time as irradiance diminishes. Capture losses and system losses are high during the low radiation levels due to the variation of solar radiation.

Lana S. PANTIC at el., [5] Practical field study of performances of three identical monocrystalline solar modules, single power of 60 W, with different inclinations (horizontal, optimally inclined oriented toward South and vertically oriented toward South) in real meteorological conditions, in Nis, Serbia are presented. The efficiency, performance ratio and fill factors are measured and compared.

Cristina Cornaro at el., [6], the results of a two years outdoor monitoring campaign that has been carried out on the same polycrystalline photovoltaic module at two different locations in Europe: the SUPSI-ISAAC outdoor facility in Lugano, Switzerland, from April 2006 till May 2007, and the outdoor ESTER facility in Rome, from April 2008 till May 2009. The monthly PR appears higher for Lugano than for Rome apart from the April 07-09 case where the performance in Rome has been higher. A 3% maximum PR deviation between the two sites has been registered during the autumn months.

Pablo Ferrada at el., [7], the paper has reported on the performance of photovoltaic systems in the coastal zone of Antofagasta, northern Chile. It analyzed how the performance ratio is influenced by the dust accumulation and the ambient temperature associated to this place. It came out that the difference of energy yield between the technologies became larger for summer and smaller for winter, and that the performance ratio decreased due to the dust accumulation.

Lana S. PANTIC at el., [8], the performance of PV modules under actual outdoor conditions is found to be quite different from that determined under controlled laboratory conditions. Performance of PV modules will not be the same for a given PV module if it is located in places with different climate type e.g. wet tropical, dry desert or continental climate.

Gay, Rumberg and Wilson at el., [9] thirty years ago, researchers in the PV field acknowledged the need to go beyond STC, suggesting that module performance be characterized by categories of weather conditions (hot sunny, cold sunny, hot cloudy, cold cloudy, and nice).

Seung-Ho Yoo at el., [10] presented the influence of tilt angle of PV panel, building azimuth and shading effects on power generation of SPV modules were considered to optimize the performance of a Building Integrated Photovoltaic (BIPV) system located in Korea. The efficiency of this BIPV system during different months was compared. According to this study, the power generation is more influenced by the above factors in summer than in winter.

M. Shravanth Vasisht at el., [11] study showed a 20 kWp Solar Photovoltaic (SPV) system was set up on the library roof-top in Indian Institute of Science, Bangalore, India. This Roof-top photovoltaic (RTPV) system partly powers the Central Office of IISc. The main objective of setting up this SPV system was to study the performance of solar plants under different seasons and climatic conditions of Bangalore.

In this paper five operation years performance of the grid connected rooftop solar PV plant is figured out by using the parameters efficiency, performance ratio, capacity utilization factor, generated energy. System operation from 2014 to 2018 is considered for estimation of the plant. To valuate the performance ratio and to calculate theoretically generated energy values are collected from NASA.

II. EXPLICATION OF SYSTEM

The 100 KWp solar photovoltaic system installed at roof top of Aryabhatta block of B.V.Raju Institute of technology (BVRIT), Narsapur, and Hyderabad. This plant is located in South India with latitude of 17.30^{o} N, longitude of 78.90^{o} E, altitude of 590 m and azimuth angle of 0°. The aim of installation of solar PV plant is to extend the green technology into the institute and also to overcome the energy calamity.

Fig. 1 replicates the rooftop solar PV plant installed at BVRIT, Plant consists of 20 strings, each string is equipped with 20 modules and each module consists of 60 cells i.e. 400 PV modules of poly crystalline silicon technology with rated power 250 Wp. The module efficiency at STC is 14.3%, open circuit voltage (V_{oc}) is 37.56

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V, short circuit current (I_{SC}) is 8.53 A, rated voltage (V_{MPP}) is 31.18 V, rated current (I_{MPP}) is 8.02 A, power tolerance is ±3%.



Fig. 1: Rooftop Solar PV Plant Installed at BVRIT

Five REFUsol string inverters of 20 kW_p are connected to the panel strings as shown in Fig. 2. The inverter specifications are as mentioned in table. 1.



Fig. 2: REFUsol Inverter of 20kw_p Capacity

Table 1: Inverter Specifications Used in 100 kW_p solar PV Plant

DC Specifications		**AC Specifications**	
Max. Input voltage	1000 V	Nominal operating voltage	3ϕ 400 V + N
MPP range	480-850 V	Nominal operating frequency	50/60 Hz
Max. input current total	41.0 A	Rated power	19.2kVA
Max. Input current per input pair/-triplet	25 A	Max. Active power@ cosϕ=1	19.2 kW
Operating temperature range	-25 to +55° C	Max. Output current	3*29 A= 87 A

III.INSTANCED COMPUTATIONS

Estimated energy

Estimated energy is defined as the product of peak sun hours, plant capacity and number of days in month/year.

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$$Estimated\ energy = peak\ sun\ hours * plant\ capacity * no.of\ days\ in\ month/year \quad (1)$$

Peak sun hours data is collected from NASA. Estimated energy is measured in terms of kWh.

Normalized energy (P_{norm})

Normalized energy is defined as the ratio of generated energy to the product of plant capacity and number of days [15].

$$P_{norm} = \frac{generated\ energy}{plant\ capacity * no.of\ days}\ W_p/kWh \quad (2)$$

Performance ratio (PR)

Performance ratio is defined as the ratio of generated energy to the estimated energy [2], [15],[16].

$$PR = \frac{generated\ energy}{estimated\ energy}\ \% \quad (3)$$

Capacity utilization factor (CUF)

Capacity utilization factor is defined as the ratio of generated energy to the product of number of days, number of hours per day and installed plant capacity [2],[3],[12],[16].

$$CUF = \frac{generated\ energy}{no.of\ days * 24 * installed\ plant\ capacity}\ \% \quad (4)$$

Efficiency

$$system\ efficiency(\%) = \frac{practical\ energy\ generated}{solar\ irradiation\ value * no.of\ days * plant\ area}\ \% \quad (5)$$

IV. PERFORMANCE ANALYSIS

To evaluate the performance of 100 kWp solar PV plant, the data is tracked for five operational years is considered. The parameters considered in this study are

Table 2: Estimated Energy, Generated Energy, Normalized Energy, Performance Ratio and Capacity Utilization Factor for Five Years.

Year	Estimated Energy (kWh)	Generated Energy(kWh)	Normalized Energy(Wp/kWh)	PR(%)	CUF(%)
2014	193258	152687	4.19	79	17.45
2015	195176	151534	4.16	77.63	17.30
2016	188538	145914	3.99	77.39	16.62
2017	192962	147211	4.04	76.29	16.82
2018	191737	135733	3.73	70.79	15.51

Table 2 consists the values of generated energy, performance ratio and capacity utilization factor for five years. Fig.3 shows the generated energy of 100kwp solar PV plant from 2014 to 2018. The generated energy is getting decreased every year but in between 2016-2017 the generation has been increased. At intervals the generation difference from 2014 to 2015 is -0.7%, 2015 to 2016 is -3.7%, 2016 to 2017 is 0.88% incremented, 2017 to 2018 is -7.79%. The decrease in generation can be due to losses, repairs, temperature, shadow, maintenance, degradation and weather conditions.

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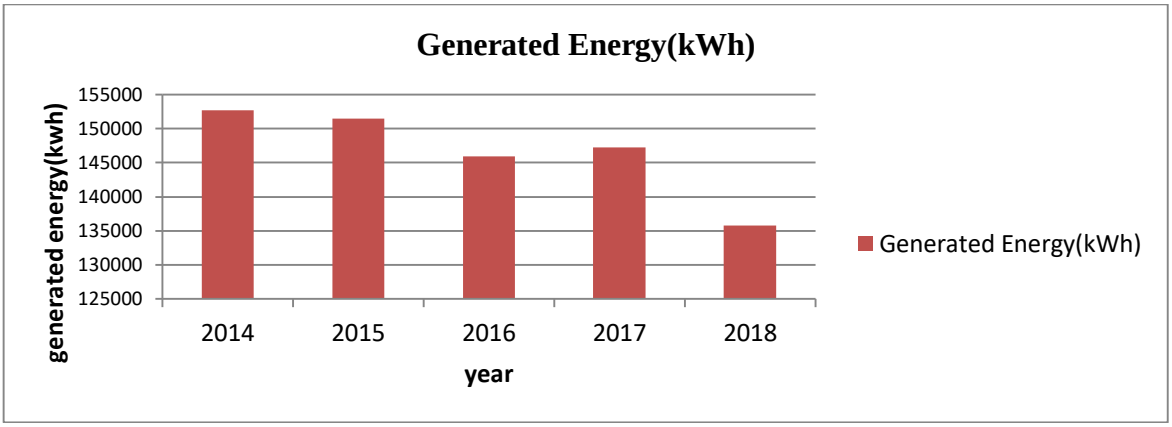

Fig. 3: Energy Generated in Five Years

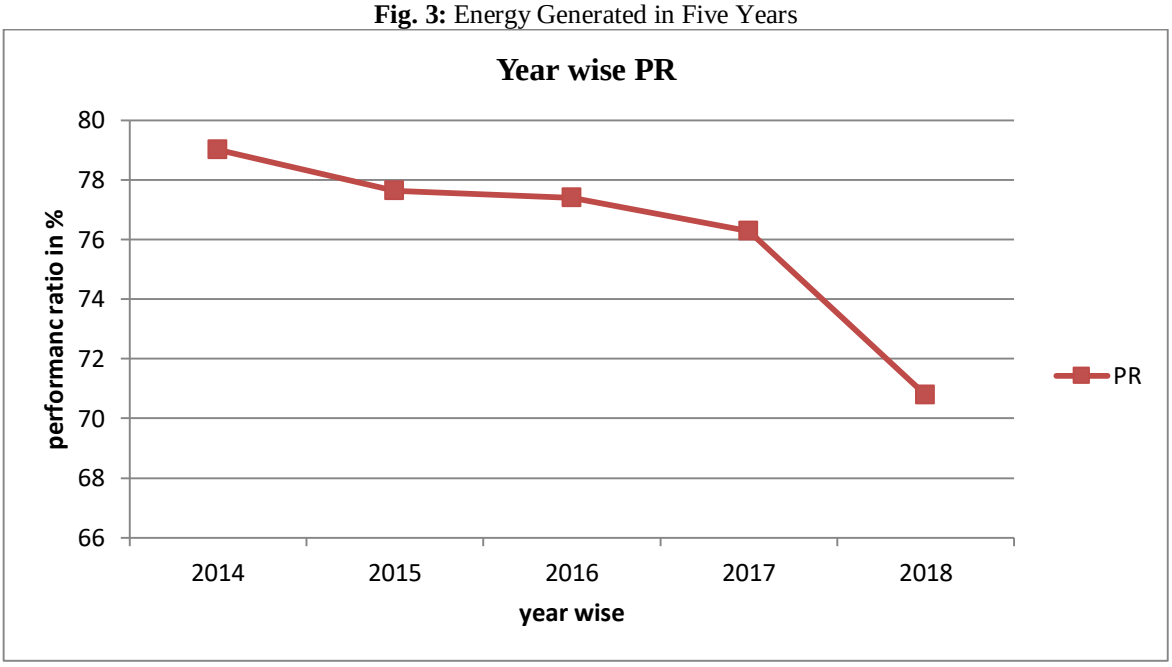

Fig.4: Year Wise Performance Ratio for Five Years

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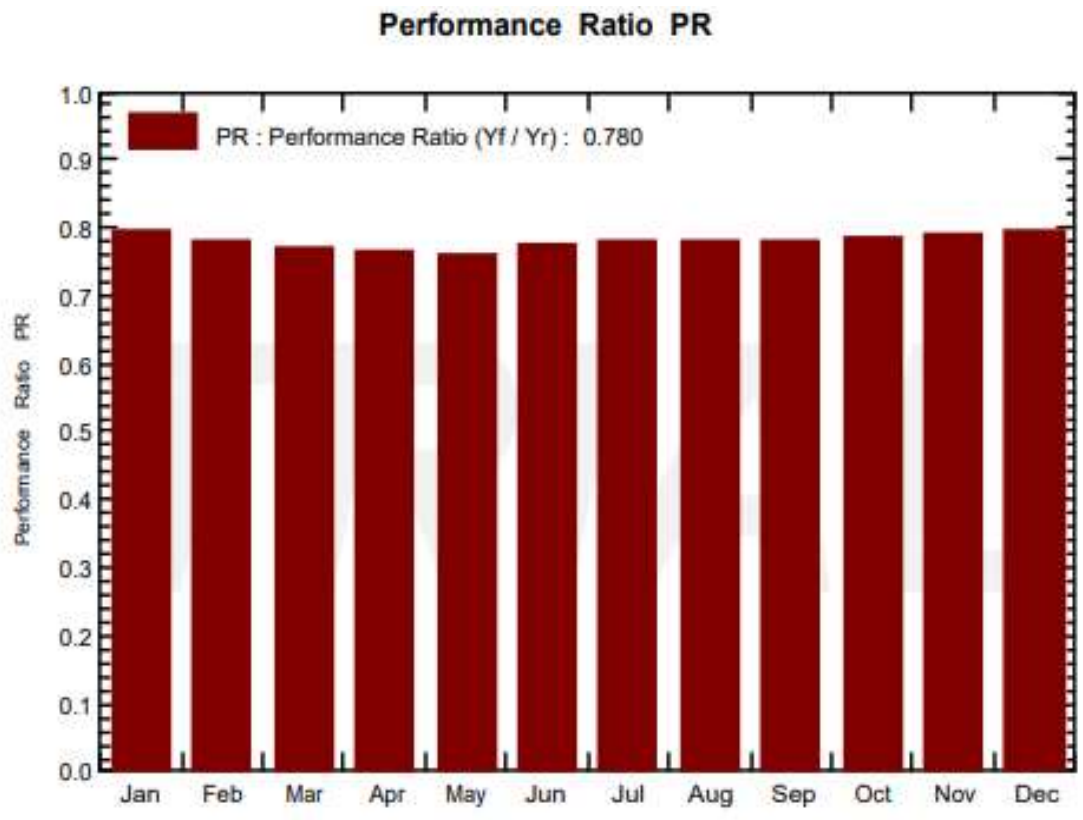

Fig.5: Performance Ratio for Year by PVSYST Software Simulation

The year wise performance ratio of plant from 2014-2018 show in fig 4. In 2014, the performance ratio is 79%, in 2015 it is 77.63%, in 2016 it is 77.39%, in 2017 it is 76.9%, and in 2018 it is 70.79%. From 2014-2018, performance ratio is gradually decreasing, from 2014-2015 performance ratio is decreased to 2%, in 2015 and 2016 it is equal, from 2016-2017 performance ratio is decreased to 1%, from 2017-2018 performance ratio is decreased to 6%. The fig 5. Shows that the annual performance ration of the solar PV plant given by the the pvsyst simulation and also seen that the performance ratio is 78% from this we can observe that the actual performance ratio is almost nearer to the pvsyst simulation report but it changed 7% in year 2018.

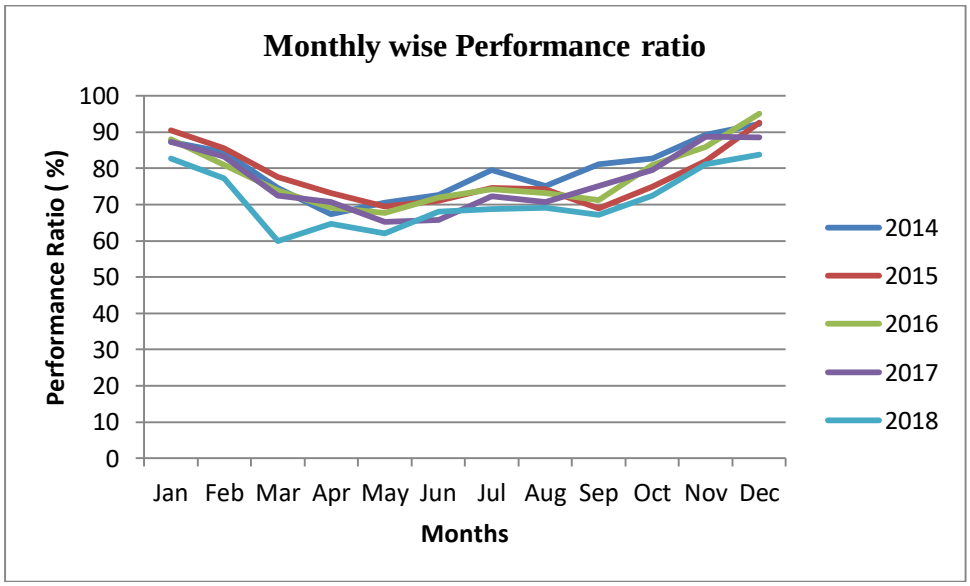

Fig.6: Monthly Wise Performance Ratio

Fig.6 shows the monthly wise performance ratio of plant for five years i.e., from 2014-2018. Generally in India the performance ratio of solar plant is about 80%. The performance ratio is higher in the months of January and

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December i.e., in winter season as the temperature is low, solar irradiance will be more. In summer season i.e., in the months of April and May performance ratio is less due to more temperature and less irradiance.

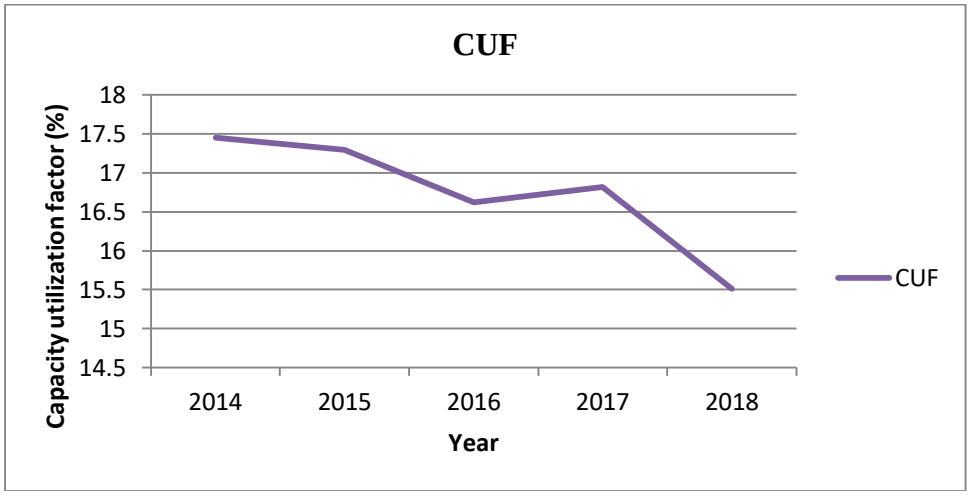

Fig.7: Capacity Utilization Factor for Five Years

Fig.7 depicts the capacity utilization factor (CUF) for different operation years. Generally in India, capacity utilization factor of solar PV plant must be about 16-17%. In 2014, 2015, 2017 the capacity utilization factor is 17% and in 2016 and 2018 it is 16%.

Table 3: All Five Inverters Energy Output in Five Years

Inverter	2014	2015	2016	2017	2018
Inverter 1	30448.7	30664.1	29368.7	29965.2	27406.3
Inverter 2	30489.2	30599.1	29345.8	29308.9	28081
Inverter 3	30653.3	29551.1	29979.8	30347.5	26607.2
Inverter 4	29979.9	29987.5	28243.7	27923.4	25694.1
Inverter 5	31115.7	30732.4	28976.5	29666.1	27944.8

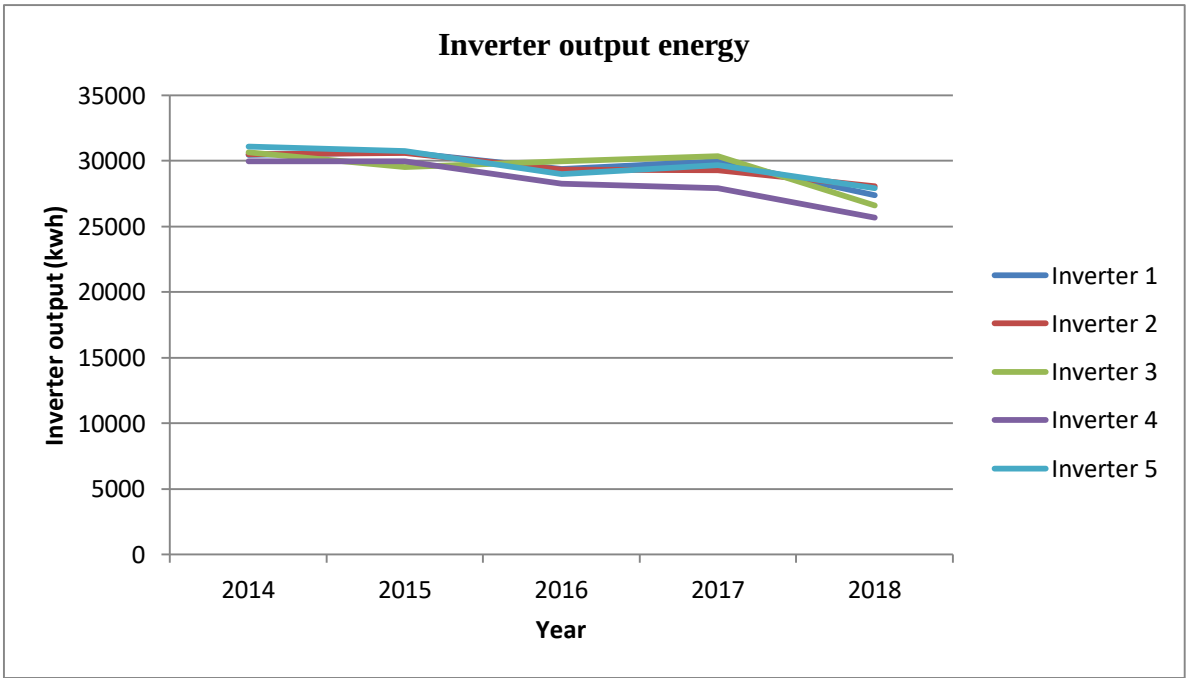

Fig.8: Inverters Output Energy in Five Years

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The table.3 and fig.8 shows the year wise inverter output energy from 2014-2018. For 100kwp solar PV plant, we have five inverters of capacity 20kw each. The output of each inverter used must be equal but the inverter output energy is approximately equal for all five inverters used, from 2016 the output has been gradually decreasing for inverter 4.

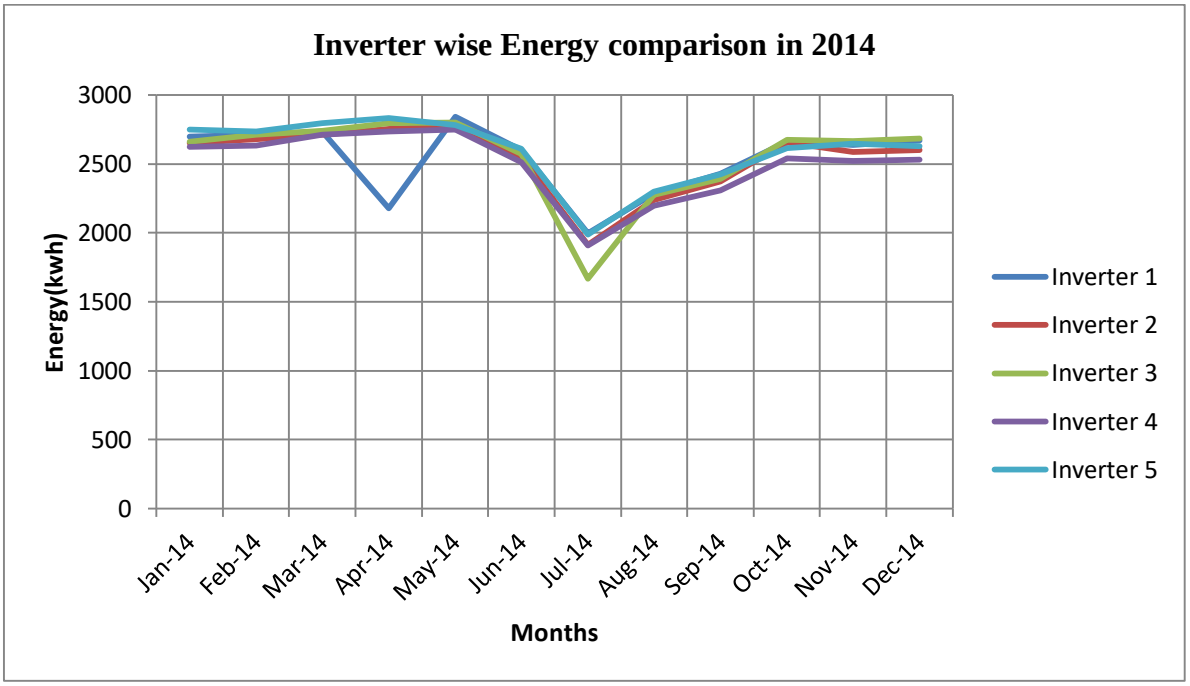

Fig.9: Inverter Wise Energy Comparison in 2014

Fig.9 shows the inverter wise energy comparison in the year 2014. In 2014, all five inverters output is almost equal in the months of January, February, March, May, June, August, September, October, November, December and in the April month the output of inverter 1 has decreased and in the month of July the output of inverter 3 has decreased.

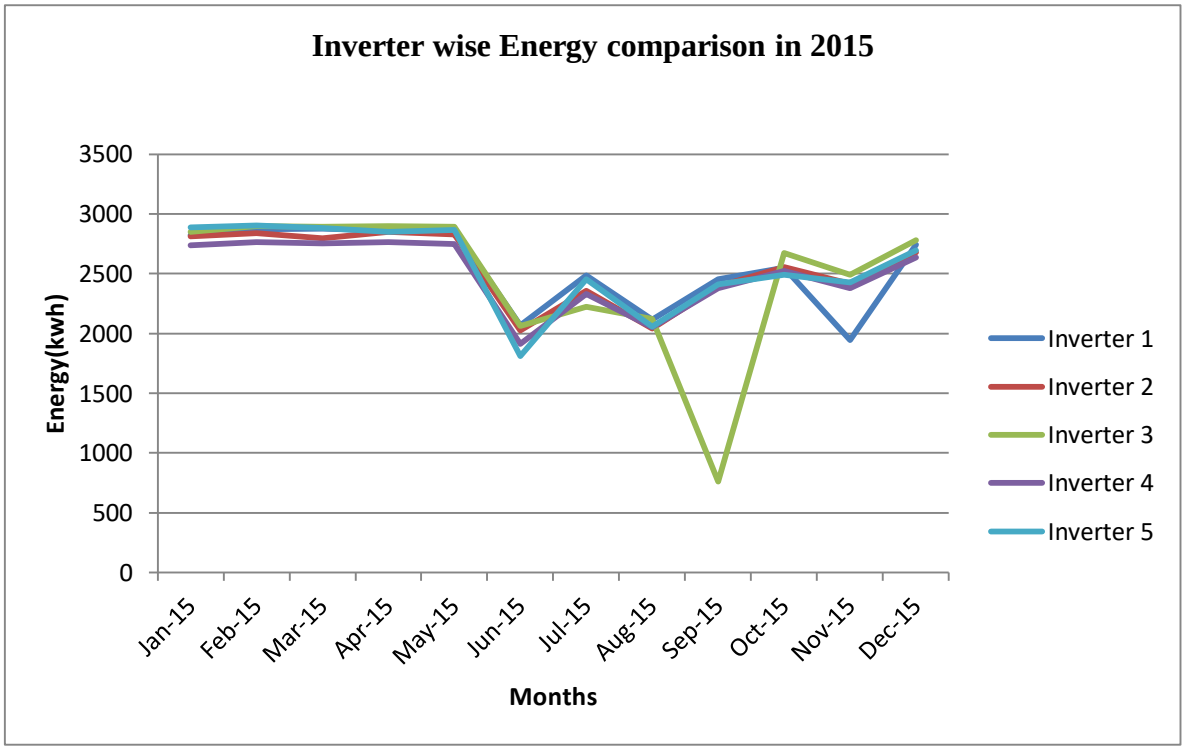

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Fig.10: Inverter Wise Energy Comparison in 2015

In 2015, the output of all inverters is almost equal in all months except in September and November. In the month of September inverter 3 output decreased and in the month of November inverter 1 output decreased are shown in fig.10.

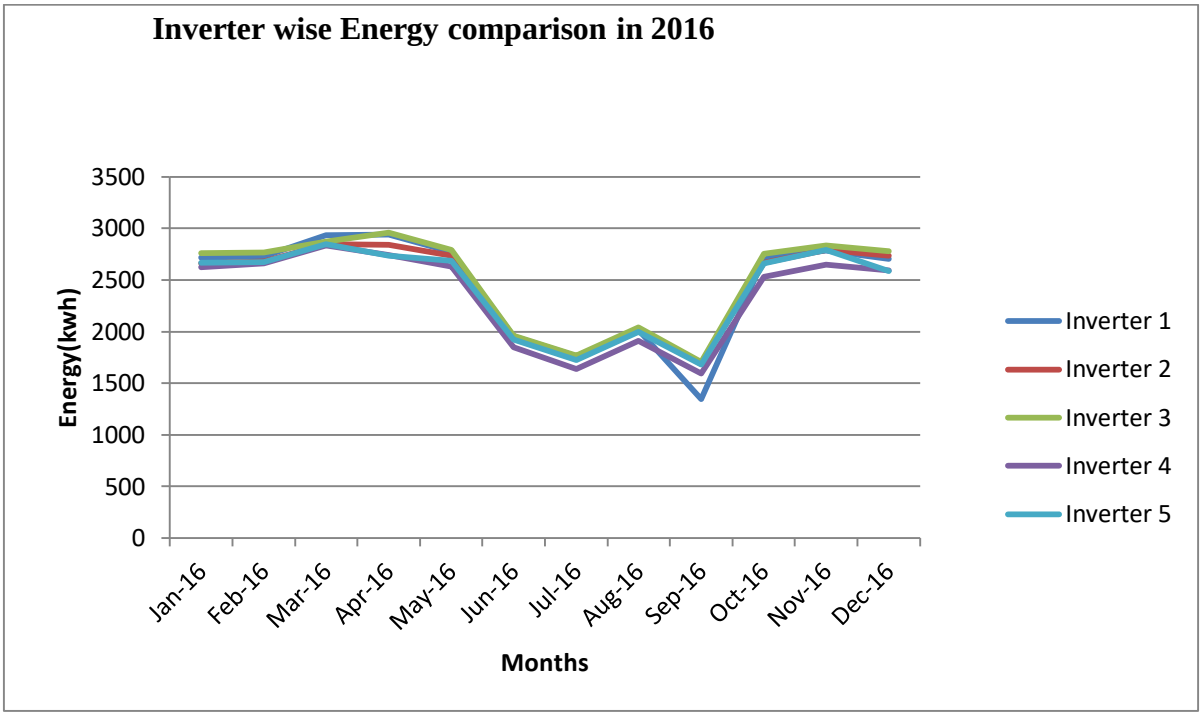

Fig.11: Inverter Wise Energy Comparison in 2016

In 2016, almost equal energy output is observed for all inverters in all months as shows in fig.11 but in the month of September inverter 1 output is less. Later the energy output is almost equal for all the inverters from the month of October.

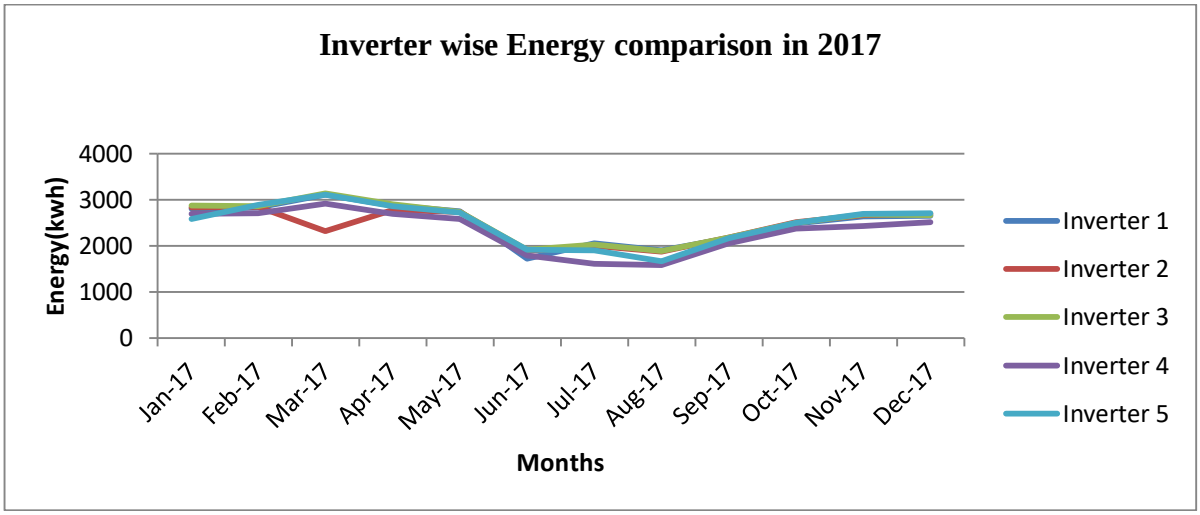

Fig.12: Inverter Wise Energy Comparison in 2017

Fig.12 shows Inverter wise energy comparison in 2017, inverter energy output is deviated in the month of March in inverter 2 and in the months of June, July, August output is decreased in inverter 4 and in July, August inverter 5 output is decreased.

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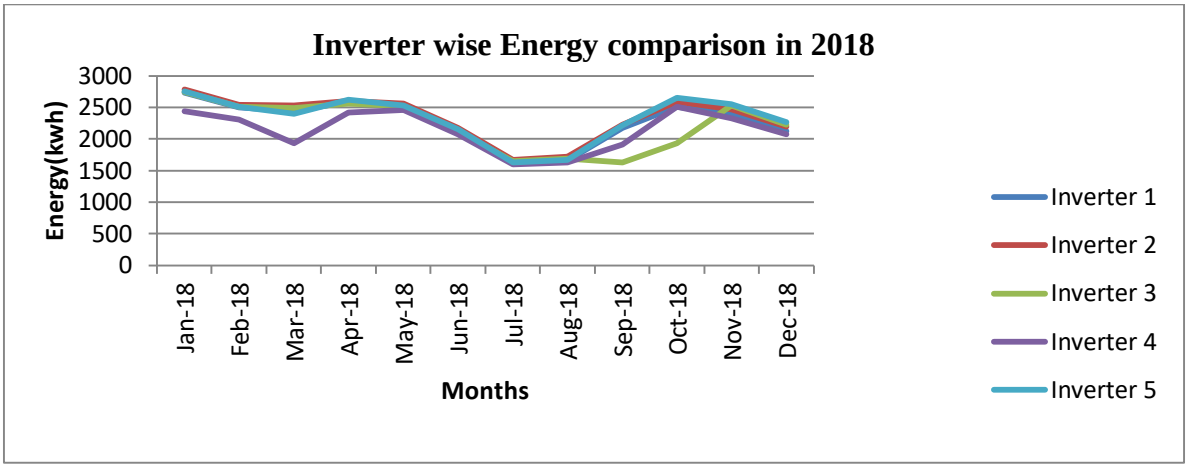

Fig.13: Inverter Wise Energy Comparison in 2018

Fig.13 shows Inverter wise energy comparison in 2018, the inverter 4 output has been decreased in January, February, March and inverter 3 output is decreased in months of September, October, November and in the months of September and October the inverter 4 is decreased.

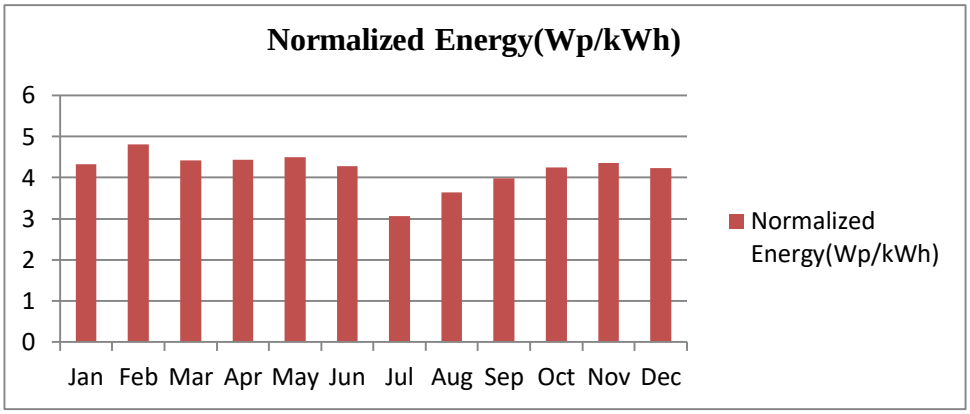

Fig.14: Normalized Energy

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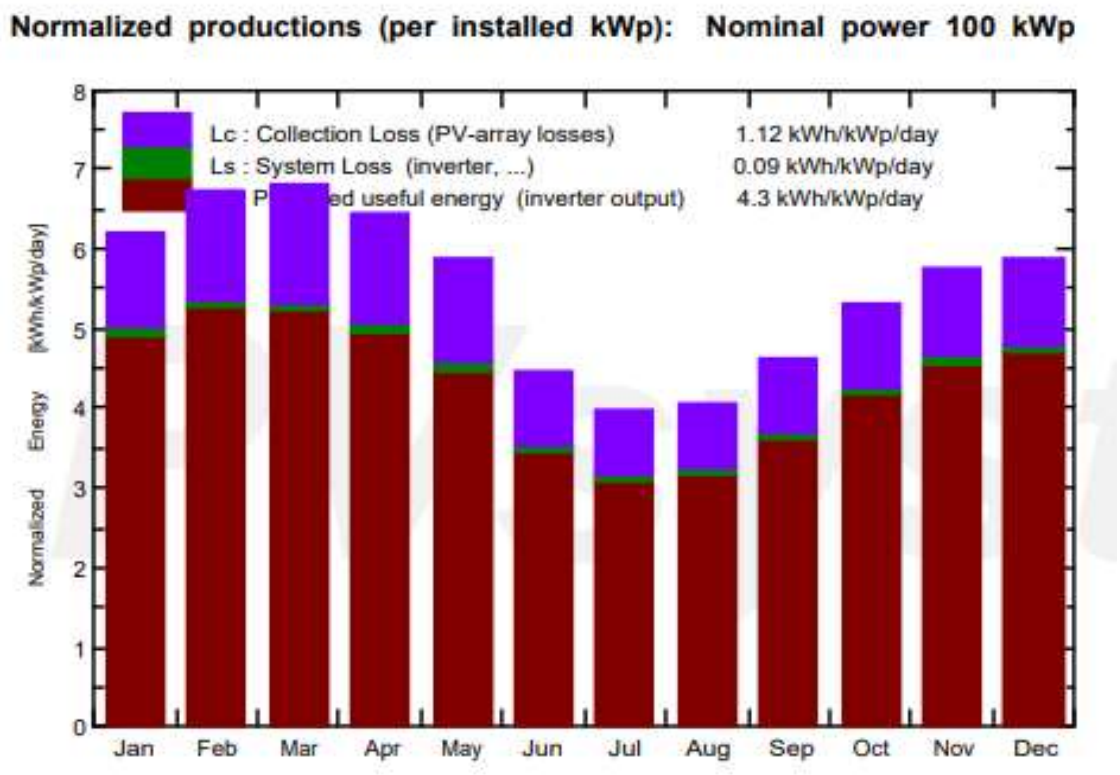

Fig.15: Normalized Energy by PVSYST Software

The fig 14 shows that the normalized energy calculated by the real time data of one year. Fig 15 shows the normalized energy produced by the pvsyst software simulation for year. From the normalized energy graphs we can observe that the normalized energy produced by the plant is 4.19 kwh/kwp/day and the normalized energy produced by the pvsyst simulation report is 4.3 kwh/kwp/day. For Five years normalized energy are like this 2014 it is 4.19kwh/kwp/day, 2015 it is 4.16 kwh/kwp/day, 2016 it is 3.99 kwh/kwp/day, 2017 it is 4.04 kwh/kwp/day and in 2018 Normalized energy is 3.73 kwh/kwp/day. Comparing with the pvsyst simulation report the normalized energy production is less it dependence on the generated energy pvsyst gives the simulation without considering the failures and losses of the plant like module cleaning, weather condition, module failures, junction box damages and due to other problems the energy production may varies from the pvsyst simulation report to real time PV plant output.

Table 4: PV System Efficiency of 100 kW_p Solar PV Plant for Five Years

	2014	**2015**	**2016**	**2017**	**2018**
Jan	11.06	11.47	11.15	11.06	10.48
Feb	10.71	10.84	10.26	10.55	9.78
Mar	9.45	9.84	9.35	9.17	7.58
Apr	8.52	9.28	8.76	8.95	8.19
May	8.94	8.81	8.57	8.25	7.87
Jun	9.21	9.01	9.11	8.32	8.62
Jul	10.09	9.44	9.41	9.16	8.72
Aug	9.52	9.41	9.28	8.96	8.75
Sep	10.28	8.73	9.03	9.51	8.52
Oct	10.48	9.49	10.25	10.08	9.18
Nov	11.30	10.39	10.89	11.23	10.29
Dec	11.68	11.74	11.67	11.22	10.62

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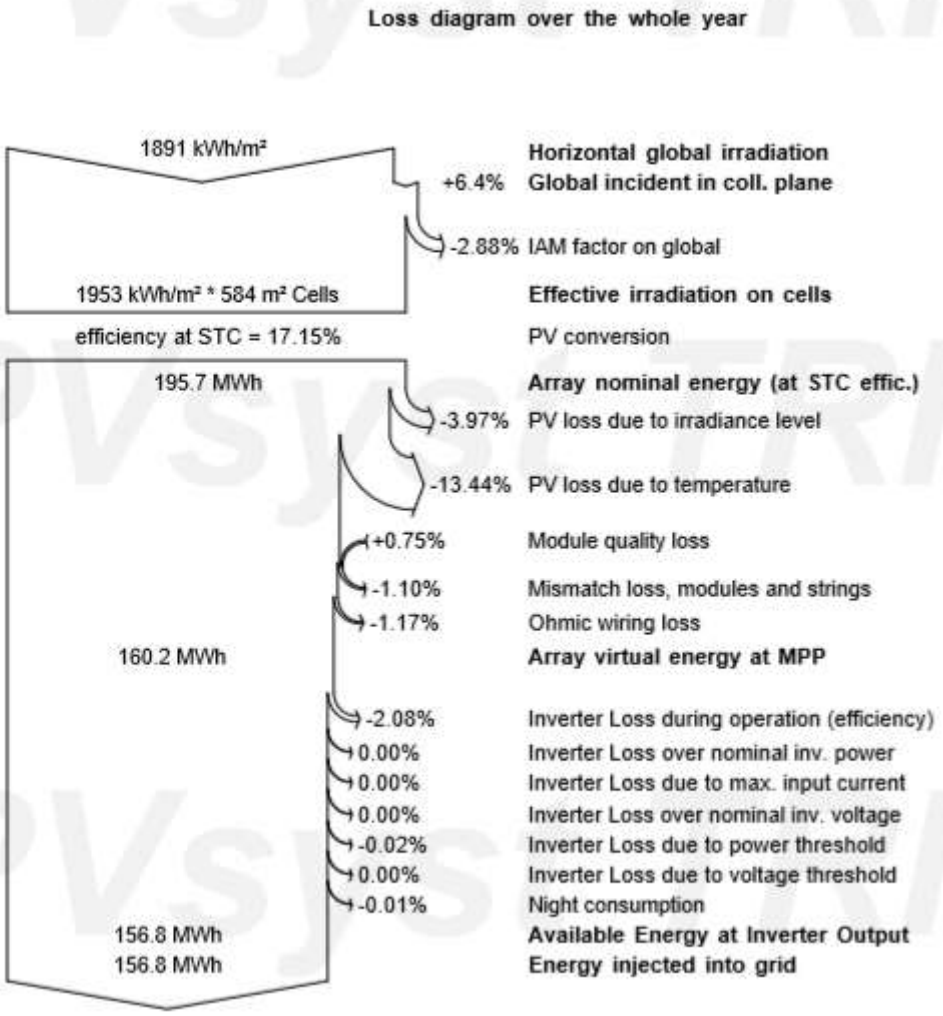

Fig.16: Loss Diagram Over the Whole Year by PVSYST Software

The PV system efficiencies for five years monthly wise are listed in the table 4 and also the system efficiency at standard test condition given by the pvsyst simulation is shown in the loss diagram fig 16.Efficiency at standard test condition is 17.15% for whole year from the table 4 we can see that the PV system efficiency for the year 2014 is 10.10%, 2015 is 9.87%, 2016 is 9.81%, 2017 is 9.70% and 2018 is 9.05%.comparing with the pvsyst report 100kwp solar PV system get the 58.89% efficiency in the year 2014, 57.55% in 2015, 57.20% in 2016, 56.58% in 2017 and 52.76% of efficiency in the 2018 year [13],[14].

V. CONCLUSION

Long term field performance analysis of 100KWp grid-connected rooftop solar PV power plant installed at BVRIT was studied and the following observations are drawn.

The generated energy is getting decreased every year but in between 2016-2017 the generation has been increased. The year wise performance ratio of plant from 2014-2018 is getting decreased progressively, in winter season the performance ratio is more compared to summer season. Performance ratio of the 100kwp solar PV plant is nearer to the pvsyst simulation Performance ratio. Capacity utilization factor of plant is varying between 16-17%. The output of all five inverters in five operation years is almost equal except in some months. Mainly the output of inverter 4 is comparatively less as the panel strings connected to this inverter are under shaded region. The PV system efficiency compared to the pvsyst simulation report getting 58.89% to 52.76% of standard test condition.

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COMPARISON OF PI AND AI CONTROLLERS USED FOR DC-DC CONVERTER FOR EV FAST CHARGING

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ABSTRACT

The usage of Electric Vehicles is increasing rapidly, we need to decrease the time required for charging. Therefore there is a demand to built High rated Charging Stations (CS) to reduce drivers Range Anxiety. Neutral Point Clamped (NPC) Converter containing Charging Station have benefits, but this converter has problem of unbalanced power. To overcome this problem, Comprehensive DC Power Balance Management (PBM) in coordination of Fast Chargers based on High Power Converter is used. Active DC PBM (APBM) is used to support balancing power of NPC converter so that an extra circuit for balancing is abolished. Where as Passive DC PBM (PPBM) is used to remove fluctuating currents in the neutral terminals and enable consistent operation of fast chargers. In these paper the DC-DC Converter is controlled using both proportional plus Integral(PI) and Artificial Intelligence(AI) controllers. The performance of PI controller is compared with AI controller to evaluate the system performance. Simulation results are validated using MATLAB/SIMULINK software.

KEYWORDS: AI controller, High power charging stations, Comprehensive DC PBM.

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I. INTRODUCTION

A feasible alternative to traditional internal combustion engine vehicles (ICEVs), Electric vehicles (EVs) are slowly rising their shares in the automobile industry due to low consumption of fuels and carbon emission gases [1], [2]. The price, time for charging and charging facilities are consumer's key importance, they are affecting their choice of EVs [3], [4]. So in order to increase the purchase of electric vehicles, need to implement the quick charging stations. If fast chargers minimize replenishment of EVs at reasonable rates than the normal replenishment of ICEVs and the fast charging stations scattered across the cities, then purchase of EVs would be increased [1], [5].

Not only the charging station circuit, the DC-DC converter used for fast chargers also plays an important role in terms of system efficiency and time required for charging battery. Usually Level I and Level II chargers are used for slow charging with low power rating so, they are mounted on board. The voltage and power rating are very high (DC Level III) for fast charging to reduce charging time. The DC voltage ranges from 200V to 600V and power from 50kW to 240kW, so it is mandatory to be off board charging station.

The bipolar dc bus circuit is studied in [6] and NPC converter used in centralized grid converter to convert AC-DC as shown in Fig 1. The bipolar bus gives more power capacity and flexibility for loads connected to it. The NPC converter's switching frequency is twice the switching frequency of device. Therefore results in low dv/dt, filter circuts and good performance in current. To solve problems arrived due to configuration in [6], comprehensive dc PBM is used. DC-DC converter used in high power fast charging stations does not need electrical isolation. So these convereters are more economical.

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The social optimality of the proposed policies is established when each station is equipped with multiple charging slots[7]. The characteristics of EV charging, charging and discharging periods of loads for energy storage systems for whole day are studied in [8]. To support V2G and reactive power compensation the charging station was designed[9]. The performance of converters like classical buck converter, QZS and QZSC are studied in [10]. Measurements of EV fast charging process ABB Terra 52 charging stations installed in Aleksandro Lodzki(Poland) in [11]. The intelligent decision making system based on ANN is presented in [12]. The impact of EV charging stations on grid and distribution network in countries like Bangladesh is analysed in [13]. The step up DC-DC converter topologies in terms of start up currents and passive components are analysed in [14].

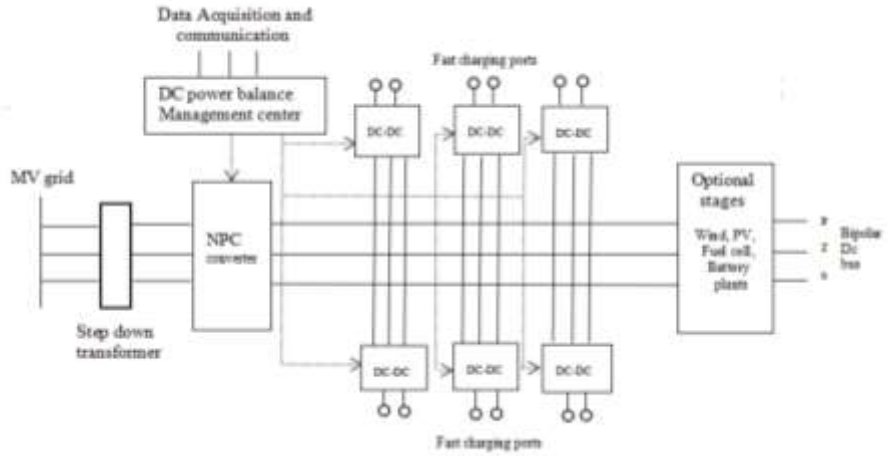

Fig. 1: Block Diagram of Controlling DC-DC Converters through DC Power Balance Management

These paper proposes the controlling of DC-DC converters with AI controllers. The high power dc-dc converter are used in fast chargers for high rated fast charging stations. The existing system has fast chargers with DC PBM capability which helps to remove additional balancing circuit and transformers. The NPC converter used as centralized grid converter will control the grid side currents leads to high power quality. The comprehensive DC PBM is used to solve the unbalanced power problems among positive and negative DC bus.

The PI controllers used in fast chargers have high steady state error. To reduce this AI controllers in the fast chargers are proposed which can reduce the error and leads to stable operation. The performance of proposed fast chargers with AI controllers are verified through simulation results.

II. PI CONTROLLER

A PI controller is a feedback controller which produces error by taking difference between two variables. The rise time decreases and overshoot and settling time decreases by using PI controller.

When proportional gain increases, it effects on control signal proportionally to error. Closed loop system will act fast because controller pushing harder for a given level of error. The erroer will not removed completely but reduced by incresing K_p.

When integral gain (K_i) added to the controller, it will reduce the error. If the error is constant, the integrator increases their gain, so control signal increases there by reduces the error. The only effect of integral term is it can make the system slow, because it will takes time to unwind when the sign of the error signal changes.

The output of PI controller y(t) can be written as,

$$y(t) = K_p e(t) + K_i \int e(t)dt \quad (1)$$

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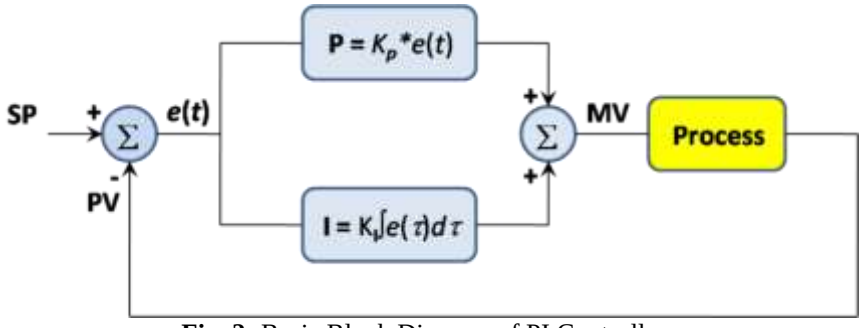


Fig. 2: Basic Block Diagram of PI Controller

III. AI CONTROLLER

An Artificial intelligence is an information processing model inspired by the way how biological neural system like brain process information. The central aspect of this paradigm is the new framework of the Model Application development system. It consists of a large number of fully integrated processing components, which work together to solve particular problems.

An ANN is set for a particular applications, such as pattern Recognition or evaluation of data, by way of learning. Genetic learning involves the modifications of Synaptic linkages between the neurons. That's it Also true Ann. It offers very extensive capabilities for Modelling of complex systems, predictions, controls and Achievement.

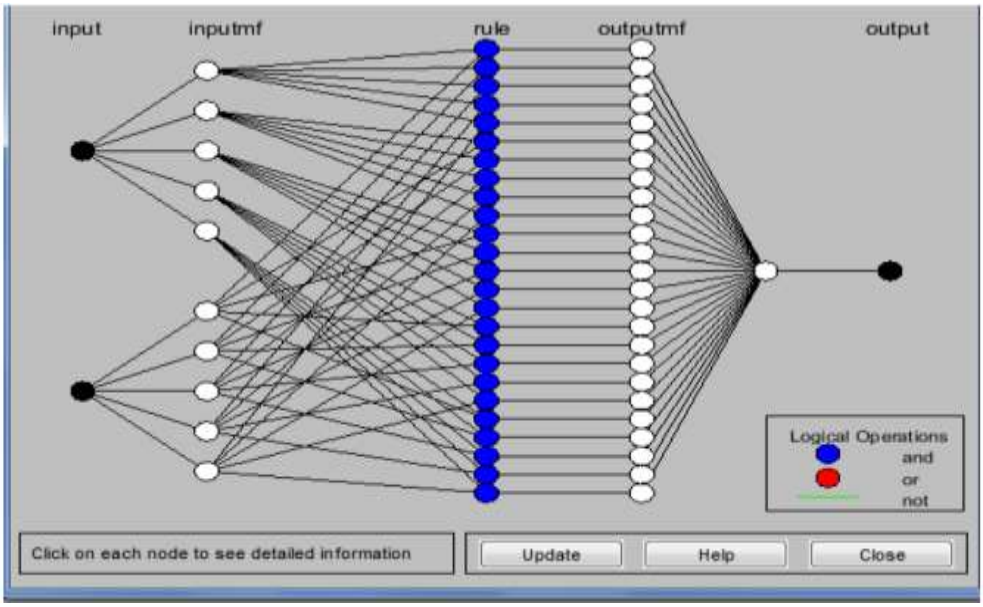
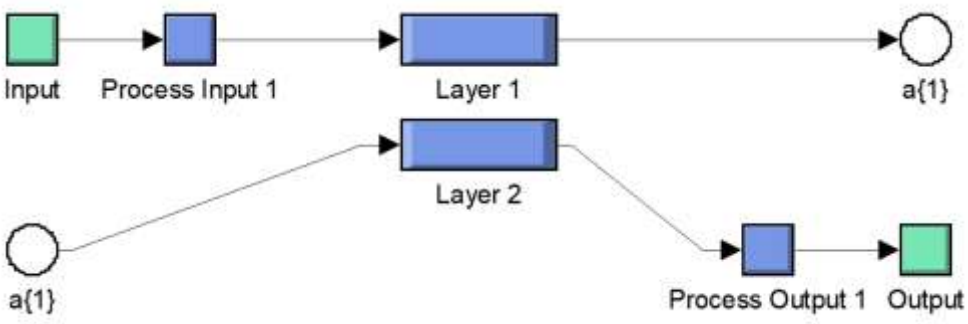


Fig. 3: Design of Neural Network



(a) Function fitting neural network

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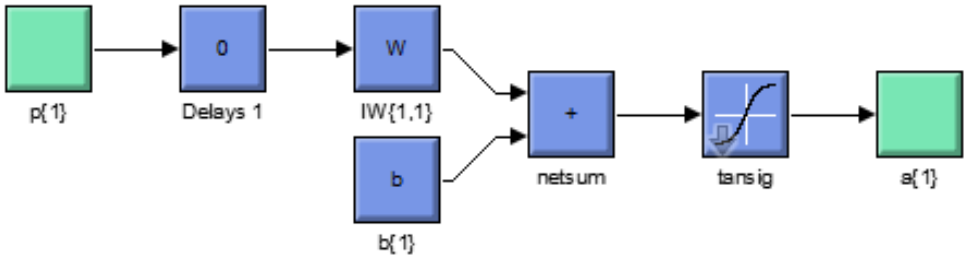
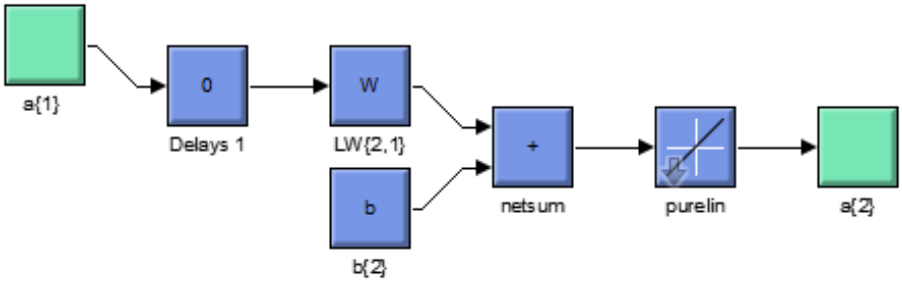


(b) ANN based Layer 1



(c) ANN based Layer 2

IV. DC-DC CONVERTER

A. Toplogy

The circuit of high power converter for fast chargers can be shown on Fig.4, it is composed of two 3 level DC-DC converters connected in parallel for handling high currents. Each converter unit consists of four switches with Free-wheeling diodes and two output inductors.

B. Modulation and principle

In the case where the circuit in balanced condition and the two convereter units are working in in-phase mode (as no phase difference between their gating signals.

To analyze the converter 2 operating modes are presented when Dx1=Dx4=D≤0.5, the waveforms of converter is shown in simulation results and also displays the waveforms when Dx1=Dx4=D≥0.5. where dx1 and dx4 are duty cycles obtained from controller and x indicates 1or 2 equivalent to unit 1 or 2. As modulation signals Dx1 and Dx4 are compared to two interleaved signals at 180^0 carrier signals c1, c4 to produce outer switches sx1 and sx4 gate signals. While sx2, sx3 will operate complimentarily to switches sx1 and sx4 respectively.

V. COMPREHENSIVE DC PBM

If the unbalanced power here between buses is not in the limits of central NPC converter's predefined control zone, the APBM is triggered for balancing the power so that there is no need of extra circuits for balancing. Where the unbalanced power is inside the balanced region, then the passive PBM is triggered to enhance the operation of the fast chargers in balanced region and to reduce fluctuation of the neutral currents. The comprehensive DC PBM will benefit the combination of APBM and PPBM in achieving the far more better cooperation for the charging station's total power balance. Therefore, it is proposed to cause the switching between APBM and PPBM by the power difference between Pp and Pn. The APBM is selected if ΔP is outside the pre-determined zone; If ΔPis within the zone, the PPBM is selected. For this the transition rule is as follows:

$$PBM = \begin{cases} APBM, & if \Delta P \notin [-P_{be}, P_{be}] \\ PPBM, & if \Delta P \in [-P_{be}, P_{be}], \end{cases} \quad (2)$$

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Where P_{be} is selected on the basis of the NPC converter balance limits[6] and the sharing of balance tasks between the converter and the converter fast chargers.

The PBMC commands the reference power P_b^* for balance, which is calculated by collecting voltage and current values from loads which are connected to bipolar dc bus and getting the information of number of fast chargers 'n' which are in operation.

$$P_b^* = \Delta P / n = (P_n - P_b) / n \quad (3)$$

We can calculate the power to be balancedP_{bx}obtained from the each converter by,

$$P_{bx} = (D_{x1} - D_{x4}) v_i i_{ox} \quad (4)$$

By generating the control signals $\Delta\overline{D}_x$, the power can be controlled. And the control signals $\Delta\overline{D}_x$ have limits in the boundary[- $\Delta\hat{D}_x$, $\Delta\hat{D}_x$], and $\Delta\hat{D}_x$ is defined as:

$$\Delta\hat{D}_x = \begin{cases} \min\{\overline{D}_{x1}, \overline{D}_{x4}\}, & \overline{D}_{x1,x4} \le 0.5 \\ 1 - \max\{\overline{D}_{x1}, \overline{D}_{x4}\}, & \overline{D}_{x1,x4} \le 0.5 \end{cases} \quad (5)$$

The control signals$\Delta D_x$is obtained by multiplying $\Delta\overline{D}_x$ bysign of Output current i_o:

$$\Delta D_x = \Delta\overline{D}_x \operatorname{sgn}(i_0) \quad (6)$$

The final modulation signals D_{x1}, $D_{x4}$are obtained by above calculated$\Delta D_x$and original modulation signals $\overline{D}_{x1}$ $\overline{D}_{x4}$

$$D_{x1} = \overline{D}_{x1} + \Delta D_x \quad (7)$$

$$D_{x4} = \overline{D}_{x4} - \Delta D_x \quad (8)$$

VI. SIMULATION AND RESULTS

Fast charger is simulated by MATLAB / Simulink with comprehensive DC PBM with both PI controller and AI controller. A 240 kW rating converter is intended for verification, and the parameter values of the system model are given in below table I.

Table I: Simulation Parameter

PARAMETER	Sym.	SIMULATED VALUES
TOTAL DC VOLTAGE	2Vi	3.3 PU
INPUT CAPACITANCE	Ci	0.56 PU
OUTPUT INDUCTANCE	Lf	1.25 PU
OUTPUT CAPACITANCE	Cf	0.6 PU
SWITCHING FREQUENCY	Fs	72 PU
BASE FREQUENCY	Fb	60 HZ
BASE VOLTAGE	Vb	600 V
BASE POWER	Pb	240 KW

(a) Simulated circuits

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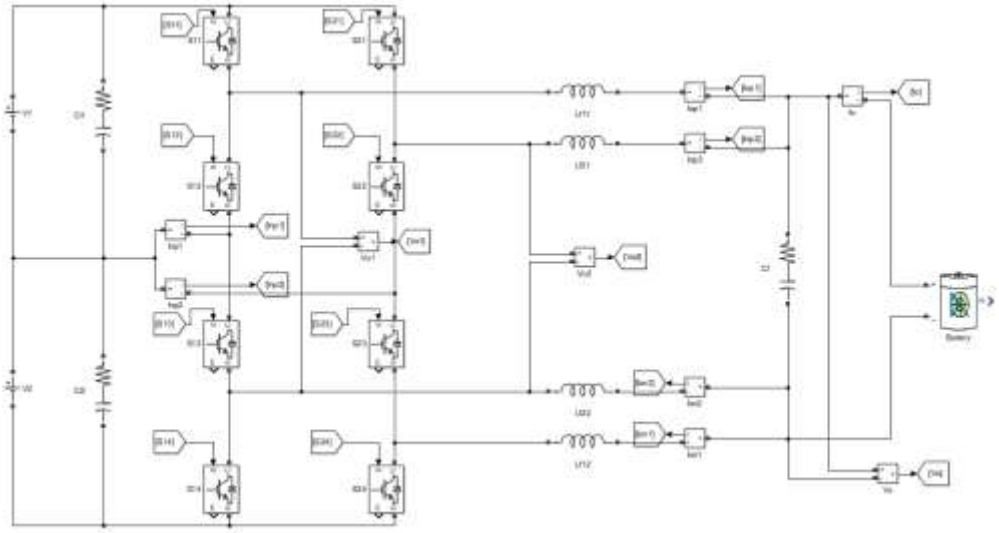
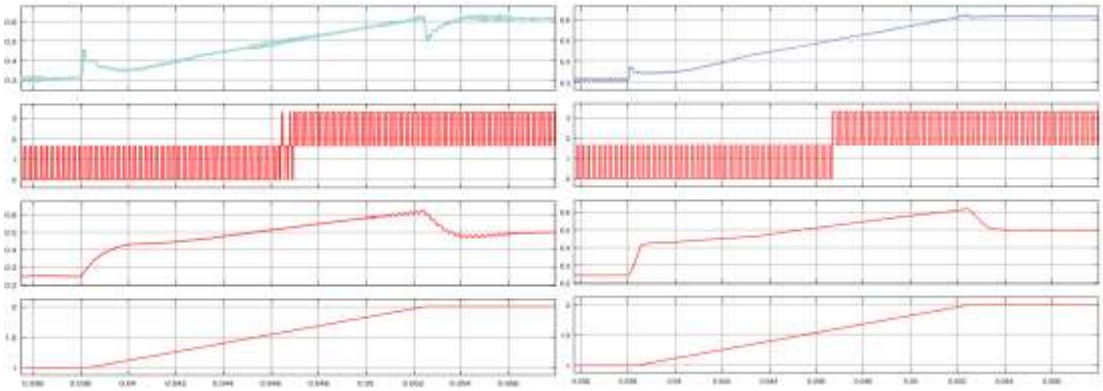


Fig. 4: Simulated Circuit for dc-dc Converter

(b) Simulated Results and discussion

The simulation results for changing from constant current to constant voltage condition for both PI and AI contollers are given in Fig 5. Modulation signals, output voltage across converters first unit, total output current and output voltage are compared using both PI and AI controllers.

Fig 5. shows that the modulation signals D11 and D14 using PI and AI controllers. The signals obtained AI controller have smooth signal compared to PI controller. The steady state error is less in case of AI controller and balanced operation can be achieved. In the same way the voltage and current signals have less error and steady state operation can be seen.



With PI Controller With AI Controller

Fig. 5: Simulation Performance for Changing from Constant Current to Constant Voltage Condition. (a) Modulation Signals D11 and D14. (b) Output Voltage of First Unit V_{01}. (c) Output Current I_0. (d) Voltage Across Output V_0

Fig 6. shows the conduction of PBM in constant current condition for D≤0.5. Here current, balance power & neutral point currents are compared. The output current signal had more dampings using PI controller which can be drastically reduced by using AI controller.

The Fig 7. and Fig 8. shows the simulated outputs of Modulation signals and output currents at constant current condition when D≤0.5. Modulation signals and current signals are compared using both PI and AI controllers.

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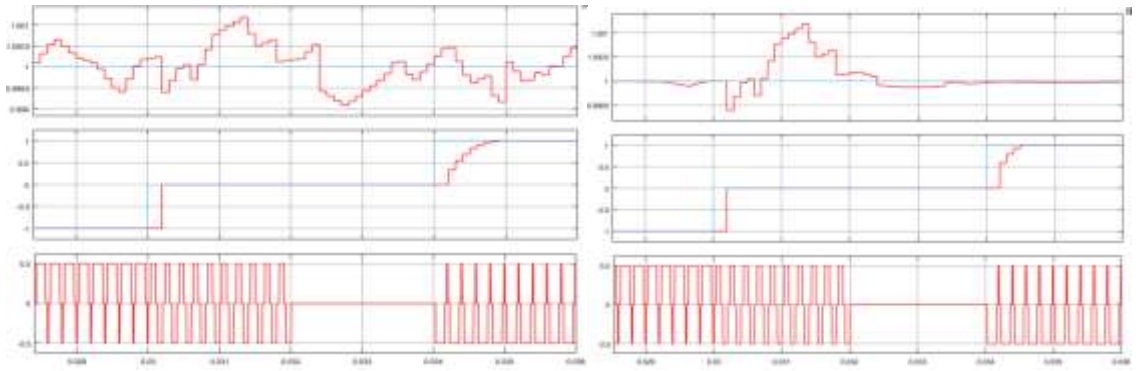
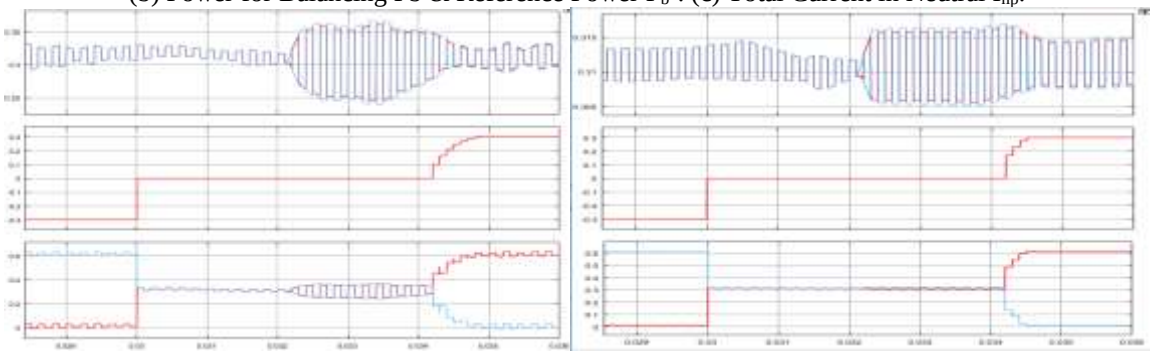
The modulation signals D11 and D14 shown in Fig 7 can observe the changes clearly obatined using both controllers. As well as the current signals as shown in fig.8, are continuous and uniform by using AI controller.



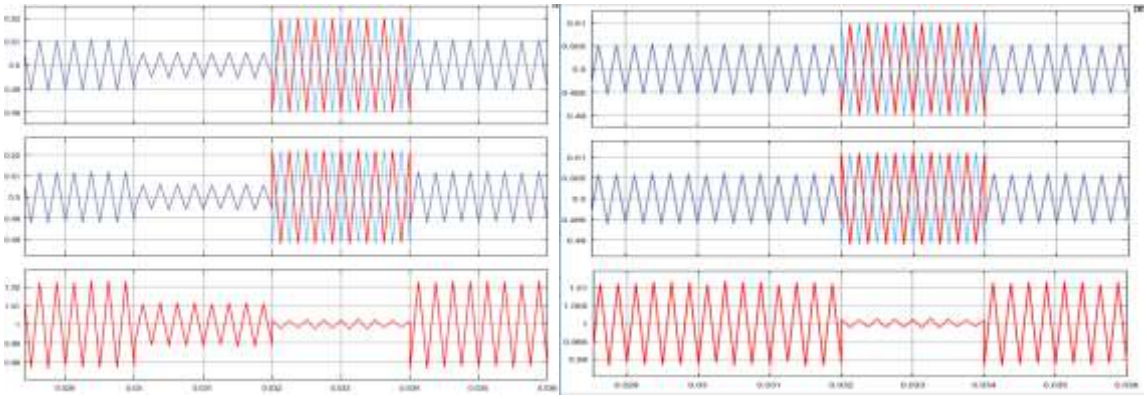
With PI controller With AI controllers

Fig. 6: Simulation Signals of PBM in Constant Current Condition, for D≤0.5:(a)Output Current I_0& Reference Current I_0*.
(b) Power for Balancing Pb & Reference Power P_b*. (c) Total Current in Neutral I_{np}.



With PI Controller With AI Controller

Fig. 7: Modulation Signals in Constant Current Condition, for D≤ 0.5: (a)Initial Modulation Signals D_{11}&D_{14}, (b) Control Signal for Power Balance ΔD1, (c) Resulted Modulation Signals D_{11}&D_{14}.



With PI Controller With AI Controller

Fig. 8: Signals of Output Currents in Constant Current Condition, for D≤ 0.5: (a) Output Current from First Unit $I_{op1}$and I_{on1}.
(b) Output Currents from Second unit$I_{op2}$and I_{on2}. (c) Output Current I_o.

We have discussed about signals in case of D≤ 0.5 from the above results. In the same way, when the condition where D>0.5 also shows the improvement of voltage, modulation current signals as shown in Fig 9, 10 and 11 respectively. In Fig.9 the voltage signals have high impact using PI controller rather than AI.

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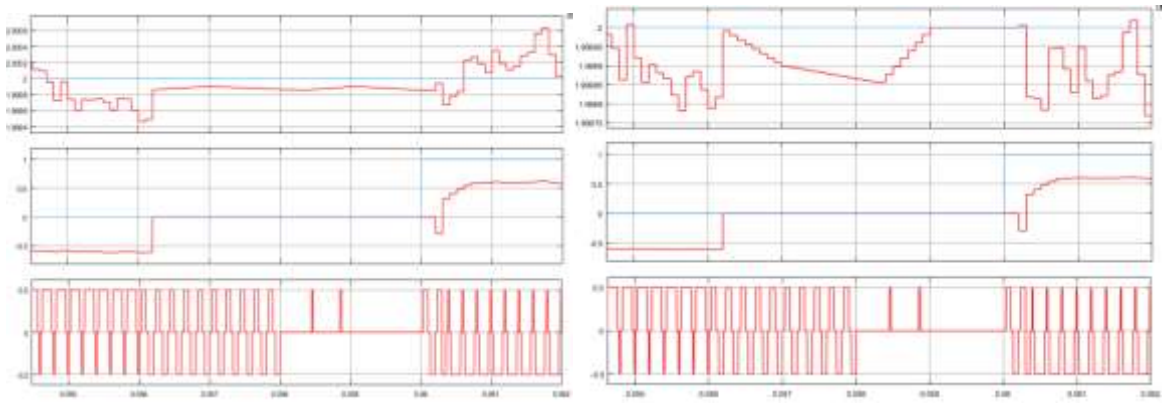
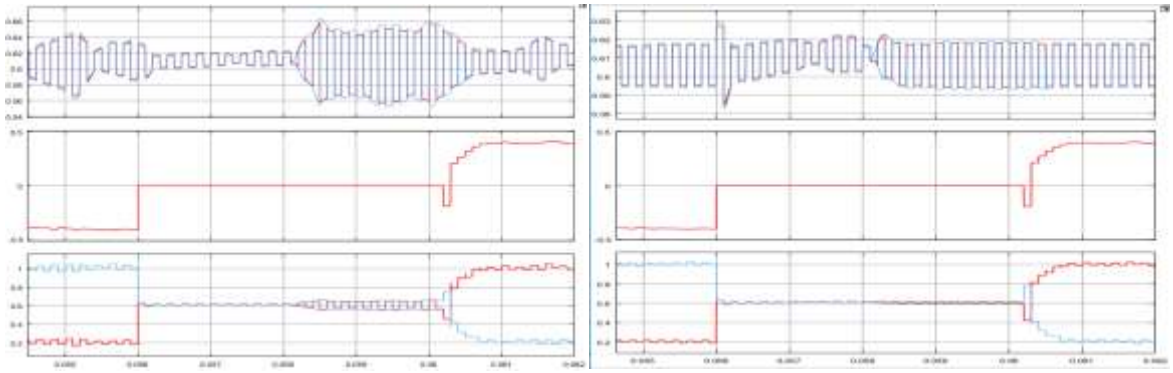
Fig.10 shows the modulation signals D11 and D14 which shows the difference between both controllers. And also the current signals in Fig.11 shows how effective using AI controller.



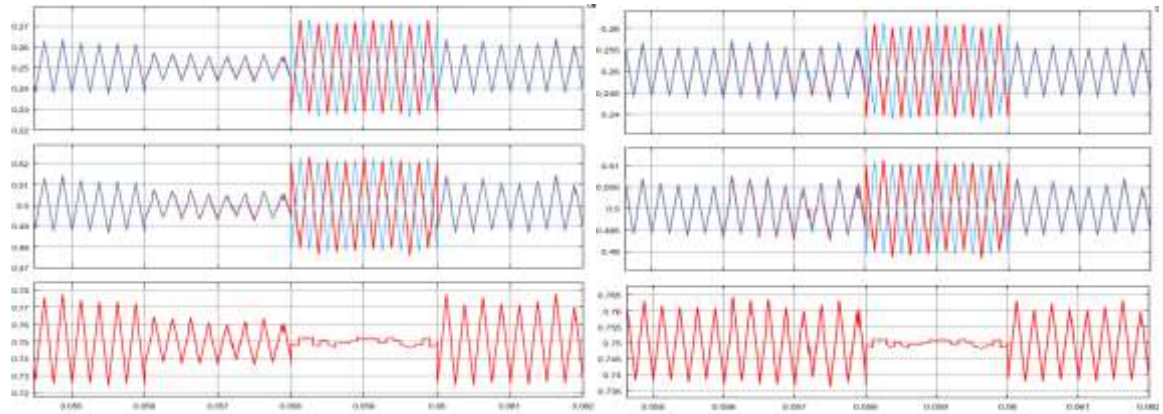
With PI Controller With AI Controller

Fig. 9: Results of PBM in Constant Current Condition, for D>0.5:(a)Output Voltage V_o& Reference Voltage V_o* (b)Power Balance P_b& Reference Power P_b*. (c) Current at Neutral Point I_{np}.



With PI Controller With AI Controller

Fig. 10: Modulation Signals in Constant Voltage Condition, for D>0.5: (a)Initial Modulation Signals D_{11}& D_{14}, (b) Control Signal for Balancing Power ΔD_1, (c) Resulted Modulation Signals D_{11}&D_{14}.



With PI Controller With AI Controller

Fig. 11: Signals of Output Currents in Constant Voltage Condition, for D>0.5: (a) Output Current from First Unit $I_{op1}$and I_{on1}. (b) Output Currents from Second Unit $I_{op2}$and I_{on2}. (c) Output Current I_o.

VII. CONCLUSION

The DC-DC converter used in Fast chargers is controlled using PI and AI controllers. The fast chargers used in this project has a capacity of DC power balancing and results in removing extra circuit for power control and high rating transformers. And there by increasing overall system performance. The performance of PI and AI controllers used in DC-DC converters are analyzed. The simulated results shows the AI controller gives high speed response and study state error compared to PI controller. The study state error in using AI controller is low and stabilization is best compared to PI controller. The computation time for AI controller is less than PI controller.

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Advanced Honey Bee Algorithm For Optimization of Voltage Stability In Ieee 14 Bus System Using Facts Devices

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ABSTRACT:

Optimization technique plays very important part in frequent issues. During this optimization techniques like Advanced Honey Bee algorithmic program are tested in an IEEE-14 Bus installation. As a result of reducing the power losses, the voltage profile improvement and voltage stability improvement can be maintained throughout the power system. In addition, these views show the enhanced optimization technique that ensemble the power system to take care of voltage stability by reducing power losses in transmission line. Among a variation of FACTS controllers, Unified Power Flow Controller (UPFC) is the main powerful and versatile device in facts controller. To boost system bus voltage and to reduce the reactive power and active power losses within the lines as well as steady state model of UPFC in Newton-Raphson (NR) power flow algorithmic program. To see the steady state performance of the UPFC within the load Flow studies an IEEE-14 bus system has taken. Also, this paper shows the higher optimization performance that suit in the ability of power system to retain the voltage stability by reducing losses in the transmission system. These results are tabulated to improve the power quantity losses and reduced from the actual losses in the power system.

KEYWORD: *Unified Power Flow Controller (UPFC), Advanced Honey Bee algorithmic*

INTRODUCTION

Power Generation and Transmission could be a composite process, everywhere power is to be resettled, and therefore the 2 main parts are active and reactive power. During a three-phase ac power structure reactive power and real power flows at the generating station toward the load through various transmission lines and networks buses. The true power and reactive power flow line is termed as the power flow or load flow in transmission system.

In this paper, a singular optimization method primarily based on the mixing of the normal honey-bee mating optimization algorithm with a plant boom model for this set of rules are carried out. Initially, then Honey-bee mating optimization algorithm became most commonly mimic the mate and breeding of the queen of a hive. Its calculation begins with a mate flight procedure with the aid of the usage of an annealing characteristic to pick out correct solutions and save in the sperm theca.The plant growth simulation set of rules was technologically advanced based on the categorization of the plant growth process and plant phototropism, only sure solutions pleasurable the limitations in conjunction by their health are superior to one of the basis version and are stored in the following search. The effects can be compared with numerous strategies toward analyze of robustness and working out efficiency of this technique.

As a consequence, the optimization of control strategies and development in the performance of ac strength systems, we require the various exceptional kinds' compensators. These devices represent an emerging technology known as FACTS (bendy alternating contemporary transmission structures).The FACTS generation open up new opportunity for calculating the each kind of real and reactive power and enhancing the existing transmission structure.

The power through a transmission line may be prohibited for increasing the capacity of strains. This prospect will rise thru the capacity of FACTS controllers to regulate the electrical parameters along with series impedances and shunt impedances connected in power system

HONEY-BEE MATING OPTIMIZATION TECHNIQUES:

A colony of honey bees be inclusive of a queen, numerous hundred drones, 30,000 to 80,000 people and brood at some stage in the energetic season. The queen and handiest has capable of laying eggs upto 1,500 throughout a one day processing time period. Drones' position is to mate with the queen.

The obligations of an employee bee are consisting of rearing brood, nurture of the queen and drones, clean-up, regulating temperature, grouping of nectar, pollen, water, and so forth. The HBMO technique Algorithm is the aggregate of numerous

techniques correspond to exclusive section of mating procedure of the queen.

The primary points of HBMO set of guidelines Based on their mating process are given beneath:

Initially the mating process is done which queen select drones to form the sperm theca (list of drones) probabilistically. Subsequently, a drone is chosen from the mention list at random process for the era of the broods. Making a new broods through crossover of genotypes, by their drone's and their queens.

Before starting of mating technique, the queen's length of sperm theca huge range equals to certain level of the quantity with mating of the queen and unmarried mating escape is determined. When the queen pals efficaciously, the genotype drone is saved.

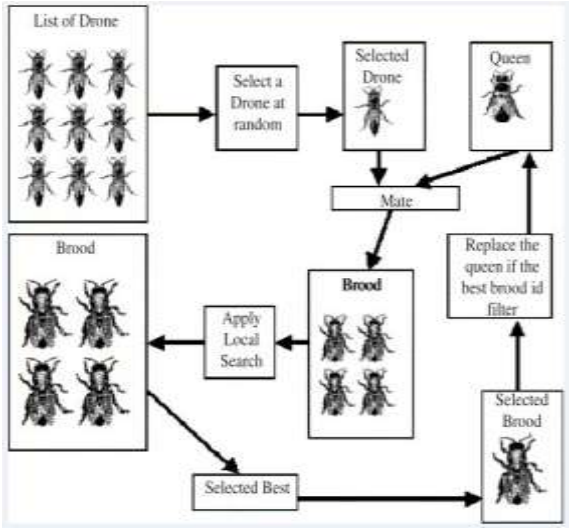


Figure 1. The HBMO algorithm

Two distinctive parameters need to be described, the wide sort of queen and the quantity broods as a manner to be borne by means of queens. In this performance advanced HBMO set of rules, then variety of queens is same to be one, and the quantity of broods is situate equal to the amount of the queens sperm theca period. Drone buddies with queen probabilistically the usage of an annealing that means as follow:

$$\text{Prob}(D) = \exp(-\Delta(f)/S(t))$$

When the queen is at high-speed quantity or health of drone is same as the queens, then possibility of mating is extreme. After seeing each process, the velocity of queens and energy level is decreases by keeping this equation:

$$S(t+1) = \alpha \times S(t)$$

$$\text{Energy}(t+1) = \alpha \times \text{Energy}(t)$$

Let α is speed and strength reduction issue in each step. Initially, fee and the energy of each queen are generating at different process. Since the speed and strength are equal impact on their mating procedure, in this paper, speed of queen and strength has been determined. This brood may be stepped forward, inside the next degree, via using people to use local search.

The people put into effect the limited search techniques to improve broods produced with mating process. This technique is implemented by using the number of local seek heuristics (NWorker1) and combining with them (Nworker2). Therefore, wide varieties of workers are calculated with the aid of sum that number.

CALCULATION OF THE ADVANCED HONEY-BEE MATING OPTIMIZATION TECHNIQUE:

The certain range of optimization solution in honey-bee mating technique with set of rules and qualification lies in the variant of control parameters. As a result of combining both the merits and demerits of omission with outside parameter and reduction of infeasible answers which exhibit in plant growth reproduction technique, then most advanced HBMO algorithm with set of rules to improve the result

Step 1. Input places in the shielding gadgets

The calculation process starts with the evolved records and retrieval of relay & Circuit breakers from SCADA method. Then this parameter contains of colony range, and wide variety of queen and brood.

Step 2. Structure the hive

Using colony N bees are shaped at this stage, in which all bees consist of M gene. An environment shape H= [H1 H2 H3….Hi…..HN] T is used to symbolize this type of colony, wherein Hi =xi,1 xi,2…xi,j…..Xi,M], and xi. Then Honey-bee colony usually includes of queen, drones, workers, and broods. Only the queen bees are capable to lay the eggs. The drones inside the honey-bee colony are haploid and act as their moms' genome by changing its genetic symphony. Then fitness standards (Hi) of its every bee in the colony is evaluated and differentiate between the queens and drones, where

$$F(H) = 1 / (1 + \text{job } j).$$

Step 3. Mating of the queens, breed & broods

Based on their mating possibility compute are suggested, and then threat sperm maintenance within the queen's spermatheca. A lay down of N broad answers (broods) Hbroad be subsequently generated in the crossover process. In this line to line fault are estimated and trouble shouted, by this mating a solution will be modified chances of line fault happening at a positive section in an energy storage device.

Step 4. Advanced Bee fitness with broods

In this process, fitness of each bee generated answer f (Hbroad) is calculated. These solutions are most important fitness serves as compared to foundation version R0. Then R0 may be a fundamental view to look N answer, such that the trunks locate T is fashioned. If the fitness of dth node f (Td) be greater than (R0) then there is deemed the

viable answer; in any other case, Td is abandoned. Until the answer determined within the new brood gives the preceding queen, then comes with an anticipated solution.

Step 5. Preventive circumstance

The complete procedure is terminated to end process when the computation fallout converges. To improve the facilitate and visualization process, a picture with user interface design is essential to expose the location of faulted phase.

THE PLANT GROWTH SIMULATION TECHNIQUES:

Here PGS technique based on the power system in which plant increase, where as stem grow beginning from the roots and the plants; some of the branches develop from nodes at trunk; at this time a few sparkling branches develop from the nodes on the branches. Inspired by the matching with the plant development technique, an optimization set of rules may be defined. The gadget that is to be optimized initial then `grows' begin at the bases of a plant stem and keep `growing' subsequences branches is located.

The Plant Growth simulation law procedure:

The following records were proved through the organic experiments approximately the increase laws of plant,

(i)There is a morphactin concentration in the node and it's far above the ground, the chance of developing a brand new buds and branch at the node.

(ii)Here morphactin awareness in any node to be analysis in the plant simulation. The ecological information to plant growth with node is depending on the digital role. Here morphactin concentrations of nodes are assigning to the new atmosphere records to a certain node which is new branch.

Probability of plant growth Model:

A possibility model which is famous for simulate the boom process in plant phototropism. During this structure, the feature g(Y) is defined for illustrating the surrounding process of node Y in a plant. The much less significant cost of g(Y) is higher for surroundings condition of the node Y for developing a fresh branch. The most important comic strip of this form can be explained as shown: At first, Plant growth simulation trunk M at its origin B0. but we imagine that there is k nodes B_{M1}; B_{M2};: : : ; B_{Mk} are better environment than the root node B_0, and the trunk M, significance in that job g(Y) of its nodes B_{M1}; B_{M2}; : : : ; B_{Mk}, and B_0 suit $g(B_{M\,i}) < g(B_0)$ (i = 1; 2; 3; : : : ; k), next morphactin concentration C_{M1}; C_{M2}; : : : ; C_{Mk} of its nodes B_{M1}; B_{M2}; : : ; B_{Mk} are obtain from the subsequent steps.

$$C_{Mi}=\frac{g(B0)-g(Bmi)}{\Delta 1} \text{ Where (i = 1, 2, :: : k)}$$

$$\Delta 1 = \sum_{i=1}^{k} g(B0) - g(BMi)$$

The following Equation are the morphactin concentration at any node is dependent to their relative magnitude with the gap of the environmental function between the root nodes and the corresponding node in the nodes, in which it's essential, to give the relationship between the Morphactin concentration and location.

$\sum_{i=1}^{k} Cmi = 1$, that means there is morphactin concentration C_{M1}, C_{M2},….M_k of the nodes.

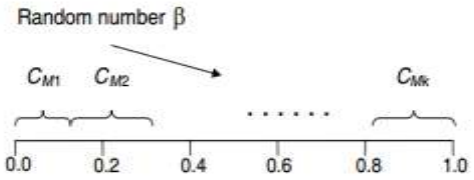


Figure 2. Morphactin concentration state space.

New superior plant growth nodes will grow a new branch in next step which can gain a similar way as that of B_{M2}. This procedure is repeated till here is no new fresh branch are grown, which means that plant are produced.

UPFC Injection Model for Load Flow Studies:

The UPFC is the most controlling and versatile FACTS-equipment used to manage the power system over the power flow and stability of the system. UPFC can be performing static as well as dynamic condition. Static is an analysis at the steady state condition and dynamic state analysis at the transient condition such as faults occur in power system.

Operation of UPFC:

The UPFC is a device that can manipulate simultaneously all three parameters of line strength float (line impedance, voltage and segment perspective).UPFC is one of the FACTS households that used to lessen strength float in transmission. The UPFC is mixture of both STATCOM and SSSC. Converters are operating from common dc system with a dc storage capacitor. The controller provide the gating alerts to the converter valves to provide the favored collection voltages and concurrently drawing the vital shunt currents, In order to provide the desired collection injected voltage, the inverter calls for a dc supply with regenerative skills. The viable solution is to use shunt inverter with help of dc bus voltages.

Advantages of UPFC:

The UPFC can make a feature of STATCOM and SSSC and phase perspective regulator. The Unified Power Flow Controller (UPFC) is includes two switching converter, which

can be consider as voltage source inverter the use of gate thyristor valves, as illustrated. These inverters, named as "VSC1" and "VSC2" can be determined and its operated with a common place dc hyperlink supplied by way of a dc storage capacitor.

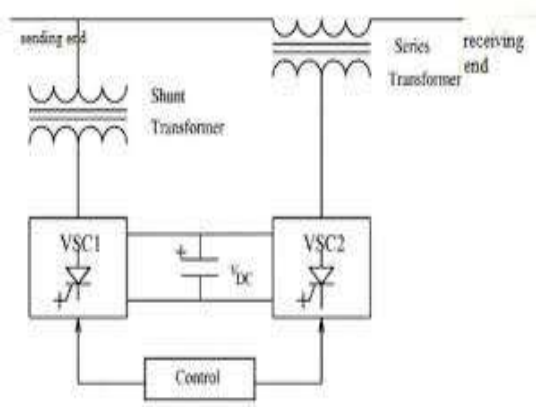


Figure 3. The Schematic diagram of UPFC

While the collection converter of the UPFC can inject a voltage with choppy importance and segment angle it is able to alternate actual power with the transmission line with the assist out of series transformer. However, a UPFC as a whole (each converter) can't deliver or soak up real electricity in regular state (besides for the electricity interested in atone for the losses).

The characteristic of voltage source converter to be generate or take into the account of real and reactive power by converter 2 on common place dc hyperlink. Inverter 2 gives the foremost feature of UPFC is to inject a voltage with controllable converter significance (zero= V= V) and its section attitude ρ (zero = ρ = 360°), on the electricity frequency is delivered with line thru an insertion transformer.

Then modern transmission line flows through voltage supply which will resultant an actual or true power and reactive power trade between them. So, that Inverter may be operates at a unity power factor or manage to have a reactive power flow in transmission system and its alternate with reactive power which is exchange between the two Inverter.

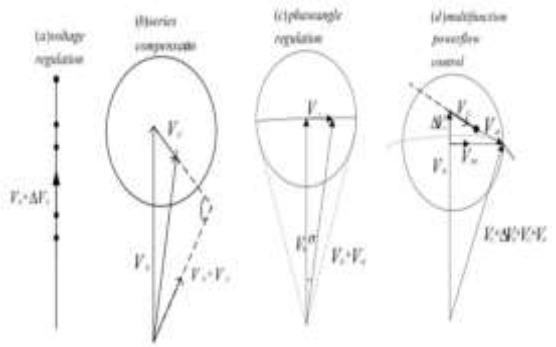


Figure 4. Basic diagram for UPFC control function.

The Unified Power Flow Controller are standard and conventional devices in power system which based on its real and reactive series compensation, shunt compensation, then UPFC is the only device which can complete all the role in transmission line.

In this representation, conventional series compensators are needed for phase shifting. An UPFC can control both the magnitude and angular position of injected voltage in the real system, and also to improve the real and reactive power flow in the transmission line.

RESULT AND DISCUSSION

In this research advanced Honey bee mating technique and advanced plant growth simulation process are based on hybrid algorithm for the voltage stability and to enhance the system. This was performed on MATLAB and output was evaluated in IEEE-14 bus system.

First of all, Newton-Raphson load flow analysis is used to analyze the system performances. Contingency analysis for the systems were performed and based on that performance indices were calculated at normal load and were ranked accordingly. Thus, the optimal solution for UPFC is determined based on its contingency analysis. Then the location of UPFC is determined by PGS which depend on the value. Bus 1,2,3,6 and 8 are the generator buses excepted whereas UPFC is connected at all other buses. The standard IEEE 14 bus system was shown in figure.

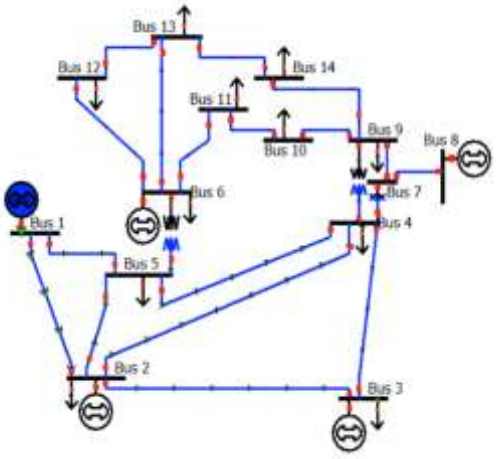


Figure 5. Systematic diagram to an IEEE-14 Bus System.

An IEEE-14 bus system was important for voltages, active and reactive powers at each bus. A MATLAB plan is used for IEEE-14 bus system with standard IEEE-14 bus system data input file.

Bus No	Bus Code	Voltage Magnitude	Angle Degrees	Load		Generator				Injected MVAR
				MW	MVAR	MW	MVAR	Qmin	Qmax	
1	1	1.06	0	30.38	17.78	40	-40	0	0	0
2	2	1.045	0	0	0	232	0	-40	50	0
3	2	1.01	0	131.88	26.6	0	0	0	40	0
4	0	1	0	66.92	10	0	0	0	0	0
5	0	1	0	10.64	2.24	0	0	0	0	0
6	2	1.07	0	15.68	10.5	0	0	-6	24	0
7	0	1	0	0	0	0	0	0	0	0
8	2	1.09	0	0	0	0	0	-6	24	0
9	0	1	0	41.3	23.24	0	0	0	0	0
10	0	1	0	12.6	8.12	0	0	0	0	0
11	0	1	0	4.9	2.52	0	0	0	0	0
12	0	1	0	8.54	2.24	0	0	0	0	0
13	0	1	0	18.9	8.12	0	0	0	0	0
14	0	1	0	20.86	7	0	0	0	0	0

TABLE.1 LINE DATA FOR IEEE 14 BUS SYSTEMS

Sending End Bus	Receiving End Bus	Resistance P.U.	Reactance P.U.	Half Susceptance P.U.	Transformer Tap
1	2	0.01938	0.05917	0.0264	1
2	3	0.04699	0.19797	0.0219	1
2	4	0.05811	0.17632	0.0187	1
1	5	0.05403	0.22304	0.0246	1
2	5	0.05695	0.17388	0.017	1
3	4	0.06701	0.17103	0.0173	1
4	5	0.01335	0.04211	0.0064	1
5	6	0	0.25202	0	0.932
4	7	0	0.20912	0	0.978
7	8	0	0.17615	0	1
4	9	0	0.55618	0	0.969
7	9	0	0.11001	0	1
9	10	0.03181	0.0845	0	1
6	11	0.09498	0.1989	0	1
6	12	0.12291	0.25581	0	1
6	13	0.06615	0.13027	0	1
9	14	0.12711	0.27038	0	1
10	11	0.08205	0.19207	0	1
12	13	0.22092	0.19988	0	1
13	14	0.17093	0.34802	0	1

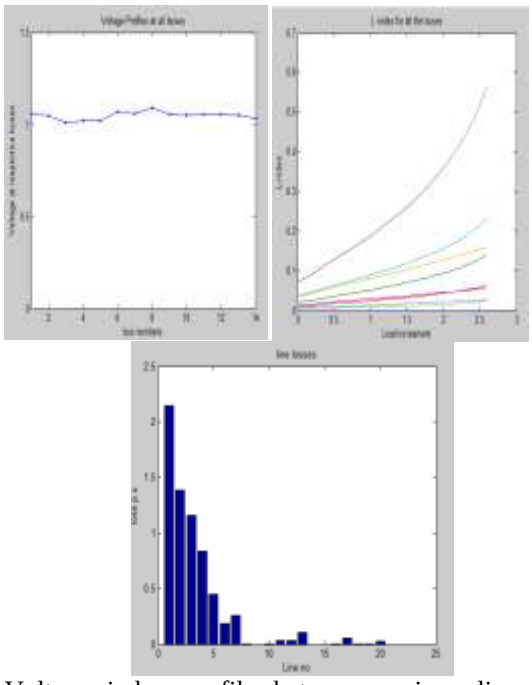
After simulate the list, it displays outcome of voltage, active & Reactive Power and line losses.

Case1: IEEE-14 bus system without an optimization technique

Power Flow Solution by Newton-Raphson Method
Maximum Power Mismatch = 0.000712011
No. of Iterations = 3

Bus No.	Voltage Mag.	Angle Degree	------Load------ MW	Mvar	---Generation--- MW	Mvar	Injected Mvar
1	1.060	0.000	0.000	0.000	232.314	-16.794	0.000
2	1.045	-4.981	21.700	12.700	40.000	42.660	0.000
3	1.010	-12.719	94.200	19.000	0.000	23.568	0.000
4	1.018	-10.318	47.800	-3.900	0.000	0.000	0.000
5	1.020	-8.781	7.600	1.600	0.000	0.000	0.000
6	1.070	-14.242	11.200	7.500	0.000	13.070	0.000
7	1.061	-13.357	0.000	0.000	0.000	0.000	0.000
8	1.090	-13.357	0.000	0.000	0.000	18.023	0.000
9	1.054	-14.935	29.500	16.600	0.000	0.000	19.000
10	1.049	-15.098	9.000	5.800	0.000	0.000	0.000
11	1.056	-14.800	3.500	1.800	0.000	0.000	0.000
12	1.055	-15.096	6.100	1.600	0.000	0.000	0.000
13	1.050	-15.174	13.500	5.800	0.000	0.000	0.000
14	1.034	-16.041	14.900	5.000	0.000	0.000	0.000
Total			259.000	73.500	272.314	80.527	19.000

Voltage deviation of load = 0.673280
Real power loss =13.393360 MW.
L-index = 0.565328
Voltage stability index = 2.700000
Then Weak bus is 14



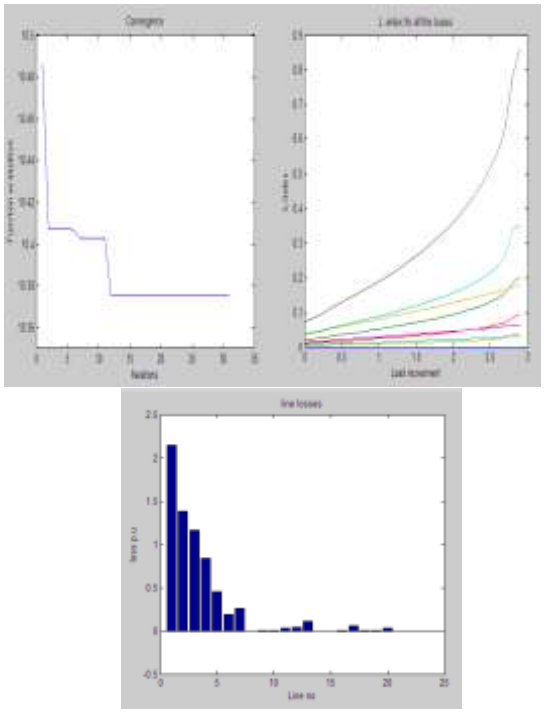
Voltage index profile between various lines the system is also calculated using LSI methods.

Case 2: IEEE-14 bus system by advanced honey bee mating optimization technique

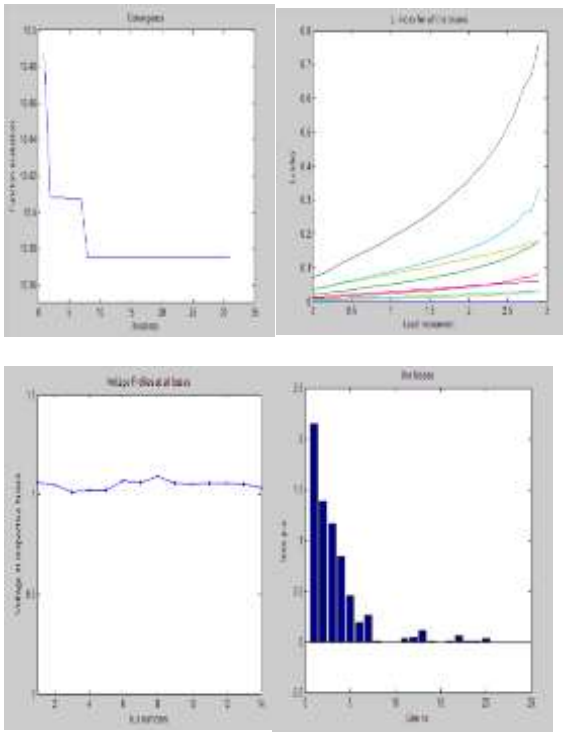
Power Flow Solution by Newton-Raphson Method
Maximum Power Mismatch = 0.000443533
No. of Iterations = 5

Bus No.	Voltage Mag.	Angle Degree	------Load------ MW	Mvar	---Generation--- MW	Mvar	Injected Mvar
1	1.060	0.000	0.000	0.000	232.344	-16.774	0.000
2	1.045	-4.981	21.700	12.700	40.000	42.737	0.000
3	1.010	-12.719	94.200	19.000	0.000	23.608	0.000
4	1.018	-10.318	47.800	-3.900	0.000	0.000	0.000
5	1.020	-8.781	7.600	1.600	0.000	0.000	0.000
6	1.070	-14.242	11.200	7.500	0.000	13.146	0.000
7	1.061	-13.357	0.000	0.000	0.000	0.000	0.000
8	1.090	-13.357	0.000	0.000	0.000	18.061	0.000
9	1.054	-14.935	29.500	16.600	0.000	0.000	19.000
10	1.049	-15.098	9.000	5.800	0.000	0.000	0.000
11	1.056	-14.800	3.500	1.800	0.000	0.000	0.000
12	1.055	-15.096	6.100	1.600	0.000	0.000	0.000
13	1.050	-15.174	13.500	5.800	0.000	0.000	0.000
14	1.034	-16.041	14.900	5.000	0.000	0.000	0.000
Total			259.000	73.500	272.344	80.779	19.000

Load voltage deviation is 0.673299
Real power loss is 13.393541 MW
L-index is 0.858395
Voltage stability index is 3.000000
The weak bus is 14
Location of UPFC is 9 - 14
Series injection voltage is 0.030000
Angle of injection is 0.165724

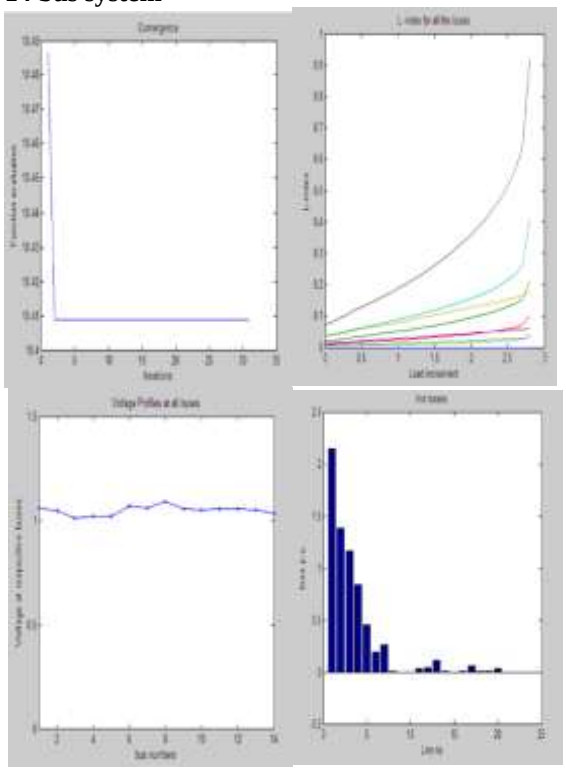


Case 3: Plant Growth Optiminization Technique for IEEE 14 bus system



Load voltage deviation is 0.673282
Real power loss is 13.393283 MW
L-index is 0.762855
Voltage stability index is 3.000000
Weak bus is 14
Location of UPFC is 13 - 14
Series injection voltage is 0.020265
Angle of injection is 1.030045

Case 4: Hybrid Optimization Technique for IEEE 14 bus system



Load voltage deviation is 0.673229
Real power loss is 13.391747 MW
L-index is 0.922264
Voltage stability index is 2.900000
Weak bus is 14
Location of UPFC is 9 – 10
Series injection voltage is 0.020252
Angle of injection is 0.89036

CONCLUSION:

The hybrid approach becomes proposed for fixing IEEE 14 bus device hassle in electricity transmission system. FACTS gadgets play a great task to control the power flow in transmission line. Advanced Honey Bee technique and plant growth simulation is proposed to optimize the area of UPFC device.. The proposed hybrid technique is carried out in MATLAB operating platform which is examined with IEEE 14 bus bench mark machine. Here, loading instances are taken into consideration to evaluate the proposed technique and the entire system cost, power loss, voltage stability index are as compared with conventional AHB algorithm. The comparative analysis completed for the effectiveness hybrid set of rules for solving objective of optimization.

FUTURE SCOPE:

Further extension of the thesis can be completed by using incorporating present day synthetic intelligences (AI) techniques Such Grey wolf optimization, Symbiotic organisms search set of rules, Fruit fly set of rules, Water cycle and evaporation set of rules, Bacterial foraging optimization, Satin bowerbird optimization and so on…for checking out the IEEE 30 bus system, and it as compared with IEEE 14 bus machine.

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Design and implementation of an automatic solar tracking system for a monocrystalline silicon material panel using MPPT algorithm

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ABSTRACT

The energy crisis is the biggest problem in the world today. Renewable energy resources are gaining worldwide priorities to reduce reliance on traditional resources. Solar energy is gaining prompt attention as significant means of increasing uses of renewable energy. Owing to variability in the day night cycle and also owing to seasonal changes, the variability in solar energy occurs daily. World population is increasing quite rapidly. Non-renewable energy sources such as oil and coal have been extinguishing for the past decade, making it a severe problem to supply the planet with sustainable electricity. Yet, solar power plays an important primary energy role. This paper introduces a dual axis solar tracking device from which maximum solar energy can be collected by implementing the work by coding a suitable Maximum Power Point Tracking (MPPT) algorithm for a Monocrystalline solar panel. This work is carried out using microcontroller, Light Dependent Resistor (LDR), dc motor, and Arduino.
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1. Introduction

The change in the climatic conditions has reached the critical level in the present scenario. The key explanations for climate change are due to natural causes, and destructions caused by man such as global warming and greenhouse gasses impact the global climate conditions. The need for reliable, plentiful and affordable electricity from renewable energy sources has an important position to play in the country's energy crisis in the last decade. The government has started to reduce the usage of traditional energy sources and promotes the use of renewables. Such an example is solar which is abundant and inexhaustible in nature. Solar panel transforms the solar energy directly into electricity. Solar panels are primarily constructed of materials made from semiconductors [1]. Monocrystalline solar panels are made in silicon wafer formats and are assembled in a large silicon block. The most reliable and tested technology for increasing the performance of solar panels is solar tracking system which align the panels with the direction of the sun. In recent days, it has become popular worldwide to extract the maximum power in the most effective way. It was observed that a dual axis tracker can increase power output by 40 percent – 60 percent over a fixed system. Over the past two or three decades, energy from solar have emerged as a potential renewable source of energy and are now used in a wide range of industries and households. These systems are solar collector-based, designed to absorb the energy from sun and transform it into either electric or heat energy. The power produced in these applications depends on the level of solar energy collected by the collector, and hence utmost care should be taken in designing the tracking schemes which is capable of tracking the sun's direction with high accuracy.

2. Photovoltaic technology

A solar cell or PV cell is a device, which by the principle of photovoltaic action, transforms solar energy into electricity. The word solar cell is often used for devices explicitly designed to absorb energy from sunlight, while the term photovoltaic cell is used when the source is unclear. A photovoltaic cell's current- and power-voltage characteristics are shown in Fig. 1. Photons reach the solar panel and are absorbed by semi-conductive materials, such as silicon. Negatively charged Electrons are easily knocked

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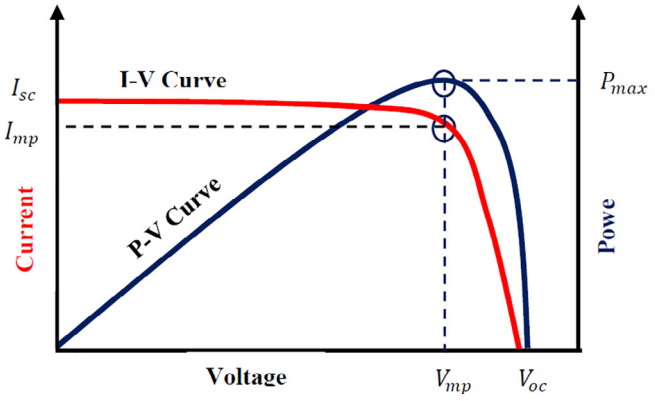

Fig. 1. Characteristics of photovoltaic cell.

out of their atoms to allow them to flow unidirectionally and generate electricity. Isc and Voc are the short-circuit current and open circuit voltage of the panel respectively. Imp and Vmp are the current and voltage at the maximum power point time. Whereas, the positive charged particles flow in the opposite direction in a silicon solar cell. Therefore, a number of solar panels transforms solar energy into a usable amount of DC [3].

3. Methodology and design

Contemplating the concept of constructing the design, the concept conceived mainly is to use solar power as best as possible. The primary requirement out of all expectations is to store solar energy at its maximum level, which ultimately leads to incubation of a new solar tracking system which works autonomously. The key components of this system are as follows

- Panel of Solar Arrays
- DC Motor
- L293D Motor driver
- Microcontroller/ Arduino Board
- LDR
- Current sensor

3.1. Solar panel

Solar panels represent an assembly of photovoltaic cells which excites the electron when the photons strike the solar cells. Most residential application uses crystalline silicon cells or thin-film semiconductor material. Here, the monocrystalline silicon cells are used in the solar panels in which the complete pack of the cell is made by a single silicon crystal [2]. The average sunlight per solar panel is proportional to the sun's angular position relative to the panel [5]. In order to maintain the angle of 90° between solar rays and the solar array, a solar tracking system is intended. The maximum power for calculating the electricity is defined as the product of voltage under open-circuit condition (V_{OC}), current during short-circuit condition (I_{SC}), and fill factor (FF).

$$P_{\max} = V_{OC} * I_{SC} * FF \tag{1}$$

The efficiency (η) is then calculated as

$$E = \frac{V_{OC} * I_{SC} * FF}{P_{in}} \tag{2}$$

3.2. DC motor and driver

A current-carrying conductor when placed in an external magnetic field will experience a force which depends upon the conductor's current and the intensity of external magnetic field. The Driver is a motor module which allows to simultaneously control the direction and speed of motors. Some drivers which can amplify the 5v voltage to 12v are required to drive a motor. This motor driver is built with the L293D IC. Many IC manufacturers these days have H-bridge motor driver available on the market, as L293D is the most commonly used H-bridge driver IC. H-bridge can also be made using transistors and MOSFETs, and so on. This IC is used to control the forward, reverse, left, and right direction of the motor. The driver IC has a 16-pin configuration and produces bidirectional currents required for changing the motor's direction at voltages from 5 to 36 V. Certain applications require power electronic control which induces harmonics in the system and mitigation of harmonics should be properly addressed through suitable harmonic filters [10,11].

3.3. Microcontroller

Circumstances in the field of microcontrollers that we find ourselves in today had their beginnings in the development of integrated circuit technology. The technology has allowed hundreds of thousands of transistors to be stored in one chip. The system used the ATMEGA328P microcontroller. Microcontroller is the centre of the device at large. The ATMEGA328P microcontroller requires a voltage supply regulated at 5 V. The voltage regulator '7805′ helps to provide the microcontroller with a set supply of 5 V. The timer in ATMEGA328P is used for creating delay. In respect to the sun, earth rotates 360° in a day on its own axis and therefore it rotates 15°every hour or every 15 min it rotates 3.75°. Therefore, a short delay of 1.5 min and moderate delay of 15 min should be programmed.

3.4. Light Dependent resistor (LDR)

Light Based Resistor or Photoresistor, a passive electronic component, is essentially a resistor that has a resistor that varies depending on the strength of the light. One type of resistor is LDR. The resistance of this resistor can vary depending on the light that falls upon it. If light decreases on LDR the resistance increases and vice versa. A stable condition is reached when the LDR light intensities are equal. The primary source of energy for light, the Sun, travels from east to west. This Sun movement induces variability in the degree of light intensities that fall on the LDRs. The developed algorithm measures the difference in light intensity falling on the LDRs and then rotates the solar panel to travel along with the trail of the light source.

3.5. Current sensor

A signal which is proportional to magnitude of current is generated in the sensor whenever it senses current. The output of the sensor may be of analog or digital in nature. The initiator signal can also be used by an ammeter to measure the current. These can also be stored for future data collection evaluations, or can be used for monitoring purposes.

4. Maximum power point tracking

MPPT is a technical solution used in solar PV inverters to maximize power output in less than optimal sunlight conditions. Perturb and Observe (P&O) which is the one of the most commonly used algorithm is used here. When the photovoltaic module produces maximum power at certain voltage it is called as maximum power point. The power output of the module depends upon climatic conditions and solar cell's temperature. Photovoltaic cells

share a composite link with their working environment and the maximum generated power [4]. A solar cell's non-linear electric tendencies are indicated by a ratio of the solar cell's maximum power to the sum of V_{oc} and I_{sc}. From the I-V curve it is evident that the PV cells serve as a current constant source till the maximum power point region. Once the maximum point is reached, the curve transforms to exponentially decreasing nature. This algorithm is used to collect the maximum power by setting the required voltage in the PV module. The association between the battery voltage and output voltage is done [9]. They extract the high voltage power from the PV modules and modify them to fulfill the requirement of charging lower voltage batteries. The power is henceforth converted to the best voltage to obtain maximum current in the battery. The algorithm extracts the high voltage power from the PV modules and adjust it to meet lower voltage battery charging requirements. Henceforth, the conversion of power to the required voltage is achieved to get full battery current.

5. Operation of the solar tracker

The automatic solar tracking module consists of LDRs, solar panel, DC motor and Microcontroller. To sense the intensity of light, the corners of the solar panel is equipped with LDRs. The basic property of LDRs is generating low resistance when maximum light intensity. The basic property of LDRs is to produce least resistance when the intensity of solar ray falling on them is maximum. The motor that is attached to the panel shifts it with respect to the position of the sun. The solar panel is positioned in manner so as, the intensity of light falling on the LDRs are compared and the motor drives it towards the LDR which is having high light intensity. If there is more light intensity dropping on right LDR, the panel moves slowly to the right and if there is more light on the LDR which is mounted on left side, the panel moves gradually to the left. Sun is ahead in the noontime and light intensity is the same on both sides. Under this condition, the panel is stagnant without any power output from the motor drive. Fig. 2. shows the block diagram for the automatic Solar Power Tracking System [8].

An Arduino is actually a microcontroller-based kit which, owing to its open source hardware feature, can be either used directly by buying from the vendor or made at home using the components. It is used mainly in communications and in the control or operation of many devices. The most important advantage with Arduino is that the programs can be loaded directly to the device without any hardware programmer needing to burn the program. It is achieved because of the Boot loader's 0.5 KB presence which enables the program to burn into the circuit. What we need to do is download and write the code to the Arduino program. Fig. 3. displays the Arduino Control Circuit. Motor rotation relies on Allow Pins. When Activate 1/2 is Small, motor connected to

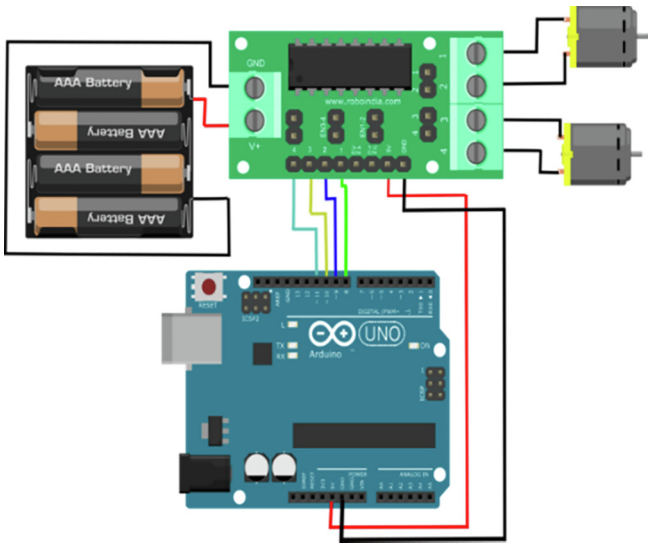

Fig. 3. Connection of Arduino with Motor Driver.

Table 1
Motor Directional Mechanism.

IP 1	IP 2	Condition
0	0	Stop
0	1	Counter-clock wise
1	0	Clock wise
1	1	Stop

the left part of IC will rotate as shown in Table 1 for the given inputs (IP1 and IP2).

The performance of the system is tested under two operating conditions viz, normal daylight and bad light condition.

5.1. Normal day light condition

The solar tracker uses the LDR outputs for comparing the output voltages. As the sun moves in the daytime from east to west, ATMEGA328P's Analog Input 0 should generate higher voltage than the Analog Input 1 for sensing the sun's rotation. This state is known as normal daylight state and after every 15 min, 3.75° rotation is achieved in the panel by the tracker.

5.2. Bad weather condition

During cloudy days or bad weather condition the magnitude of light intensity on LDR will be less and therefore there may not be

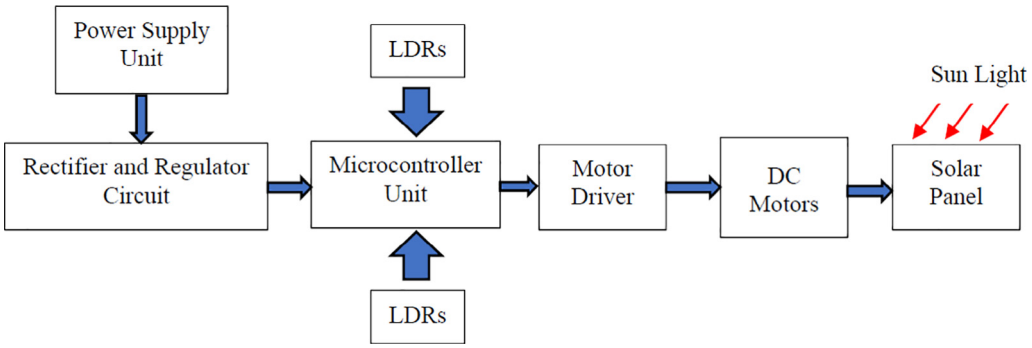

Fig. 2. Block Diagram of Solar Power Tracking System.

sufficient voltages at the point [1213]. Under this condition, the voltage difference at the junction will be lesser than the threshold value and the sun continues to rise westwards. A short delay is provided to fix this problem, which tests the voltage input every 1.5 min from the junction point. For a step rotation of the motor, the microcontroller consecutively checks the variable count 10 times to generate a wait signal which is equal to 15 min which results in a moderate delay.

6. Algorithm

Microcontroller acts as brain of the solar tracking system as a whole. The desired light radiation is received through the CDS sensors. You can then equate the input radiation to the sensors to determine the direction of the sun or the source of light [6 7]. The microcontroller then transmits the output signal to the motor for the desired angle of altitude and angle of elevation. To make the microcontroller read out the input and respond accordingly, an algorithm must be created. This flow charts are then translated into C language and compiled using the Arduino IDE. Fig. 4. shows the flow chart of the method.

7. System Specification and circuit diagram

The technical specification of the proposed system is given in Table 2.

The circuit diagram and the hardware prototype of the proposed system is shown in Fig. 5(a) and (b) respectively.

8. Experimental results and discussions

During normal day light and bad day light conditions, the readings from automatic solar tracking system are taken and analyzed. The observations and readings which have been taken are as below in Table 3 and Table 4. On different days the Table indicates different readings.

Table 2
System Specification.

Parameters	Specification
Weight	75 g
Diode	WG40 Bridge
Transformer	230V/12V AC
Rectifier	W04G Bridge
Filter Capacitor	1000μf & 100μf
Resistance	330 Ω, 10K X
IC Regulator	IC 7805
LDR	PG Series/ CdS
Arduino	ATmega328P
Motor	0-5V
Temperature Rang	0°C – 55°C
Solar panel	V(OC) : 11.05 VI(SC) : 10AP(Out): 10 W

8.1. Under normal day light condition

Table 3 shows the experimental results obtained under normal day light condition to study the performance of a fixed and dual axis solar panel of the autonomous solar tracking system. From the observed readings, it is clear that the voltage output of each LDR varies from one another as the intensity of light varies from east to west. Table 3 reveals that LDR_1 provides low resistance from 7:00am to 1:00 pm, while LDR_3 provides medium value of resistance from (7 – 11) am, respectively. From 7:00am until 1:00 pm, LDR 2 and LDR 4 offers more or less same resistance. Fixed panels deliver maximum output from 11:00am to 3:00 pm, whereas the automatic tracking system panel offers 61%, 93% and 82% efficiencies at 7:00am, 12 noon and 5:00 pm respectively. The per day average temperature reading was 28 °C. The variations in output power during normal day light condition is shown in Fig. 6

8.2. Bad day light condition

Below is also a collection of readings taken on a Bad day light condition. The intensity of light was very low, which leads to low output from the PV system. The experimental results obtained on a bad day light are shown in Table 4. It is inferred from Table 4 that,

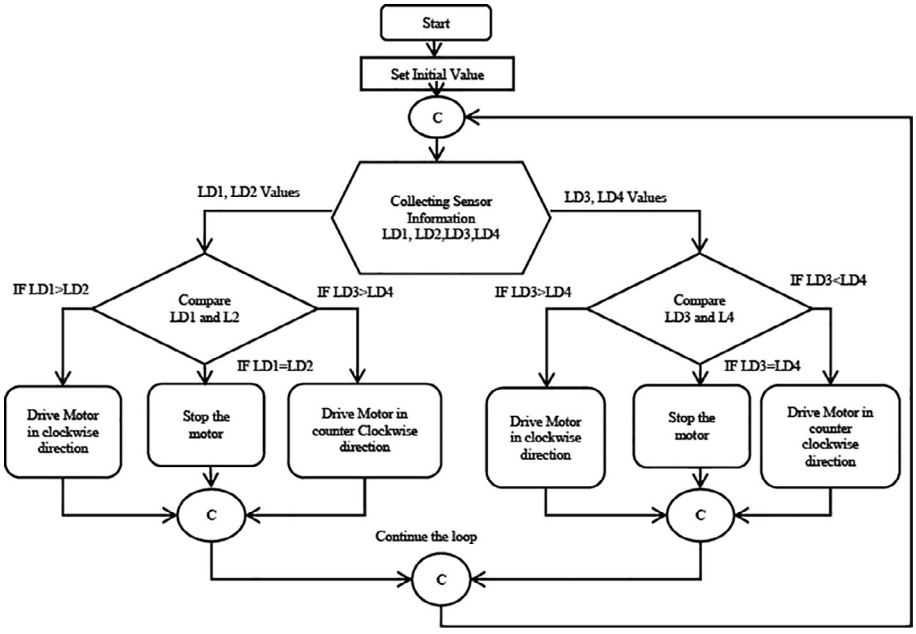

Fig. 4. Flowchart of the process.

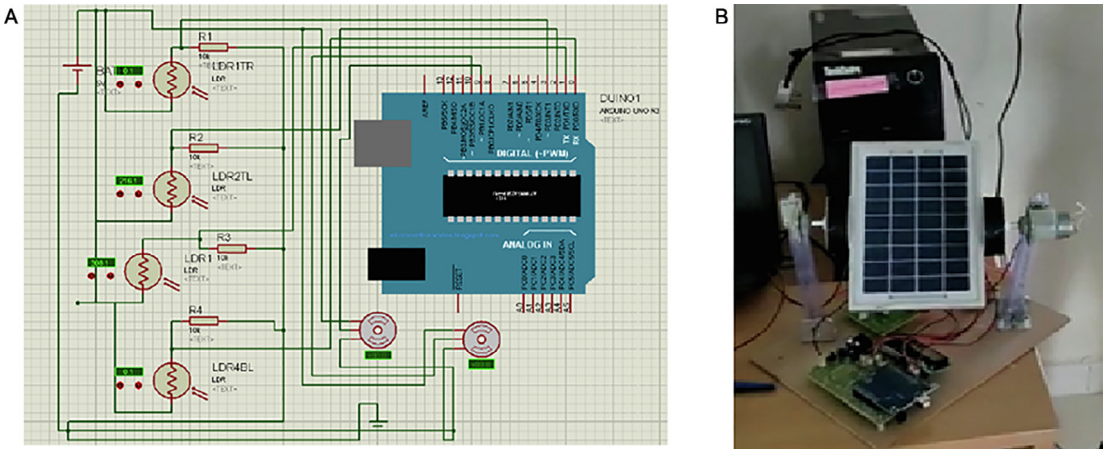

Fig. 5. (a) Circuit Diagram (b) Hardware prototype model.

Table 3
Experimental results under normal day light condition.

Time	LDR_1	LDR_2	LDR_3	LDR_4	Temp. (°c)	Fixed panel (W)	Dual Axis panel (W)
07:00 AM	46	74	158	75	25	2.2	6.02
08:00 AM	45	76	164	76	26	3.65	7.86
09:00 AM	47	71	170	66	28	6.7	8.36
10:00 AM	48	69	163	64	29	7.33	8.78
11:00 AM	45	56	165	51	29	7.9	8.47
12:00 PM	42	49	43	50	30	8.82	9.6
01:00 PM	47	45	51	47	31	8.85	9.34
02:00 PM	166	160	54	160	32	8.62	9.1
03:00 PM	173	162	56	160	32	8.36	8.88
04:00 PM	172	173	67	175	29	7.31	8.8
05:00 PM	173	167	68	164	28	5.67	8.39

Table 4
Experimental results under Bad day light condition.

Time	LDR-1	LDR-2	LDR-3	LDR-4	Temp (°c)	Fixed panel (W)	Dual Axis panel (W)
07:00 AM	220	216	212	219	20	0.706	2.195
08:00 AM	201	196	197	195	21	1.177	2.878
09:00 AM	46	70	177	67	20	2.173	3.053
10:00 AM	46	66	177	83	20	2.377	3.18
11:00 AM	45	76	177	87	22	2.578	3.067
12:00 PM	180	131	110	130	22	2.863	3.45
01:00 PM	185	65	145	113	21	2.878	3.36
02:00 PM	170	159	54	160	23	2.8	3.277
03:00 PM	173	161	53	159	22	2.713	3.2
04:00 PM	181	172	54	174	22	2.388	3.179
05:00 PM	235	239	236	225	20	1.828	3.032

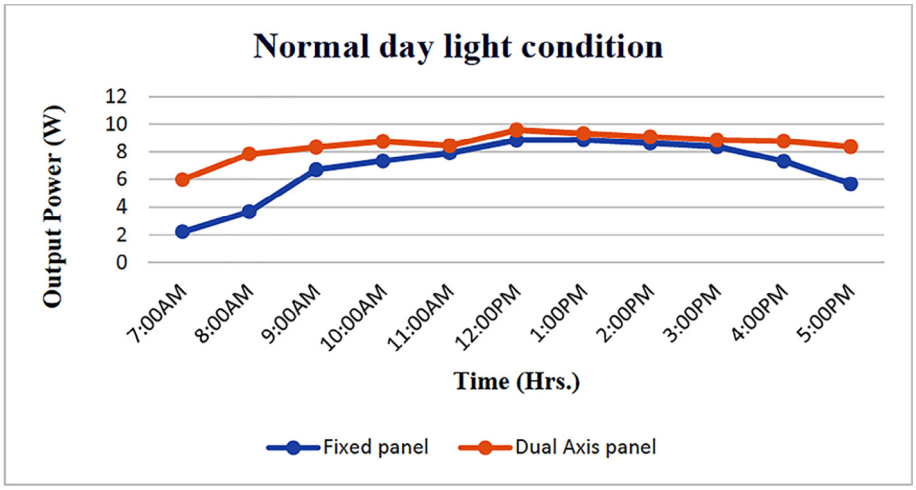

Fig. 6. Variations in Output Power during Normal Day Light Condition.

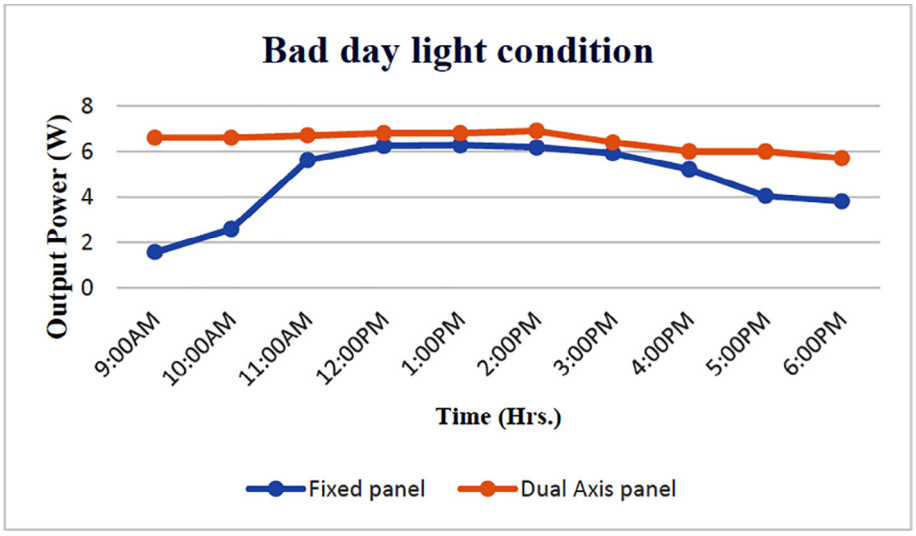

Fig. 7. Variations in Output Power during Bad Day Light Condition.

LDR_1 offers high resistance at (7 to 8) am, low resistance at (9 to 11) am, and medium resistance for remaining time. LDR_3 offers high and medium resistance from 7:00am to 1:00 pm. Its resistance decreases drastically from 2:00 pm to 4:00 pm. Again, the resistance increases at 5:00 pm and 6:00 pm. Throughout the day, LDR_2 and LDR_4 offer quite similar resistance. Due to irregular light nature, all LDRs offers mixed behaviour. Fixed panel only has full output from 12:00 noon to 2:00 pm. The fixed panel's average power output is just 27.88% of the measured power output. The dual axis panel is efficient by 30.2% at 9:00am, efficient by 33.6% at 12 noon and efficient by 31.62% at 5:00 pm. The noted mean temperature reading was 21.18 °C during this day. On a poor day of sunlight or solar irradiation it can be inferred that both the fixed and variable panels, i.e., have less electricity outputs than the other days. The variations in output power during Bad light condition is shown in Fig. 7

9. Conclusion

Readings were taken under different environmental conditions and compared. It can be inferred from experimental results that the automatic solar tracking system is in all ways more effective than the fixed panel system. The paper is evaluated from the readings, and then concluded. On a typical normal day light condition, fixed panels only have maximum output from 11:00am to 3:00 pm. Automatic tracking system panel offers 61%, 93% and 82% efficiencies at 7:00am, 12 noon and 5:00 pm respectively and offers 16.46% more power output compared to the immovable panel. During the bad day light condition, the immovable panel produces an average power output of 2.2 W when compared to 3.26 W of adaptive solar monitoring system. Here, the fixed and automatic tracking has lower power output compared to normal day light condition. The above results suggest that the automated solar tracking system is a much better way to implement than the fixed panel under any environmental situation.

CRediT authorship contribution statement

T. Rajesh: Methodology. **K. S. Tamilselvan:** Validation. **A. Vijayalakshmi:** Validation. **C. H. Narendra kumar:** Validation. **K. Anitha Reddy:** Validation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Further Reading

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Frequency control of PV-connected micro grid system using fuzzy logic controller

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ABSTRACT

Frequency is a variable parameter in a power system, and it denotes the balance among the generation and the requirement. The operator of the system has to maintain the frequency within certain acceptable limits. The tediousness of integrating Distributed Generators (DGs), like solar photovoltaic (PV) system or wind turbines is the intermittency in power system that balances the power and regulates the frequency and voltage. If a number of electric motors are connected along with PV, the frequency of rotor speed will be varied. Hence, this paper intends to propose a Fuzzy Logic Controller (FLC) for controlling the frequency of rotor speed to enhance the power system performance. Hence, the major objective of the proposed model is to provide control over the output signal by reducing the error between the reference signal and control signal. The performance evaluation of the proposed model is done and proved over other controllers with respect to switching time, and the performance metrics, namely settling time, rise time, and percentage overshoot.
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1. Introduction

In the present era, the regulated and the centralized utilities of electric power mainly depends on fossil fuels to satisfy the requirement of energy. Traditional power generating plants are normally centralized, and thus the power is needed to be forwarded over wide distances. This results in losses of energy and affects the effectiveness of the system. One of the important limitations of the traditional technique is the discharge of pollutant gases in huge amount that acts as reason for global warming [1]. With the increasing need for energy, renewable energy oriented systems possess high interest in research. Thus, to satisfy the needs of energy, it is important to produce electric power using different renewable sources of energy, like solar, wind, geothermal, and so on.

At present, generation of power using PV system acts as an important method because of number of reasons, like pollution free generation of power, no need for fuel cost, and less cost for maintenance. Hence, it is generally selected as a best alternative as compared with the rapidly depleting reserves of fossil fuels. Even with the present enhancement of the materials of solar cell, the effectiveness in conserving the energy of PV model stays moderate [1]. These effectiveness decreases when there arise no match in load among the input and the output terminal. In general, when a module of PV is connected to the load directly, the operating point does not lead the maximum power of power voltage (PeV) graph. In addition, the MPP changes with the irradiance level of solar and operating temperature of cell. Thus, it is necessary to raise the power conversion efficiency of the module by forcing it to operate at its MPP, without considering the variations in weather conditions. This is carried out using a power electronic converter in the presence of algorithm for maximum power point tracking (MPPT) [2].

Even though Renewable energy sources (RESs) are deployed as zero-emission energy, the uncertainty nature of Distributed Generators (DG) may result in frequency control and stability problems. Frequency stability represents the capability of a system to provide

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steady frequency even under severe upset of the system that lead to significant imbalance among the generation and the load. Thus, the stability controlat reduced inertia with higher RESs penetration remains a major concern. To solve this issue, the inertia of Micro Grids is needed to be increased via energy storage. Thus, it is necessary to find out the appropriate inertia constant value for such systems so that the frequency stability is maintained at a minimal cost. In addition, frequency of Distributed Energy Resources (DERs) and loads also have an impact on the Frequency Control of Micro Grids.

In this proposed paper, the micro grid comprises of PV system, which works independently in order to supply power to the loads without any disturbance to the supply. For controlling the three phase VSC, the primary control circuit with the loop for maintaining the power and voltage is used. The developed technique enhances the performance of the system by smoothly handling the flow of power between the distributed generation units and the load. In addition, it maintains the frequency of the micro grid within a particular range even at the time of sudden changes in load and environmental conditions.

2. Literature review

Different types of sources of power are utilized for developing the micro grid to be operated either in autonomous or grid connected mode. The traditional PI controller is used for controlling the voltage source converter (VSC). The general limitation in developing this type of system is the dependency of the modeling of plant. In various cases, the systems are not elaborated clearly. Even after knowing the parameters of the whole system, there occur variations in parameter at the time of system operation, which is considered as the major drawback in design. In addition, it may not perform well during sudden load variations or disturbances. In recent years, advanced controllers, such as sliding mode controller, and predictive controller are commonly utilized to enhance the characteristics of the system. However, the drawbacks associated with these methods are the requirement of tedious analytical evaluations.

To solve the limitations, intelligent methods are generally used. In [4], particle swarm optimization (PSO) was considered for tuning PI controller parameters to enhance the quality of power in the micro grid. In [5,6], the neural network (NN) is used for tuning the parameters of the controller of a SOFC system. FLC is an enhanced technique that does not need the plants mathematical model whose characteristics is not known in a detailed manner. The FLC is generally easy to be implemented with better control accuracy. On enhanced tuning, the FLC is capable of providing enhanced performance compared to the traditional controllers. In addition, the FLC is effective over variations in parameter of the system. In [3,4], MPPT oriented FLC was developed for a PV system and the battery is used for back-up. In the proposed work, the FLC is used to regulate the frequency within acceptable limits [2].

3. Modelling of the components

3.1. Modelling of PV system

The conventional arithmetical design of a PV system by neglecting the interior shunt resistance is expressed in Eqs. (1), (2) and (3).

$$I_o = I_p - I_{rev}\left\{\exp\left[\frac{e}{BIT}(V_o + I_o R_s)\right] - 1\right\} \tag{1}$$

$$I_{rev} = I_{rt}\left[\frac{R}{R_r}\right]\exp\left[\frac{pF_{BG}}{IT}\left(\frac{1}{D_r} - \frac{1}{D}\right)\right] \tag{2}$$

$$I_g = [I_{sc} + T_{SH}(D_c - 25)]\frac{\delta}{100} \tag{3}$$

where, V_o indicates the solar arrays output voltage, and I_o represents the solar arrays output current, I_{rev} specifies the reverse saturation current, I_p denotes the produced current beneath a specified insolation, e refers to electron charge, I_{rt} indicates the saturation current at reference temperature R_r, B signifies the Boltzmanns constant, I indicates the ideal parameter at p-n junction, T denotes temperature, R_s denotes the series resistance of solar array, F_{BG} represents the semiconductor band-gap energy, T_{SH} indicates the temperature coefficient of short circuit current and δ indicates the insolation in mW/cm2. Fig. 1 depicts the structure of PV system being interconnected with the utility grid.

3.2. PV controller

In this paper, a boost converter is utilized for connecting the PV system to the dc-bus and to obtain the maximum power [7–9]. P&O algorithm is the algorithm considered in tracking the voltage corresponding to maximum power and the simulink diagram of the P&O MPPT is depicted in Fig. 2.

The complete diagram of PV setup is depicted in the Fig. 3. For controlling the boost converter, the cascaded control loop comprising of inner loop of current control and outer loop of voltage control is utilized [10–13]. The Cascaded arrangement offers high enhanced control with the reduction of oscillations on comparison with other basic control. The PI controller is used and is developed with the frequency characteristics using the MATLAB tool as shown in Figs. 4 and 5.

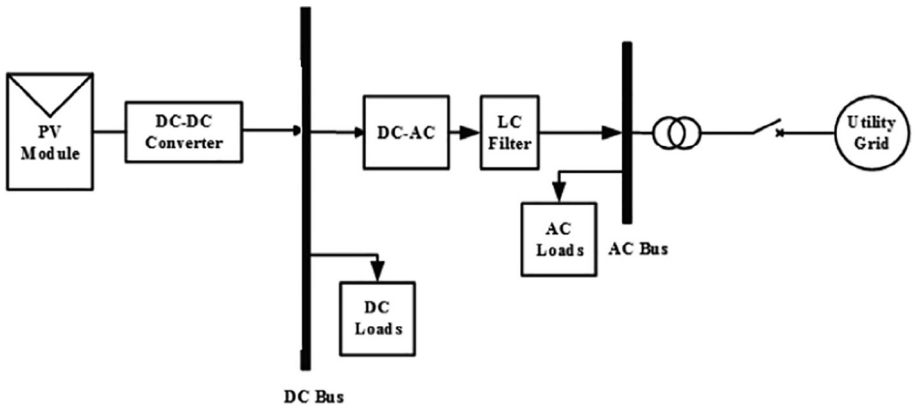

Fig. 1. Structure of PV interconnected with utility grid.

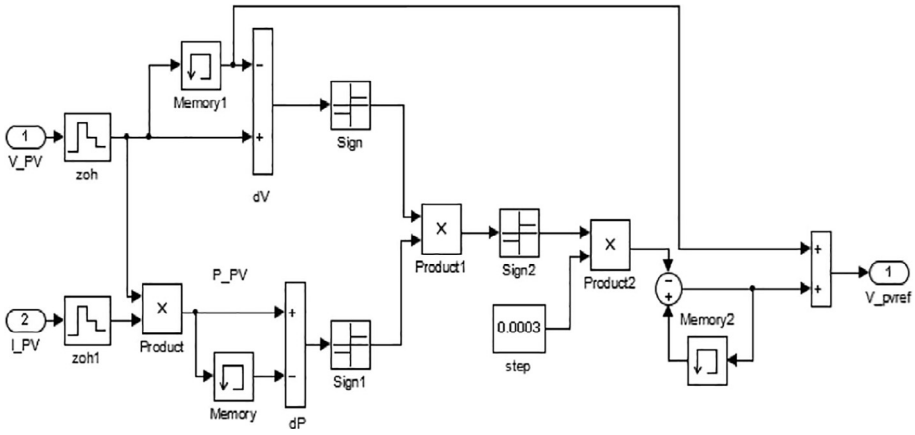

Fig. 2. Simulink diagram of P&O MPPT algorithm.

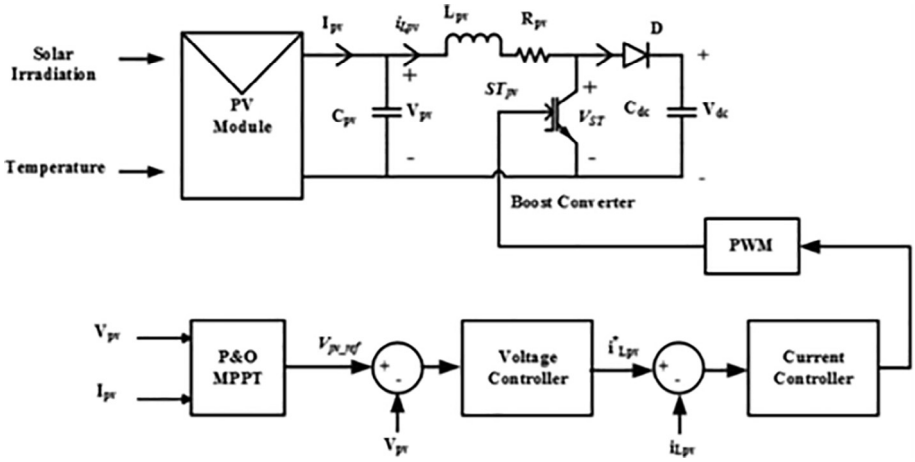

Fig. 3. Control diagram of PV system.

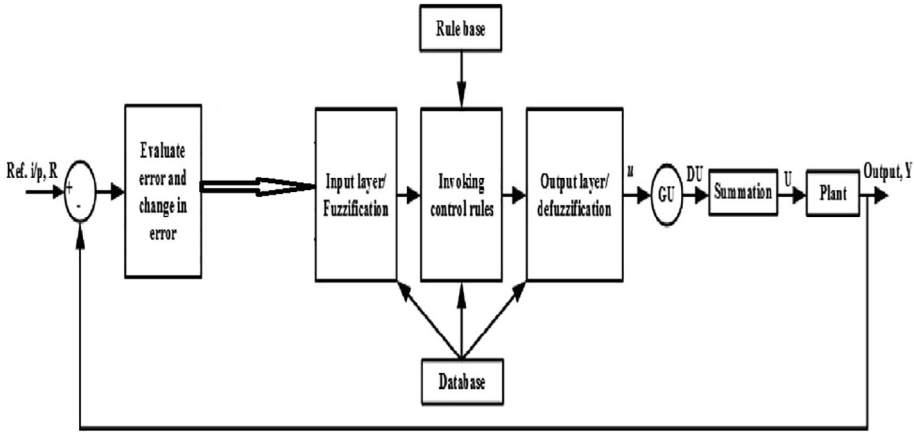

Fig. 4. Fuzzy feedback control system.

4. Proposed fuzzy Logic controller for frequency control

4.1. Fuzzy logic control

In the proposed paper, frequency control using FLC is carried out in order to enhance the performance of the system. The traditional PI controller is normally sensitive to the variation in parameters, and thus it offers low stability margin [3]. But, FLC acts effective to the variations in parameters. In addition, the tediousness in developing the control system of the VSC is eliminated clearly using FLC. It possesses three different stages, such as fuzzification, processing, and de-fuzzification stage. It acts by evaluating the error value and the change in error value among the actual output and reference input. These values are measured to change

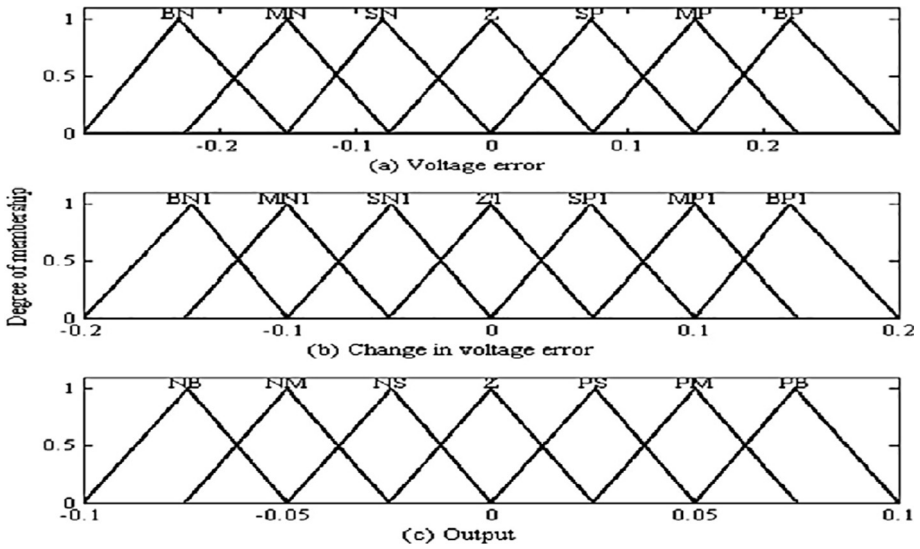

Fig. 5. Membership functions of voltage error, change in voltage error, and output.

them as per unit values [14,15]. Then, it is fed to the input layer, where the crisp values are changed to their corresponding fuzzy set values. The second stage produces the set of rules. Finally, the fuzzy variables are changed as crisp values with the use of de-fuzzification. The basic structure possessing the fuzzy feedback control system is depicted in the Fig. 8.

5. Results and discussions

5.1. Simulation procedure

The term frequency defines the value of voltage changes per second. The adopted frequency control in PV based MG model using FLC isimplemented in MATLAB and the corresponding outcomes were attained.

5.2. Frequency analysis

The frequency of the system is shown in Fig. 6. In general the frequency analysis is held by varying the amplitude with respect to time. System inertia is stated as the capability of a system to show opposition to the variation in frequency because of the resistance created by the kinetic energy of rotating masses in each of the generator. Fig. 7 depicts the power system with the impact of reduction in inertia.

The reduction of inertia increases variation in frequency during sudden disturbances, including loss or variation in the generation or demand. Thus, it is strongly advised to lower the settling time at the time of disturbance. Hence, the need for FC in power system is increased. A fast response of frequency from the side of generation is a commonly recommended solution to solve the issue of increased frequency deviation.

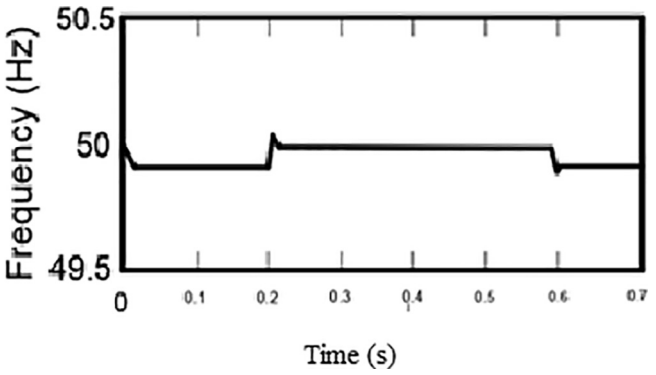

Fig. 6. System frequency.

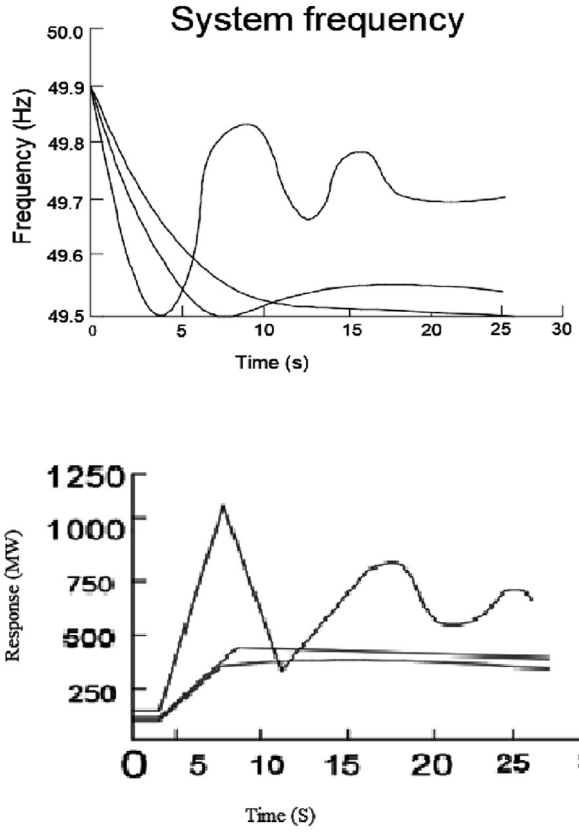

Fig. 7. Power system with the impact of reduction in inertia.

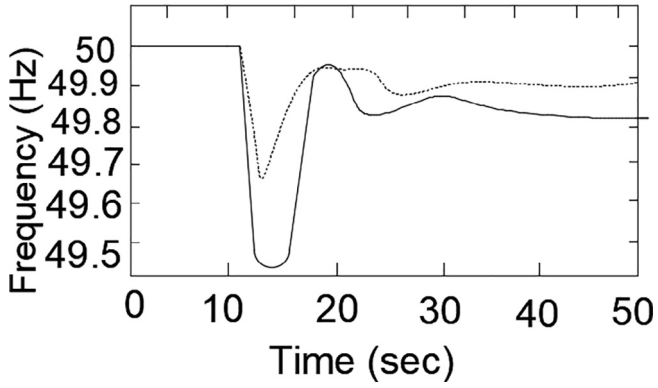

Fig. 8. Frequency control using FLC.

Table 1
Comparative table of existing method with FLC.

Metrics	Condition (1)		Condition (2)	
	PI	Proposed technique	PI	Proposed technique
Overshoot	3.82	0.2	2.58	0.18
Rise time	0.005 sec	0.0068 sec	0.0066 sec	0.0078 sec
Settling time	0.015 sec	0.012 sec	0.015 sec	0.016 sec

5.3. Switching Time analysis

For better frequency control, the value attained with respect to the fault intervals should be minimal. From the observed outcomes, the standard deviation for the presented FLC method is found to be much minimal over the compared models. Thus, the adopted scheme has shown higher efficiency in attaining better frequency control in micro grid systems. The frequency analysis of the presented scheme without frequency control and with FLC control is depicted in Fig. 8.

Table 1 tabulated the outcomes of the proposed frequency control method in terms of metrics, such as rise time, percentage overshoot, and settling time. It is evident from the analysis that the proposed technique provides enhanced control of frequency in power system.

6. Conclusion

This paper proposes the Fuzzy Logic Controller for controlling the frequency of rotor speed to enhance the power system performance. Hence, the major objective of proposed model is to lower the error that occurs among the reference signal and control signal. From analysis, the conventional schemes had experienced the sudden trigger at the respective fault intervals, however, the presented approach have not experienced much trigger. The betterment of the adopted scheme has been proved from the simulation results.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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LOAD FREQUENCY CONTROL OF AN INTERCONNECTED RENEWABLE SYSTEM USING PID COMBINED ANFIS CONTROLLER

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ABSTRACT

The necessity for power generation is randomly increasing with the increasing load demand. As the non-renewable sources are getting extinct the use of renewable sources came into existence. To have the load demand to be equivalent with power generation Load Frequency Control (LFC) technique is employed. Using renewable sources will cause deviations in the system frequency. In this a PID combined with the Adaptive Neuro-Fuzzy Inference System (ANFIS) controller is used for controlling the frequency of load connected to two area renewable system for reducing the changes in frequency responses. When the outcomes of the presented controller were differentiated with commonly used PID it was observed that the controller used in this paper has resulted in better performance, reduced settling time and increased robustness than that of the conventional controller for the same system.

Key words: LFC, PID-ANFIS Controller, Renewable system.

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1. INTRODUCTION

An electrical power system is a circuit of electrical components used for electrical power supply, transfer and usage. The system that delivers electricity to an extended area is an

example of an electrical system. In these days the demand for electricity is very high therefore various methods have been adopted to increase the generation. The rapid exhaustion of the fossil fuels and their harmful impacts on the environment has lead to the use of the renewable energy sources. Renewable energy is the energy that is obtained from renewable resources that are produced naturally from sunlight, wind, rain, wind, waves, tides, and geo-thermal heat [1-3]. The rapid exhaustion of the fossil fuels and their harmful impacts on the environment has lead to the use of the renewable energy resources. The renewable energy sources effects the performance of the system causing variations in the frequency responses. Therefore it is required to enhance the frequency response parameters of the system for reliable supply.

Frequency control is required for reducing the oscillations in frequency which is mainly caused due to the mismatch of the load demanded and power generation. Load frequency control is used to provide an area to satisfy its load requirements first, then to support in returning the system's steady state frequency to zero. Previously there are various controllers used to settle down these fluctuations to some extent. In this paper a controller which is a combination of PID and ANFIS which is again the combination of both Neural Network and Fuzzy are been used to settle down the oscillations to enhance functioning of the network. It is also able to achieve better stability with two different renewable systems and load variations. This proposed controller is based on the training data that is it will adapt the changes in the environment and will adjust the inputs depending upon the output. In this paper the performance of the two area (one area connected to Photo Voltaic (PV) generation and the other area connected to wind source) renewable system with the specified controller is compared with the efficiency of the same system along with generally employed PID [4-6].

2. MODELING OF TWO AREA RENEWABLE SYSTEM

The power system is split into multiple areas, every area is generally connected to its adjacent area [7]. To connect these adjacent areas transmission lines which are called as Tie-lines are used. The schematic layout of the interconnected power system is depicted in Figure.1.

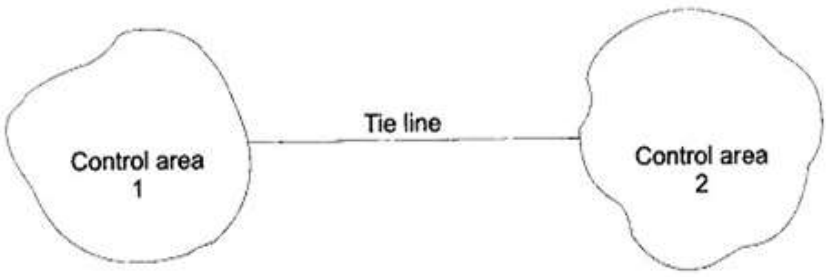

Figure 1 Representing Interconnected system

2.1. PV Generation Transfer Function

Solar power is regarded as most important renewable energy resource with a wide range of possibly numerous benefits. The Photo Voltaic (PV) is used to resemble the source of solar energy according to the reference [8-9]. This PV is a device that produces direct current (electricity) from solar radiations emitted from the sunlight, using semiconductor devices. The network function of the PV is as depicted in the Figure.2.

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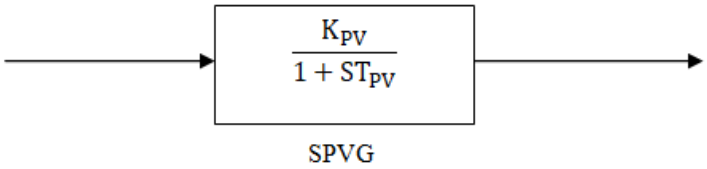

Figure 2 Photo Voltaic Generation Transfer function

2.2. Wind Turbine Generator Transfer Function

These days wind is the largely used renewable energy resource. The wind turbine blades rotate at a fixed or variable speed depending upon the wind that is the velocity of the rotor changes with respect to the velocity of the wind, in order to achieve better efficiency [10]. The electric power output obtained from the generator that is which connected to the shaft of the turbine. The network function for wind turbine and generator is as given in Figure.3.

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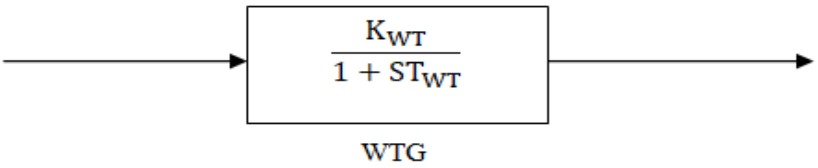


Figure 3 Wind Turbine Generator Transfer function.

The overall system function model for the LFC of interconnected renewable system with PID combined ANFIS is depicted in the Figure.4. Here these two areas consist of PV generation and wind generation which were connected through a transmission line and a step input is given as a disturbance input [11].

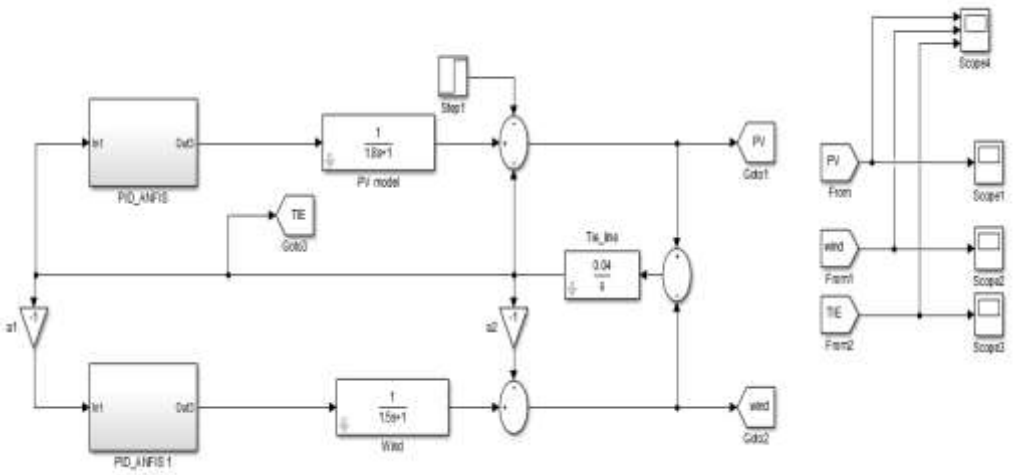


Figure 4 System function model of Two-area Renewable system with presented controller.

3. MODEL AND DESIGN OF PROPOSED CONTROLLER

Here the cascade combination of PID and Adaptive Neuro Fuzzy Inference System (ANFIS) is being utilised for improving LFC for two area renewable systems.

3.1. PID Combined ANFIS Controller

This PID is nothing but a device formed by combining Proportional, Integral and Derivative controller. In this these three controllers were added up to compute the result of the PID. It takes the input from output Δf(S) from feedback. The transfer function of PID in the Laplace form is given below.

$$L(S) = K_p + \frac{K_i}{S} + K_d \quad (1)$$

Where, K_p= value of gain for proportional controller.

K_i= value of gain for integral controller.

K_d= value of gain for derivative controller.

These gain constants are tuning parameters, which are adjusted to obtain the expected output.

The ANFIS is a combination of fuzzy logic controller and the artificial neural network. The fuzzy controller will work well when the membership functions are wisely chosen. Therefore to overcome this situation the adaptive approach of neuro-fuzzy is used. This is multi- layer network which uses both the knowledge gaining power of artificial intelligence and understanding capability representation of fuzzy logic for many modes of memberships [1]. This controller takes the two inputs from the PID controller and results in one output. It uses 'If then' rule base system of Sugeno's type. It uses the rules as following.

$$\text{If } \Delta f \text{ is X1 and } \dot{\Delta f} \text{ is Y1, then } u_1 = p_1\Delta f + q_1\Delta f + r_1 \quad (2)$$

$$\text{If } \Delta f \text{ is X2 and } \dot{\Delta f} \text{ is Y1, then } u_2 = p_2\Delta f + q_2\Delta f + r_2 \quad (3)$$

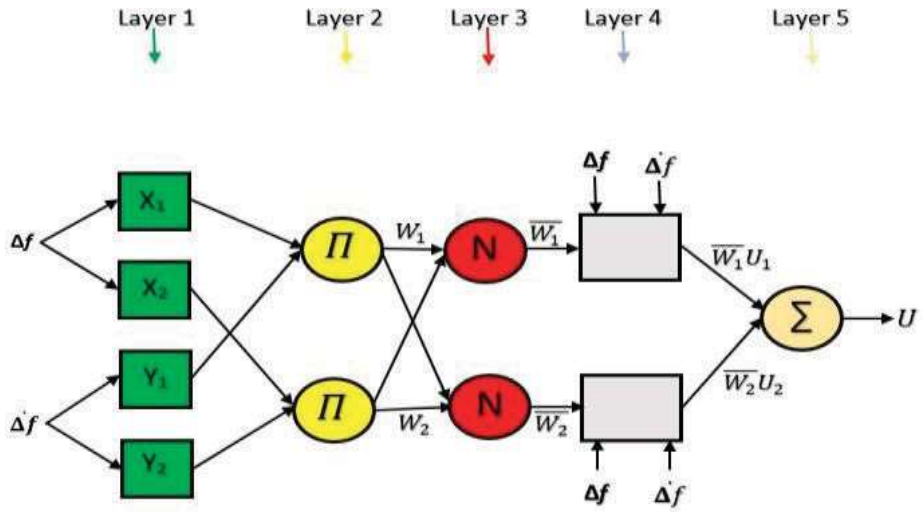


Figure 5 Multi-layer ANFIS controller architecture

Layer 1: The Fuzzification layer where it converts the crisp inputs into the fuzzy inputs that is, it will change the parameter values in reference to the error to produce the required response for each and every function for membership.

Layer 2: This is depicted as π and it is a fixed layer which consists of outputs of first layer which multiplies with one other. The output obtained gives the degree of firing capability.

Layer 3: Here the layer is denoted as N (Normalization layer). The firing strength which is normalized is computed.

Layer 4: Here the layer consists of consequent parameters.

Layer 5: The output for the entire device is obtained here.

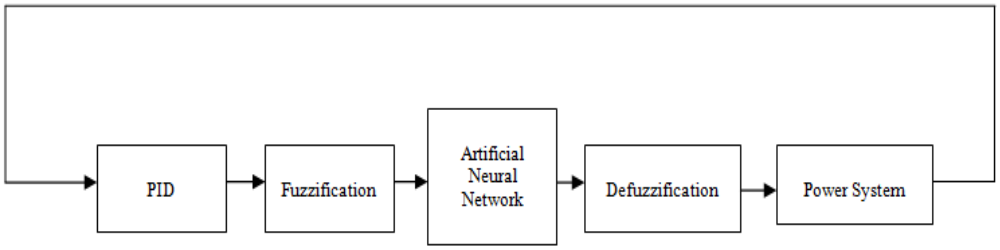


Figure 6 Block diagram of PID combined ANFIS controller.

3.2. Designing of the Proposed Controller

At first the output is given to the PID controller through feedback. The gains of the controller are adjusted and are summed with the fuzzy logic based on Sugeno system. The input-output data obtained had been used for understanding data and Neuro-Fuzzy Designer is used for designing this controller. Detail designing of ANFIS is proposed in the literature [1].

4. RESULTS AND DISCUSSION

For depicting the efficiency of the presented controller, the simulation of presented two area renewable system with the common PID controller device is also carried out separately in the MATLAB Software. The results of the LFC of two area system with presented controller device considering the tie-line are compared with conventional controller simulation results for the same system. Parameters for PID and PID combined ANFIS controller are given in Table.1.

The frequency responses for individual systems respectively are shown in the figures below. The PV output, wind turbine output and tie-line output frequency responses for both the controllers shown in the Figure.7, Figure.8 are compared with each other and the comparison results have shown better performance and stability for proposed PID combined ANFIS controller than that of the conventional PID.

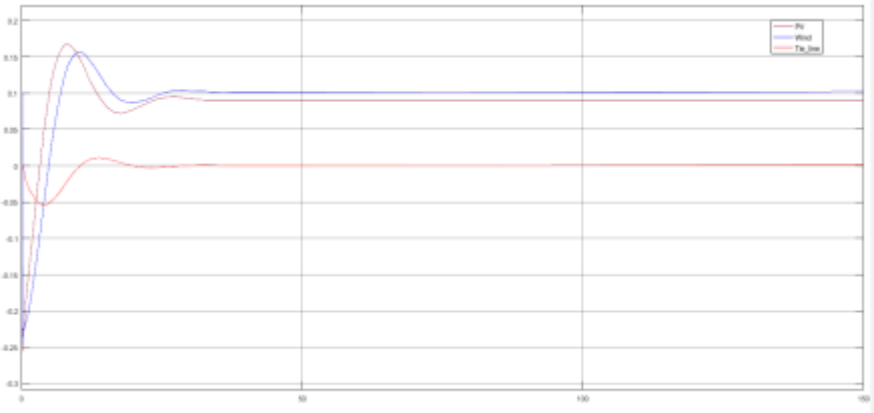


Figure 7 Frequency response for two area renewable system with PID combined ANFIS.

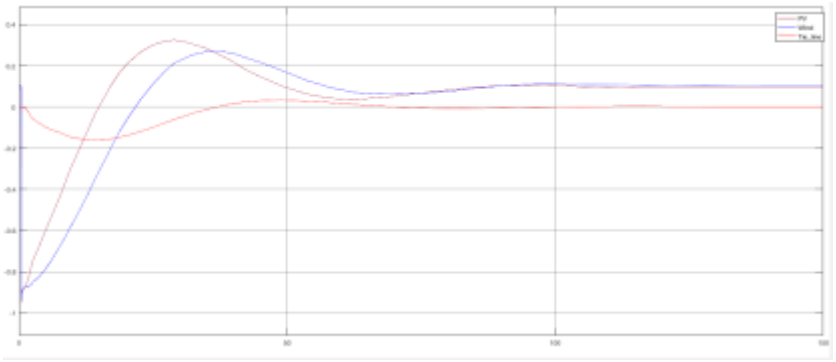
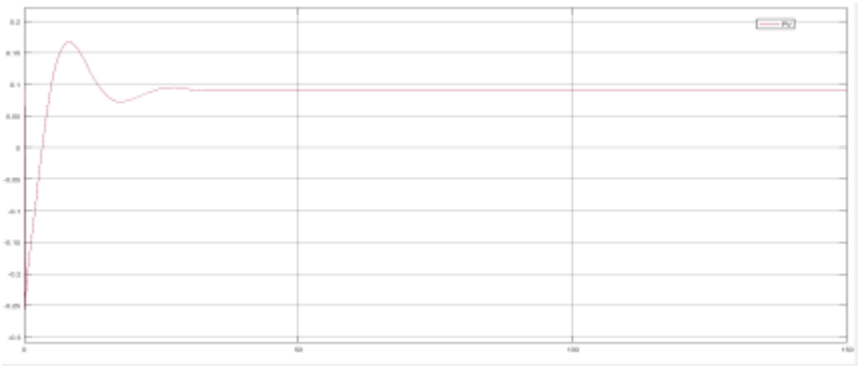
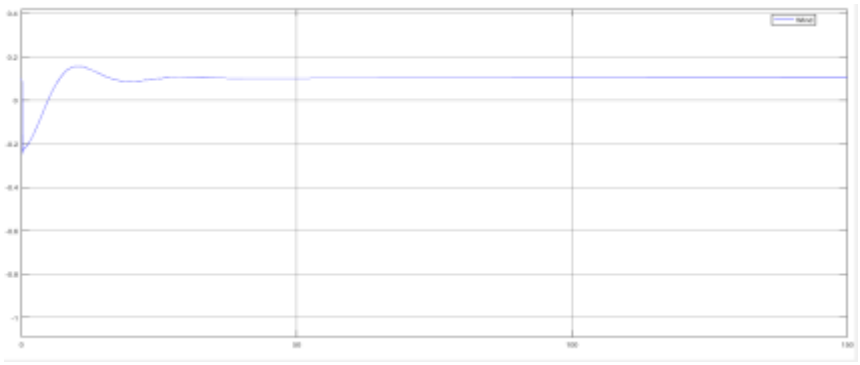


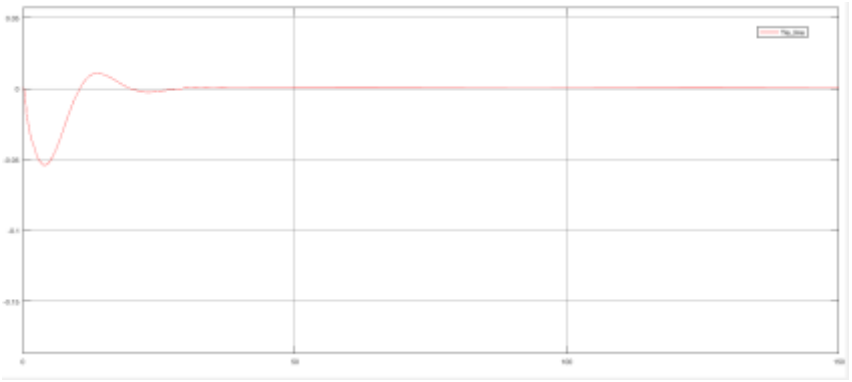
Figure 8 Frequency response for two area renewable system with PID.



(a) PV response

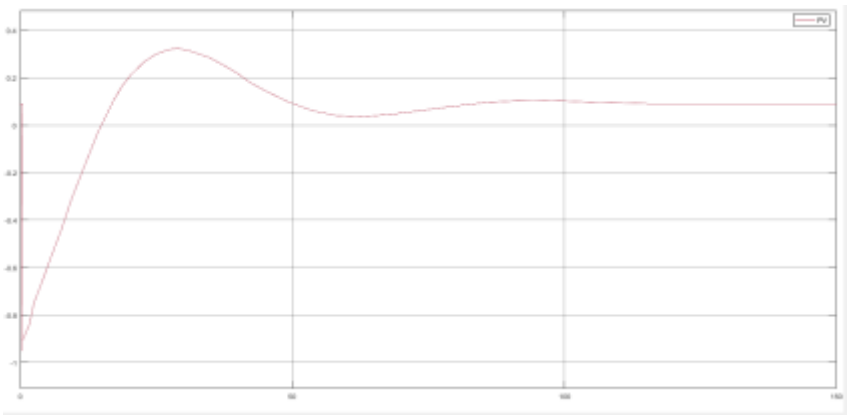


(b)Wind response

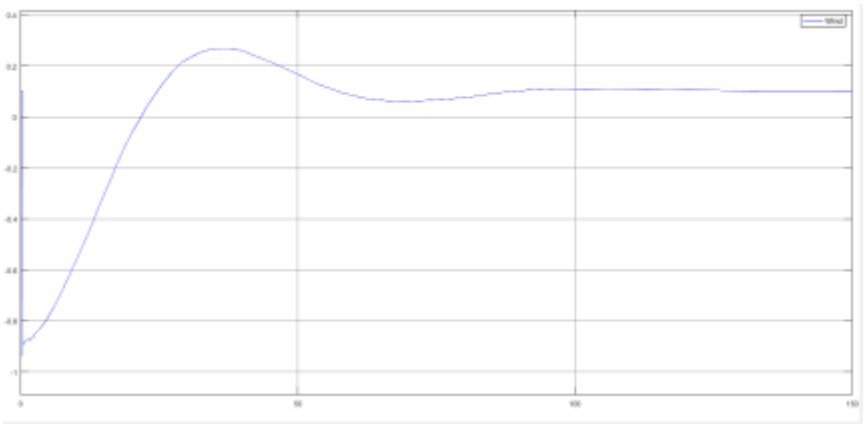


(c) Tie-line response

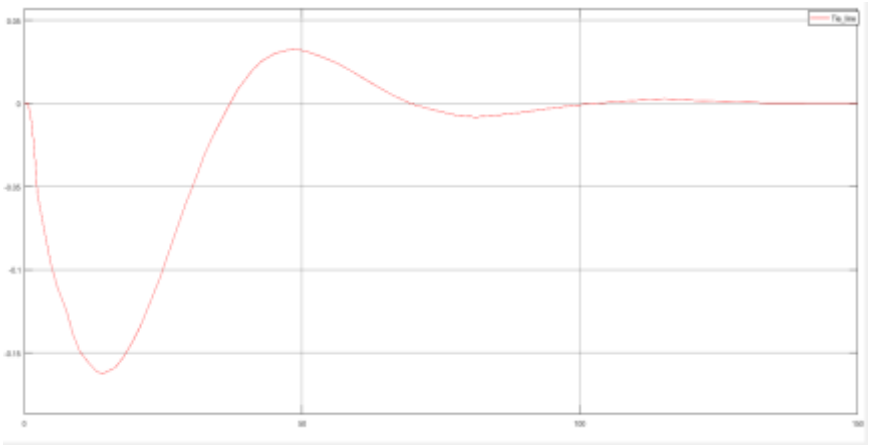
Figure 9 Individual frequency responses with PID combined ANFIS.



(a) PV response



(b)Wind response



(c) Tie-line response

Figure 10 Individual frequency responses with PID.

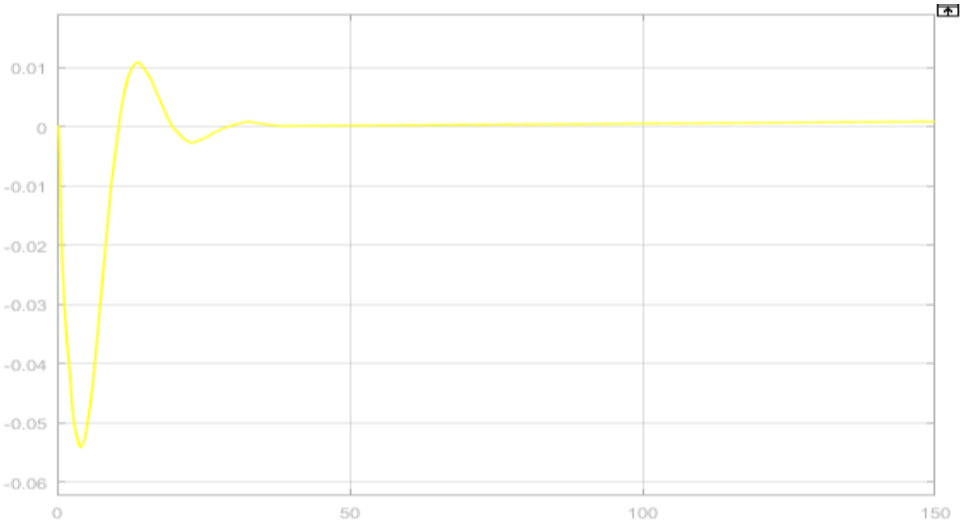


Figure 11 Feedback signal waveform fed to the controller.

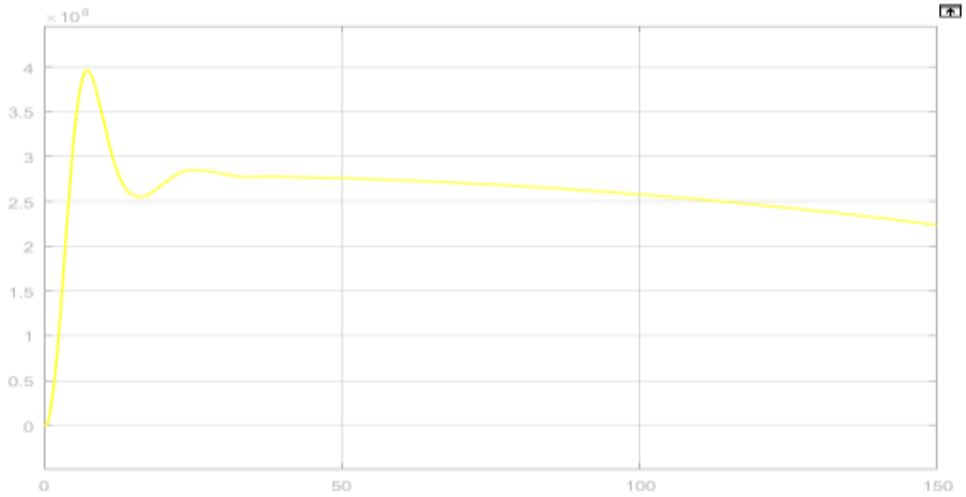


Figure 12 Output response of the signal from controller.

5. CONCLUSION

Here in this, PID which is combined with ANFIS is used for controlling the frequency of the load of specified renewable system. Obtained simulation results are differentiated with PID outputs. The proposed device improves stability and functioning of LFC of renewable system in terms of robustness, settling time, peak time. The efficiency of the explained controller does not depend on any mathematical calculations but mostly depends on the training data. This ability of the controller to adapt the changes and adjust the inputs depending on the training data makes it more effective and thereby, improving the quality of the power being given to meet the load demanded and system reliability.

Table 1 Parameters of the Frequency Response

Parameter	Settling time (sec)		Peak time (sec)		Maximum Peak Over Shoot (%)	
	PID combined ANFIS	PID	PID combined ANFIS	PID	PID combined ANFIS	PID
PV	37.50	112.50	8.300	28.846	1.320	1.661
Wind	37.50	112.50	10.368	36.733	0.402	0.246
Tie-Line	37.50	112.50	13.897	48.856	1.992	1.999

Table 2 Parameters of the two area renewable system

Components	Parameters	Description	Value
PV	K_{SPVG}	Solar photo voltaic generation gain constant	1.8
Wind	K_{WT}	Wind turbine gain constant	1.5
Tie-line	$K_{tie-line}$	Tie-line gain constant	0.04
PID controller	K_p	Proportional gain constant	0.01
	K_i	Integral gain constant	1.52
	K_d	Derivative gain constant	0.53

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A OPTIMAL LOCATION OF D-STATCOM IN A DISTRIBUTION SYSTEM USING VARIOUS TECHNIQUES

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AN INTERNATIONAL BILINGUAL PEER REVIEWED REFEREED RESEARCH

A OPTIMAL LOCATION OF D-STATCOM IN A DISTRIBUTION SYSTEM USING VARIOUS TECHNIQUES

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ABSTRACT

This paper deals with various Techniques used to determine the place of D-STATCOM in a distribution network system at different conditions. Most of the loads in distribution network system are inductive in nature which have lagging power factor which leads to Instability in the voltage, voltage variations, power losses, load variations, poor power factor, security problems which disturbs the overall efficiency and power transfer of the system. Distribution Static Compensator (DSTATCOM) is a D-FACTS device which has been utilized for Reactive power compensation, Minimize the power loss, to improve Voltage profile, Minimize the average voltage total harmonic distortion, Average voltage deviation and Reduction in investment cost. The Optimal Location of D-STATCOM is a challenging task and it plays a crucial role. A suitable place for DSTATCOM is crucially important to ensure sufficient investment for the device in distribution networks that will enhance the Margin for Voltage stability, reduce power loss, reactive power compensation, improve power factor and improve voltage profile. A Lot of Research is going on optimal placement of D-STATCOM in a Radial Distribution network. This review paper gives an idea about the various techniques and it's classification in a distribution network to determine the location of DSTATCOM at different practical conditions.

***Keywords*— DSTATCOM, Optimal placement, Voltage stability, power loss, Distribution system.**

I. INTRODUCTION

Today everyone depending on the electrical energy and it has become part of our lives. Electricity generation, transmission and distribution are very important for electrical power system either it is governed by different bodies, or by a single entity. The underlying motive of the distribution system is to provide adequate energy from transmission to the purchasers. Distribution system has a combination of different types of loads such as lighting loads commercial loads, industrial loads which have high resistance to reactance ratio(R/X).

This makes the power loss to reach a high value and lead to poor voltage regulation and voltage collapse. Reduction of power loss is considered one of the important issues from the point of view for the consumer to lead to best efficiency of the system. Hence, it is necessary to use high accurate equipment with high efficiency for loss reduction and to boost the voltage. There are traditional equipment such as capacitor banks [3], static synchronous series compensator (SSSC), Automatic Voltage Regulator (AVR), series and shunt reactors to improve voltage profile, reduce losses, decrease voltage deviation and improve the efficiency of the system. The shunt capacitors are used for Reactive power compensation in a radial distribution networks. Some disadvantages with shunt condenser are:

- Capability to produce uninterrupted reactive variable power.
- Because of this, utilities have to pay additional costs on capacitor installation.
- It has few operating resonance problems.
- Balancing of load is not possible

To rectify the above mentioned disadvantages, the D-STATCOM Optimal placing is necessary for the best results. Here the paper mainly focusses on optimal placement of only D-STATCOM because of its flexible features such as ability to supply continuous reactive power, power factor control, low power losses, small size, less resistant to resonant problems, automatic operation, good regulation and ability to reduce harmonic distortion. Optimal placement at proper location will lead to improve voltage profile, improve power quality, minimum power loss, improve the reliability and the security of the system.

II. PRINCIPLE AND OPERATION OF D-STATCOM

DSTATCOM is a Distribution Static compensator (or) Distribution static Synchronous compensator. It is a power electronics device which is connected in parallel in a distribution line to compensate reactive power, improve power factor and power quality, minimise losses and improve voltage profile mitigate voltage swell, voltage sag, voltage fluctuations, harmonic distortion. It mainly consists of four components. They are

a. Voltage source converter (VSC)
b. Injection transformer
c. Control unit.
d. Energy storage device.

A. Voltage Source Converter (VSC):

A voltage Source converter is a power electronic device which is connected in parallel to the ystem. It is used to convert DC voltage stored in storage devices to AC output voltages in three phase. It is to inject the missing voltage. It main functions are:

- Voltage generation and reactive power injection.
- Power factor correction.
- Elimination of current harmonics.

B. Injection transformer:

It is a two winding transformer in which one side is connected to high voltage and the other side is low voltage side. The high voltage side is connected to the distribution network in shunt while the low voltage side is connected to the D-STATCOM circuit. The DSTATCOM passes the current into the network through the injection transformer. It also isolates the line from the D-STATCOM.

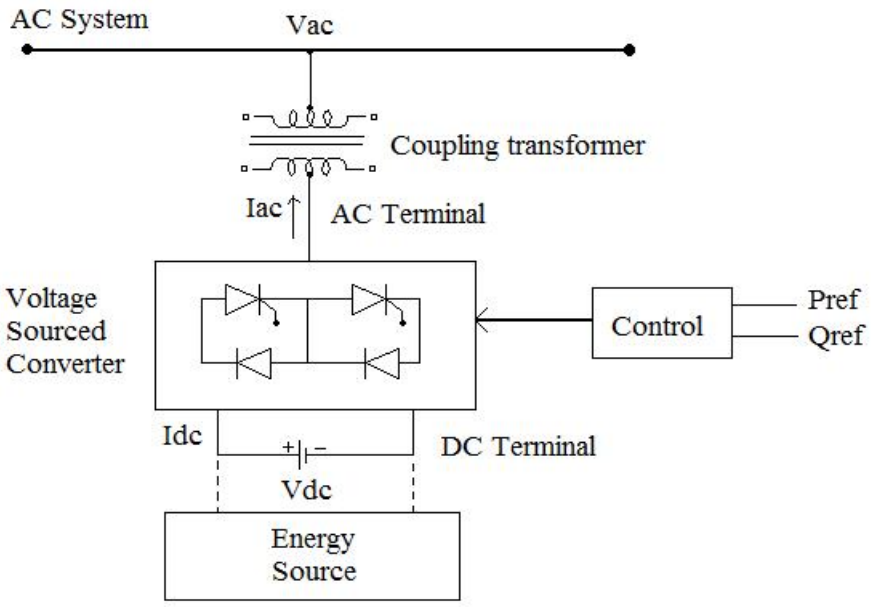

Fig.1: Block diagram of D-STATCOM

C. Control unit:

For proper operation of the D-STATCOM system a controller is used. It is used to operate the inverter in such a way that the phase angle between the line voltage inverter voltage and it is adjusted dynamically such that the D-STATCOM can generates or absorbs the desired VAR at the point of common coupling.

D. DC storage:

The purpose of the energy storage system or dc storage is to provide the VSC with the required energy that will convert the direct quantity into an alternating quantity and fed through the injection transformer to the main distribution line. Batteries are most widely used devices for energy storage, and the battery decides the amplitude of the voltage sag or swell.

III. CLASSIFICATION OF D-STATCOM TECHNIQUES FOR OPTIMAL PLACEMENT

Placing a DSTATCOM in a optimal place is very important to acheive its benefits. The optimum positioning of this device increases the loadability, compensates for reactive energy, improves stability, reduces power loss and improves the quality of electricity. If the device is placed incorrectly it affects the system operation, reliability and security. There are various techniques for optimal placing. They are categorized into three types. They are

1) Modal analysis
2) Analytical Techniques
3) Optimization Techniques

A. Modal analysis:

Modal analysis is nothing but a study of the properties of a system in time-domain simulation. D-STATCOM analysis can be performed to determine the solution for a problem in a distribution network.

B. Analytical Techniques:

Generally these analytical techniques produce an algebraic expression. Here robustification and optimisation could be examined. In these methods the machine is represented with mathematical model with computed numerical answer without delay. These methods gives accurate results and requires less computation time. These kind of techniques are mainly for simplified and limited tools. Analysis of Sensitivity, sensitivity factors, Index approach, Power Stability index, Reactive power Stability index approach are the analytical strategies used [14],[15]. Analytical approaches, however, these are not suitable for large and complex structures, as they work adversely with computational efficiency identification.

C. Optimization Techniques

The optimization system is from the available set of alternatives which locate the fine response. As we know Distribution system is a large network which consists of numerous nodes, it is difficult to manually discover the most suitable place for the placing device that compensate. Several optimization strategies are used in the literature. A variety of approaches some are traditional approaches for optimization, some are intelligent approaches that would be able to build a efficient, reliable, ideal solutions for practical problems and Meta-heuristic techniques are also some strategies. In different areas, those methods are mostly efficient for solving complications. Following are the different optimization techniques[1],[2],[3],[5],[7],[8] such as Flower Pollination Algorithm(FPA), Improved crow search algorithm (ICSA), genetic algorithm (GA), fuzzy logic (FL), JAYA Algorithm, Bat Algorithm(BA), Differential Evolution Algorithm (DEA), particle swarm optimization (PSO), particle swarm optimization based Ant colony optimization method, Effective biologically stimulated Immune Algorithm (IA), Instantaneous Active and reactive modern issue idea (IARCC), Firefly Algorithm, Bacterial Foraging Optimization Algorithm (BFOA) etc.

The authors have proposed various techniques under which DSTATCOM's some techniques placing techniques and sizing are tabulated.

Table 1: Optimization Techniques and advantages

S.NO	Authors	Techniques	Advantages
1	Hosseinian S. H, Jazebi, S., & Vahidi, B. (2011)	Differential evolution algorithm(DEA)	Differential evolution consists of a set of rules in distribution networks which is tested with special abilities. High computational search performance and correct convergence homes.
2	Bhalja, B. R., Zaveri T., & Zaveri, N. (2011)	Instantaneous active and reactive current component (IRACC)theory	These are accurate and powerful for a wide variation in charging and supply situations. It is also effective in lowering the supply VA score balance of supply currents and achieving power problem correction under specific load conditions compared to uncompensated cases.
3	Zaveri, T., Bhalja, B. R., & Zaveri, N. (2012)	Instantaneous active and reactive current component (IARCC) theory	Power factor correction is carried out. Total Harmonic distortion is also reduced
4	Arya, S. R., Singh, B., Chandra, A., & Al-Haddad, K. (2012)	Single phase p-q theory based control algorithm	Suitable for service modes ZVR and PFC with varying loads in time.
5	Masoud Farhoodnea, Azah Mohamed, Hussain Shareef,Hadi ayandehroodi. (2013)	Firefly Algorithm	To improve the system's tension profile and minimize the THDV and total investment costs. Capable of determining the D-STATCOM's most efficient position and optimum size in radial distribution systems.
6	S M Suhail Hussain, M Subbaramiah	Modelling, Load flow technique.	Effective and easy to implement.
7	Jain,A., Gupta, A.R., & Kumar, A. (2014)	Stability Index	Reduction in Active power losses and Better voltage profile.
8	Abhinav Jain ,A.R. Gupta, Ashwani Kumar (2014)	Stability Index	It gives the utilities efficient solution for power loss and tension profile improvement.
9	Yuvaraj, T., Devabalaji, K. R., & Ravi, K. (2015)	Harmony Search Algorithm	It can be extended to n number of buses. It is much better than the current Immune algorithm to find the most efficient answers

10	Tolabi, H. B., Ali, M. H., & Rizwan, M. (2015)	Fuzzy-ACO approach	In comparison with ACO, fuzzy-GA and Fuzzy-PS, simultaneous allocation and multi-target reconfiguration of DSTATCOM and PV is observed to be better.
11	Atma Ram Gupta, Abhinav Jain, Ashwani Kumar 2015 IEEE	For D-STATCOM placement the power loss index method is used. D-STATCOM size is determined through steady state mathematical modelling.	Minimizing the line losses and improving the voltage profile is achieved.
12	Amal Amin, Salah Kamel, Juan Yu, 2018 IEEE Conference	1) The Power Stability Index (PSI) is used to determine DG and DSTATCOM's optimal locations for identifying candidate buses that are more suitable for connecting those devices. 2) Sensitivity Analyzes are used to determine the optimum DG size. 3) The size of DSATCOM is gradually increased by step size until the lowest losses are achieved.	Minimizing the power loss and improving the voltage profile is achieved.

IV. CONCLUSION

DSTATCOM is a power electronics device which is connected in parallel to compensate the reactive power, minimize power loss, improve the voltage profile, minimize the average total voltage harmonic distortion, power factor control, power quality improvement, average voltage deviation, reduction of investment costs etc. A number of techniques is presented here with its advantages. An Improper placement of device always affects the system performance so a suitable location for placing the DSTATCOM is very important and crucial to enhance the voltage stability margin, reactive power compensation, reduce power loss, improve power factor and improve voltage profile in a distribution network at different practical conditions.

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D-STATCOM OPTIMUM POSITION AND SIZING IN A DISTRIBUTION SYSTEM USING VARIOUS APPROACHES

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Abstract

This paper provides a brief idea of the various methods used to evaluate the position and scale of D-STATCOM under different conditions in a distribution network. As we all know, most of the loads in the distribution network system are inductive, causing lagging power factor that causes power losses, voltage instability, voltage variations, load variations, security issue of the system that affects power transfer performance. Distribution Static Compensator (DSTATCOM) is a shunt connected voltage source converter that has been used to compensate for reactive electricity, reduce power loss, boost voltage profile, minimize total harmonic distortion of average voltage, average voltage variance, cost of investment reduction. D-Optimum STATCOM's Placement is a challenging job and it plays a critical role. In order to ensure adequate investment of the system in networks that will increase the voltage stability margin, minimize power loss and boost the voltage profile, the required position of DSTATCOM is of crucial importance. A lot of research is going on to optimize D-location STATCOM's and sizing in a radial distribution network. This analysis provides an idea of how the position of DSTATCOM can be calculated in a distribution network under various realistic conditions.

Keywords: *DSTATCOM, Optimal placement, Voltage stability, power loss, Distribution system.*

1. Introduction

Everyone now depends for a few days on the use of electricity, which has become part of our lives. For electrical power systems, the generation of electrical energy, transmission and distribution are very important. It is governed by either a number of entities or a single entity. Construction, layout, security of various electricity supply schemes with generation and medical records for the benefit of society. The key motive of the distribution system is to provide exceptional electricity to the customers from transmission. A key portion of the electrical power, however. With the aid of recent studies, it is proven that the energy produced is wasted as I2R losses at the distribution stage. In the distribution network, the majority of loads are inductive in nature. Because of this the problem of network power lags in the countryside. Because of this the voltage

profile may be negative, electricity losses may increase and greater problems may be generated within the distribution network.

The Power delivery system takes away the high capacity of transmission circuits for electrical energy. Below this level, so many electrical loads are connected. The distribution system has a very high R/X ratio relative to the transmission system, causing high voltage drops and power losses.

Increased demand for traditional sources for a few days now, so that it can transition to distributed renewable energy sources. We get 13 percent of electrical energy lost in line losses (I2R) in the distribution sectors from the estimated data. Power loss reduction is calculated from the customer side as the most significant problem.It is important to maintain a consistent and reliable enhancement of the profile of operating voltages in the electricity grid. Using compensating equipment, power loss reduction and voltage profile enhancement can be achieved. Such as shunt and collection reactors, capacitor banks, Automatic Voltage Regulator (AVR) and Distribution Network Versatile AC Transmission (DFACTS) have also been developed for this relatively advanced device. Static Synchronous Series Compensator (SSSC) systems are DFACTS systems.The DFACTS devices are Static Synchronous Series Compensator (SSSC), Distribution Static Compensator

Traditionally, shunt capacitors are used within the distribution networks to cope with the compensation of reactive power. But the disadvantages of the shunt condenser are

Inability to produce uninterrupted reactive variable strength.

As a result, utilities have to pay higher costs for the installation of capacitors.

The related resonance has few operational concerns.

In addition, load balancing is not feasible.

In distribution companies, DSTATCOM (DFACTS) is used to overcome the above-mentioned disadvantages and to compensate for the reactive electricity needs. Recently, the financial way and productive way is using energy electronics mainly based distribution versatile AC transmission machine era to increase the electricity greatly.D-FACTS (Distribution Versatile AC Transmission System) devices are implemented to develop the overall gadget output at strategic locations of the sharing structures. Originally, the concept of FACTS devices was created for transmission systems, but similar concepts have begun to extend to delivery systems.

2. Construction of D-STATCOM

The D-STATCOM Constructional Knowledge and Theory is as follows. It is connected to the main distribution line in the shunt for voltage sag and swell compensation. It is composed of the following elements:

a. Voltage source converter (VSC)

b. Injection transformer

c. Control unit.

d. Energy storage device.

3. Principle of operation of D-STATCOM

The It is a voltage source converter (VSC) connected to the distribution system in shunt by a coupling transformer by means of a linked tie reactance to compensate for the load current and maintain a fixed voltage profile. The VSC converts the dc voltage to a range of three-phase AC output voltages in the storage system via the injection transformer reactance, these voltages are coupled with the ac system and they are in phase

with the line voltage.The phase and magnitude adjustment of the D-STATCOM output voltages enables the active and reactive power exchanges between the DSTATCOM and the AC system to be effectively controlled. This form of configuration enables the system to absorb or produce active and reactive power that is controllable. If the load voltage/line voltage is greater than the desired load voltage, reactive current or power is absorbed by D-STATCOM; if on the other hand, the load voltage amplitude is lower than the desired load voltage, reactive current or power is supplied to increase the load voltage.

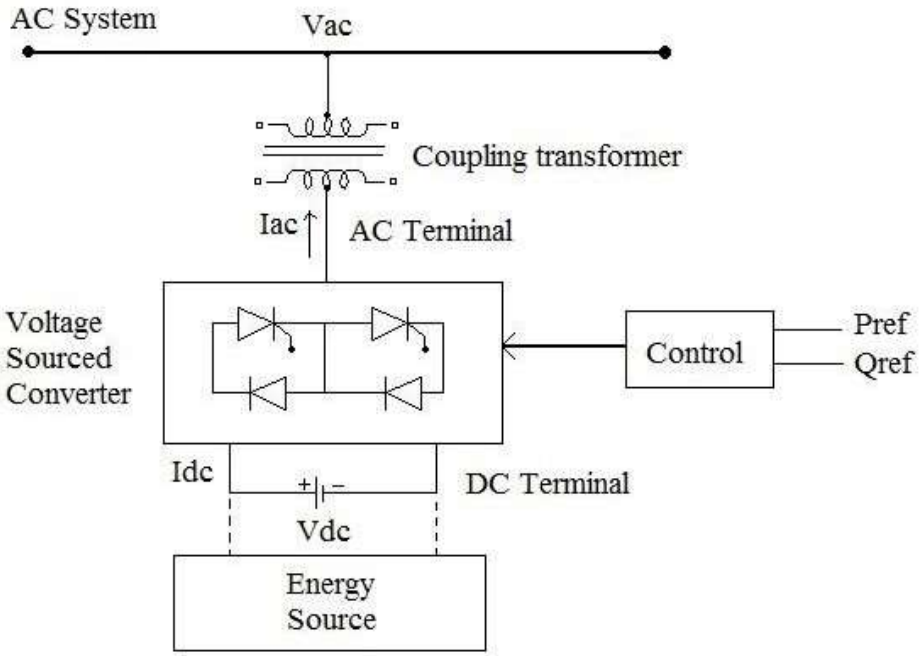

Fig.1: Block diagram of D-STATCOM

Voltage Source Converter (VSC): The VSC attached to the AC system in the shunt converts the storage device's dc voltage. There are three functions it serves:

- Generating voltage and injecting reactive power.
- Power factor correction.
- Removal of current harmonics.

Injection transformer: It is a two-winding transformer with one high-voltage side and one low-voltage side. On one side, while the low voltage side is connected to the D-STATCOM circuit, the high voltage side is connected to the distribution network in shunt. Via the injection converter, the DSTATCOM passes the current into the device. The distribution line is also separated from the D-STATCOM by the injection transformer.

Control unit: For the proper functioning of the D-STATCOM system, a controller is used. The PI controller is used in this paper to research the function of D-STATCOM under the impact of faults and dynamic load.

DC storage: The purpose of the energy storage system or dc storage is to supply the VSC with the required energy to convert the direct quantity into alternating quantities and flow through the injection transformer to the main distribution line. The most widely used

energy storage systems are batteries and the battery decides the amplitude of the sag or swell of the voltage.

4. Optimal Placement of D-STATCOM and sizing

DSTATCOM's proper setting is important for optimizing its benefits. This device's optimum position enhances load ability, compensates for reactive energy, improves reliability, decreases power loss, and improves the efficiency of electricity. It affects the system and function when the unit is incorrectly mounted. The D-STATCOM is classified into three groups of common techniques for placing and sizing. They are

1) Analysis of modals

2) Analytical Techniques

3) Optimization Techniques

4) Metaheuristic methods

5) ANN based Approach

1. Analysis of Modals:

In time-domain simulation, modal analysis is nothing but a study of the properties of a system. D-STATCOM analysis may be conducted to determine a solution to a problem in a distribution network.

2. Analytical Techniques

The analytical methods create an algebraic expression and robustification and optimization can be studied. The computer is depicted in these strategies with the help of a mathematical model and calculates numerical responses without delay. The results obtained by these methods are very precise and also give less processing time. These kinds of techniques are mainly for simple and small devices in which there is less range for the amount of state variables involved. The methodological methods that are applied are the Index approach, the Power Stability Index, the Sensitivity analysis. Analytical techniques, however are not ideal for large and complex systems, as they perform adversely in recognizing computational efficiency.

3. Optimization Techniques

The optimization system is focused on the available set of alternatives to find the correct answer. It's miles hard to find the most suitable size and position of the compensating gadgets manually in common as the dispersal systems have numerous nodes. The literature utilizes various optimization methods. A variety of methods are known as classical techniques for optimization. Intelligent approaches are techniques that might be able to cleverly achieve reliable, efficient, ideal solutions. Meta-heuristic search methods are some of the competing techniques. In different areas, these techniques are most useful for solving complications. The following are numerous methods of optimization such as Genetic Algorithm (GA), Fuzzy Logic (FL), Cuckoo Search Algorithm (CSA), Bat Algorithm (BA), Particle Swarm Optimization (PSO), Differential Evolution Algorithm (DEA), Efficient Immune Algorithm (IA), Instantaneous Lively and Reactive Modern Problem Concept (IARCC), Differential Evolution Algorithm (DEA),The primary management algorithm, Firefly Algorithm, Instant Reactive Power Theory (IRPT) control set of rules, Bacterial Foraging Optimization Algorithm (BFOA) and many others are the single section p-q theory.

4. Metaheuristic methods

The most widely used methodologies for solving D-STATCOM allocation problems are metaheuristics. They are stochastic, population-based optimization algorithms that are generally successful in managing environments that are multimodal, multi-objective, discrete and limited.In[40], the immune algorithm (IA) was used by Taher &Afsari to identify the optimal position and setting of D-STATCOM in distribution networks in order to minimize energy loss, expense, congestion of power and improve the voltage profile. A newly defined objective feature has been added, which includes the cost of installing D-STATCOM and the cost of losing electricity. Compared to GA, in both IEEE 33 and 69-bus delivery systems, IA offers lower objective feature value at light, medium and peak load speeds.IA suffers from a premature convergence problem despite its outperformance over GA, which is a common disadvantage of metaheuristics. In 2014, in order to minimize copper losses and boost the voltage profile, Devi & Geethanjali used particle swarm optimization (PSO) to find the position and scale of distributed generation (DG) and D-STATCOM.The simulations were conducted in five separate test cases on several radial distribution systems. However a comparison of this approach with other methods was not included in this study. PSO is a metaheuristic that instead of the global optimum, is likely to converge into local optimals[7]. Jazebi et al. used the Differential Evolution Algorithm (DE) for reconfiguration and D-STATCOM allocation in 2014 to relieve losses and improve the distribution network voltage profile.The proposed approach was tested on 69 and 83 bus delivery networks where DE outperformed PSO. D-STATCOM allocation has been used in the binary gravitational search algorithm (BGSA) to increase the efficiency of the distribution system. In order to decrease the amount of sags propagated across delivery networks, D-STATCOM placement is performed. Compared with other optimization algorithms, the proposed algorithm has not been validated.In 2015, Kanwar et al. implemented an enhanced cat swarm optimization (CSO) in electric distribution networks for the simultaneous allocation of DGs and DSTATCOM to reduce copper losses and enhance the voltage profile. Cat swarm optimization is a technique of optimization focused on the intelligence of a powerful newly formed swarm that mimics cats' natural behaviour, but generally suffers from low convergence and accuracy.The improved CSO (ICSO) technique is then proposed to effectively solve the problem by changing CSOs' search behaviour. The results of the simulation show the efficiency of the proposed updated CSO with regard to traditional CSOs and PSOs. For optimum allocation of photovoltaic arrays and D-STATCOM, Tolabi et al applied fuzzy-based ant colony optimization (ACO). The goal of this research was to reduce losses, improve voltage profiles and improve the balancing of feeder loads.Fuzzy definitions have been used to deal with different targets. Concerning traditional ACO, fuzzy-based PSO and fuzzy-based GA, the results show the performance of the proposed fuzzy-ACO. The Firefly algorithm is used to assess the optimal location of D-STATCOM to boost power efficiency. The aims of the research are to alleviate harmonics and enhance the profile of voltage. Four D-STATCOM's used in solving the problem of optimum allocation of D-STATCOM.The results showed the firefly algorithm's outperformance over GA and PSO. The harmony search (HS) algorithm, inspired by the music improvisation method, was used in another research work to find the optimum position and size of D-STATCOM with an objective function to reduce copper losses[28]. The approach suggested has been tested for the IEEE 33-bus delivery network.The results of the proposed HS in reducing losses indicate its outperformance over IA. In order to solve the D-STATCOM allocation problem, Chabok and Ashouri suggested a combination of imperialist competition and Nelder-Mead algorithms. Active network power losses and an index of voltage stability were included in the objective feature. For optimal allocation of D- STATCOM's, a hybrid genetic algorithm and ant colony optimization algorithm were designed.The feeding system losses involving power losses in the transmission lines were reduced by this technique. For the IEEE 30-bus system, three D-STATCOMs were used. To reduce overall device losses, the optimal reactive power values produced or absorbed by three D-STATCOM are determined by GA. In smart quest, ACO is used to decide the best point for the network to mount three D-STATCOMs.

5. Artificial Neural Network based methods

For modelling online nonlinear systems with multiple inputs and outputs, Artificial Neural Networks (ANN) are used. In the literature, some applications of ANN-based approaches can be found, such as fault detection, voltage regulation, reactive power control and voltage disturbance detection. These methods are capable of finding the optimum position of D-STATCOM under faults in the distribution network.They are not applicable to optimum D-STATCOM sizing, however. For the optimum allocation of DVR and D-STATCOM in distribution networks, the artificial neural network (ANN) was used to mitigate the voltage sag under faults. Using a feed forward ANN, optimal DVR and D-STATCOM positions have been found. Each bus's pre-fault voltage has been considered as the output target data. For D-STATCOM placement, the bus with the greatest voltage deviation from the target value is the highest.

The authors have suggested different techniques in which DSTATCOM is tabulated for top-rated sizing. Computational time in the methods suggested is extra. Despite this the authors have had pleasant implications for the high-quality sizing and positioning of DSTATCOM for the reduction.

Table 1: Optimization Techniques and advantages

S.NO	Authors	Methodology used	Observations and Advantages
1	Jazebi, S., Hosseinian, S. H., &Vahidi, B. (2011)	Differential evolution algorithm	The differential evolution set of rules in distribution networks has evaluated its special abilities through its high computational search efficiency and right convergence homes.
2	Zaveri, T., Bhalja, B. R., & Zaveri, N. (2011)	Instantaneous active and reactive current component (IRACC)theory	The techniques are effective and strong for a wide range of load and supply circumstances. It is also efficient in reducing the supply VA score balance of supply currents and in achieving power problems.Correction under different load conditions in contrast to an uncompensated scenario.
3	Zaveri, T., Bhalja, B. R., & Zaveri, N. (2012)	Instantaneous active and reactive current component (IARCC) theory	For linear load, correction of power elements is performed. This results in a reduction of the reactive energy supplied from the source. For non-linear load, electricity source component solidarity is achieved.
4	Arya, S. R., Singh, B., Chandra, A., & Al-Haddad, K. (2012)	Single phase p-q theory based control algorithm	Suitable in time varying loads for ZVR and PFC modes of operation.
5	Masoud Farhoodnea, Azah Mohamed, Hussain Shareef,Hadiayandehroodi. (2013)	Firefly Algorithm	To boost the system's voltage profile and to minimize the THDV and the overall cost of investment. In radial distribution

			systems, the most efficient position and optimum size of the D-STATCOM can be calculated..
6	S M Suhail Hussain, M Subbaramiah	Modelling, Load flow technique.	Effective and easy to implement.
7	Jain,A., Gupta, A.R., & Kumar, A. (2014)	Stability Index	Reduction in Active power losses and Better voltage profile.
8	Abhinav Jain ,A.R. Gupta, Ashwani Kumar (2014)	Stability Index	It provides efficient solutions for the improvement of power loss and voltage profile with benefit for the utilities.
9	Yuvaraj, T., Devabalaji, K. R., & Ravi, K. (2015)	Harmony Search Algorithm	For n number of buses it may be applied. For finding most efficient answers it is very accurate Better than the present Immune algorithm
10	Tolabi, H. B., Ali, M. H., & Rizwan, M. (2015)	Fuzzy-ACO approach	In contrast to ACO, fuzzy-GA and Fuzzy-PS, simultaneous allocation and multi-goal reconfiguration of DSTATCOM and PV with fuzzy ACO approach is observed to be better
11	Amal Amin, Salah Kamel, Juan Yu,	Power stability index and Sensitivity analysis	1) To determine the optimal position for DG and DSTATCOM, the Power Stability Index method is used and Sensitivity Analysis is used to determine the distance. 2) Minimization of power loss is achieved and the voltage profile is improved. 3) Radial systems are limited.
12	Atma Ram Gupta, Ashwani Kumar	(a) Optimal D-STATCOM placement based on the new reactive power stability index (b) Determination of bestDSTATCOM size with probabilistic ZIP load model	1) This study enables the engineer with D-STATCOM to prepare the distribution system. 2) Improved profile of voltage and reduction in losses.
13	Majid Moazzami,HosseinShahinzadeh, Gevork B. Gharehpetian, Seyed Hossein Hosseinian	Modified Shuffled Frog Leaping Algorithm(MSFLA) is applied to minimize the objective function to achieve the optimal place and size of these instruments in distribution system.	Stability of voltage and reduction of losses in the delivery networks. Improve the voltage profile and reduce the line current in distribution systems to decrease energy and power losses.

CONCLUSION

DSTATCOM is a shunt connected voltage source converter used to compensate for reactive power, reduce power loss, boost the voltage profile, minimize total harmonic distortion of the average voltage, average voltage deviation, investment cost reduction etc. A suitable position and size to place the DSTATCOM at a suitable size is very necessary to ensure that the system is sufficiently invested in networks that increase the voltage stability margin, minimize power losses and improve the voltage profile of the distribution network.

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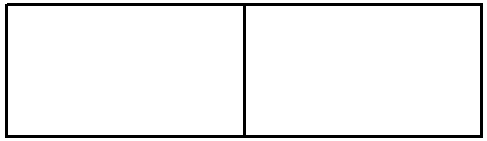
3.4.4 Number of books and chapters in edited volumes/books published per teacher during the last five years (5)

3.4.4.1: Total number of books and chapters in edited volumes / books published, and papers in national/international conference-proceedings year wise during last five years

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Year of publication	ISBN/ISSN number of the proceeding	Whether at the time of publication Affiliating Institution Was same Yes/NO	Name of the publisher
1	V. Suma Deepthi	Ch-08: Energy Management	--	--	2019	DOI:10.4018/978-1-5225-8551-0.ch008	Malla Reddy Engineering College (Autonomous)	IGI Global Publishers
2	Dr. T. Rajesh, Dr. A. V. Sudhakara Reddy, Ms. Y. Sudha Reddy	Fundamentals of Electrical Engineering	--	--	2019	978-93-83640-48-5	Malla Reddy Engineering College (Autonomous)	Spectrum University Press
3	N. Rajeswaran	Text Book on Microprocessor and Microcontrollers	--	--	2020	978-93-90420-90-2	Malla Reddy Engineering College (Autonomous)	AkiNik Publications
4	N. Rajeswaran	Advanced Microcontroller and Its Applications	--	--	2020	978-93-90322-77-0	Malla Reddy Engineering College (Autonomous)	AkiNik Publications
5	N. Rajeswaran	Ch-4: An Overview of Internet of Things	--	--	2020	978-93-90420-69-8	Malla Reddy Engineering College (Autonomous)	AkiNik Publications
6	Y. Sudha	Smart City	--	--	2020	978-81-947809-0-8	Malla Reddy Engineering College (Autonomous)	Integrated Publications
7	A.V. Sudhakara Reddy	Ch-4: Analysis of Electric Vehicle Charging Problems	--	--	2020	978-93-90541-47-8	Malla Reddy Engineering College (Autonomous)	AkiNik Publications
8	N. Rajeswaran	Ch-3: Electric Vehicle and Its Types	--	--	2020	978-93-90322-75-6	Malla Reddy Engineering College (Autonomous)	AkiNik Publications
9	N. Rajeswaran	Ch-4: Analysis of Fault Diagnosis of Electrical Machines	--	--	2020	978-93-90322-75-6	Malla Reddy Engineering College (Autonomous)	AkiNik Publications

10	D. Raja Reddy	Ch-7: Performance and Analysis of DC Grid Based Wind Power Generation with Micro-Grid	--	--	2020	978-93-90322-75-6	Malla Reddy Engineering College (Autonomous)	AkiNik Publications
11	N. Rajeswaran	Ch-3: Boilers and It's Their Types	--	--	2020	978-81-947471-9-2	Malla Reddy Engineering College (Autonomous)	Integrated Publications
12	N. Rajeswaran	Ch-4: Characteristics and Applications of Embedded System	--	--	2020	978-81-947471-9-2	Malla Reddy Engineering College (Autonomous)	Integrated Publications
13	N. Rajeswaran	Ch-5: Cyber physical system and its characteristics	--	--	2020	978-93-90420-69-8	Malla Reddy Engineering College (Autonomous)	AkiNik Publications
14	Dr. T.Rajesh	Plant protection using cold frame	--	--	2020	978-93-90471-08-9	Malla Reddy Engineering College (Autonomous)	Integrated Publications
15	Dr. T. Rajesh, Dr. A. V. Sudhakara Reddy, Ms. Y. Sudha Reddy	Fundamentals of Electrical Engineering			**2019**	978-93-83640-48-5	Yes	Spectrum University Press
16	Dr.D.Raja Reddy	--	Design of transformerless UPFC based on Multilevel Inverter	International Conference on Recent Advancements in Chemical, Energy and Environmental Engineering (RACEEE-2020)	2019	--	Malla Reddy Engineering College (Autonomous)	SSN College of Engineering, Chennai, Tamilnadu
17	Mrs.V.Suma Deepthi	--	Optimal Location of D-STATCOM in a Distribution System using Various Techniques	International Conference on Recent Advances in Mechanical, Civil and Electrical Engineering	2019	--	Malla Reddy Engineering College (Autonomous)	St. Martins Engineering College, Secunderabad, Telangana

18	A. V. Sudhakara Reddy	--	Feeder Protection From Over Load Situationsthrough IoT	Two Day National e-Conference on Electrical, Electronics and Computing Systems in Engineering (EECSE-2020)	2020	--	Malla Reddy Engineering College (Autonomous)	Vasireddy Venkatadri Institute of Technology (VVIT), Guntur, Andhra Pradesh India
19	Mr.Ch.Narendra Kumar	--	Modeling of Smart Electric Vehicle Charging Hub	Two Day National e-Conference on Electrical, Electronics and Computing Systems in Engineering (EECSE-2020)	2020	--	Malla Reddy Engineering College (Autonomous)	Vasireddy Venkatadri Institute of Technology (VVIT), Guntur, Andhra Pradesh India



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1	Dr. D. Raja Reddy, Dr. G. S. K. Gayatri Devi, Mr. V. Srinivas	Electronic Devices and Circuits	--	--	2018	978-93-83470-11-2	Malla Reddy Engineering College (Autonomous)	Spectrum Techno Press
2	Maheswari. M	Ch-18: Operation and control of Micro-grid	--	--	2018	DOI: 10.4018/978-1-5225-8030-0.ch018	Malla Reddy Engineering College (Autonomous)	IGI Global Publishers
3	V. Suma Deepthi	Handbook of Research on Smart Power System Operation and Control Ch-19: Operation of Micro-grid and control strategies	--	--	2019	DOI: 10.4018/978-1-5225-8030-0.ch019	Malla Reddy Engineering College (Autonomous)	IGI Global Publishers
4	Maheswari. M	Ch-7: Types of Faults and condition Monitoring Methods of Induction Motors	--	--	2019	DOI: 10.4018/978-1-5225-6989-3.ch007	Malla Reddy Engineering College (Autonomous)	IGI Global Publishers
5	Mrs.V.SUMA DEEPTHI	--	PENALTY QUOTED COST APPROACH FOR LOSS ALLOCATION IN A TRANSMISSION LINE BY CONSIDERING THE MUTUAL INDUCTANCE	INTERNATIONAL CONFERENCE ON EMERGING TRENDS ON ENGINEERING SCIENCE, TECHNOLOGY AND MANAGEMENT	2018	--	--	AITAM ,TEKKALI, SRIKAKULAM DT.

6	Mrs.K.ANITHA REDDY	--	HARMONIC EMISSION OG GRID CONNECTED BACK TO BACK ARRANGEMENT OF RECTIFIERS IN DISTRIBUTION NETWORKS	INTERNATIONAL CONFERENCE ON EMERGING TRENDS ON ENGINEERING SCIENCE	2018	--	--	AITAM ,TEKKALI, SRIKAKULAM DT.
7	Mrs.K.ANITHA REDDY	--	CONTROL STRATEGY FOR IMPROVEMENT OF PQ IN DC SYSTEMS INCORPORATING PR CONTROLLER	INTERNATIONAL CONFERENCE ON EMERGING TRENDS ON ENGINEERING SCIENCE	2018	--	--	AITAM ,TEKKALI, SRIKAKULAM DT.
8	MS.K.CHESTAWI	--	CONTROL STRATEGY FOR IMPROVEMENT OF PQ IN DC SYSTEMS INCORPORATING PR CONTROLLER	INTERNATIONAL CONFERENCE ON EMERGING TRENDS ON ENGINEERING SCIENCE	2018	--	--	AITAM ,TEKKALI, SRIKAKULAM DT.
9	MS.K.CHESTAWI	--	HARMONIC EMISSION OG GRID CONNECTED BACK TO BACK ARRANGEMENT OF RECTIFIERS IN DISTRIBUTION NETWORKS	INTERNATIONAL CONFERENCE ON EMERGING TRENDS ON ENGINEERING SCIENCE	2018	--	--	AITAM ,TEKKALI, SRIKAKULAM DT.
10	MR.P.GANESH	--	MODELLING AND DESIGN OF M3C-BASED UPQC FOR POWER QUALITY IMPROVEMENT IN VOLTAGE POWER GRID	NATIONAL CONFERENCE ON EMERGING TRENDS IN ELECTRICAL ENGINEERING	2018	--	--	ANURAG GROUP OF INSTITUTIONS

11	Dr. D. Raja Reddy, Dr. G. S. K. Gayatri Devi, Mr. V. Srinivas	Electronic Devices and Circuits			2018	978-93-83470-11-2	Yes	Spectrum Techno Press

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1	Dr. N. Rajeswaran, Mr. Ch. Narendra Kumar, Ms. C. Shilpa	Basic Electrical and Electronics Engineering	--	--	2017	978-81-943685-3-3	Yes	Amaravathi Publications
2	Mrs.K.Anitha Reddy	--	Design Analysis of Resonant Feedback Compensators	International Conference On Electrical Sciences	2017	--	Yes	SNS College Of Technology, Tamil Nadu
3	Mrs.S.Sunanda	--	Bi-Directional Converter For Single-Phase Micro Grid Application	National Conference On Science, Technology & Environment: Prospects And Limitations In The 21st Century	2017	--	Yes	Bineswar Brahma Engineering College , Assam
4	Dr. M.Lakshmiswarupa	--	Optimal Power Flow By A Primal Dual Interior Point Method	International Conference On Power Electronics Drives And Energy Systems	2018	978-93-85100-90-1	Yes	Malla Reddy Engineering College (Autonomous)
5	Mrs.K.Anitha Reddy	--	Distribution Systems Reliability Analysis With Clamped, Lying Capacitor H-Bridge Inverter	International Conference On Power Electronics Drives And Energy Systems	2018	978-93-85100-90-1	Yes	Malla Reddy Engineering College (Autonomous)
6	Mr.K.S.S.Naga Teja	--	Wavelet Based Signal Processing Technique For Classification of Power Quality Disturbances	International Conference On Power Electronics Drives And Energy Systems	2018	978-93-85100-90-1	Yes	Malla Reddy Engineering College (Autonomous)
7	Mr.T.Sanjeeva Rao	--	Harmonic Compensation in Electrical Systems by Active Power Filters	International Conference On Power Electronics Drives And Energy Systems	2018	978-93-85100-90-1	Yes	Malla Reddy Engineering College (Autonomous)

8	Mrs.Y.Sudha	--	Power System Stabilizer And TCSC Controller By Using Back Stepping Algorithm	International Conference On Power Electronics Drives And Energy Systems	2018	978-93-85100-90-1	Yes	Malla Reddy Engineering College (Autonomous)
9	Dr.S.Arumugam	--	Design and Analysis of Multi Modal Controller	International Conference On Power Electronics Drives And Energy Systems	2018	978-93-85100-90-1	Yes	Malla Reddy Engineering College (Autonomous)
10	Mr. P.Kamalakar	--	Digital Simulation of Interline Power Flow Controller System with PI and NN Controller	International Conference On Power Electronics Drives And Energy Systems	2018	978-93-85100-90-1	Yes	Malla Reddy Engineering College (Autonomous)
11	Dr. N. Rajeswaran, Mr. Ch. Narendra Kumar, Ms. C. Shilpa	Basic Electrical and Electronics Engineering			**2017**	978-81-943685-3-3	Yes	Amaravathi Publications

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1	Dr. N.Rajeswaran	--	Hybrid Artificial Intelligence Based Fault Diagnosis Of SVPWM Voltage Source Inverters For Induction Motor	International Conference of Processing of materials, minerals and energy	2016	2214-7853	Malla Reddy Engineering College	Ongole, Andhra Pradesh, India
2	Dr.S. Arumugam	--	Nine Level Diode Clamped Asymmetric Dual Converter Based STATCOM with DC Link Voltage Control	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC (A)	Malla Reddy Engineering College (Autonomous)
3	Dr.S. Arumugam	--	A New PWM Strategy for Three Phase Inverters Applied for Induction Motor	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
4	Mr.P.Ganesh	--	Modeling of New Multilevel Inverter Topology With reduced Number of Power Electronic Components	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
5	S.Bharati Reddy	--	Simulation Modeling And Control of Hybrid AC/DC micro grid	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
6	Mr .T. Suman	--	A PI And Fuzzy Controlled Two-Phase Interleaved PFC Boost Converter	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)

7	D. Ramesh	--	Boost Inverter Circuit With A Coupled Inductor Using Renewable Energy Source	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
8	M.Harinath Reddy	--	Soft Switching Bidirectional DC-DC Converter For Hybrid Electric Vehicle Applications	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
9	Jeepalem Muni Chandra Sekhar	--	Multilevel STATCOM Based Cascaded Two Level Inverters For High-Power Applications	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
10	Dr. M. Lakshmi Swarupa	--	A New Bidirectional Dc-Dc Converter For Electric Vehicles Applications	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
11	DR M.Lakshmi Swarupa	--	A New Control Strategy For Three-Phase Inverter Applied To Induction Motor of Micro Grid	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
12	J.Srineswari	--	Harmonic Mitigation In Ship Power Systems Using Passive Harmonic Filters	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
13	Mrs.K.Anitha Reddy	--	Effects of Harmonics on Electrical Equipment & Their Compensation By Using Shunt Active Power Filter	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
14	Ch.Venkateswarlu	--	Modeling of Fuel Cell Connected Distribution Generation System	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)

15	K. Chetaswi	--	A New Integrated Topology With Less Switches For Dual Mode Electric Vehicle Applications	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
16	A. Madhu Mohan Reddy	--	Coupled-Inductor And Voltage-Doubler Circuits With High Step-Up DC-DC Converter	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
17	T.Venkatesh	--	Power Factor Correction And Comparison Of Converter Topologies For SRM Drive	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	Malla Reddy Engineering College (Autonomous)	Malla Reddy Engineering College (Autonomous)
18	Mr.V.Ganesh Kumar	--	Super Conducting Fault Current Limiting For Energy Storage Protection In Micro Grid	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
19	K. Naresh	--	A New Multilevel Inverter Based Wind Generation System With Power Factor Correction	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
20	K. Neelima Praveena	--	A Novel Control Strategy Of Three-Phase, Four wire UPQC With Reduced Switching Losses	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
21	T.Upendar	--	Multi Input and Multi Output PWM DC-DC Converter	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	Malla Reddy Engineering College (Autonomous)	Malla Reddy Engineering College (Autonomous)
22	Ch. Narendra Kumar	--	Design of UPQC With Minimization Of Dc Link Voltage For The Improvement of Power Quality By PI Controller	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)

23	Mrs.V.Suma Deepthi	--	Green Computing With Thin Client	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
24	Dr. N. Rajeswaran	--	Speed Control of The Induction Motor Using Artificial Intelligence	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
25	Mrs.K.Anitha Reddy	--	Half Bridge Converter Based Simplified Conditioner for High Speed Rail Way Systems	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
26	Mrs. S. Sunanda	--	Integrating Fuzzy Logic And Expert System for Optimization of Smart Grid Functioning	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
27	T.Sanjeeva Rao	--	Power Quality Improvement Using Cascaded Multilevel STATCOM With DC Voltage Control	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
28	P.Kamalakar	--	The Double Loaded Resonant Converter For The Application of DC to DC Energy Conversions	National Conference on Recent Innovations in Electrical Engineering	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)
29	K.Ramesh	--	Hysteresis Current Control of Shunt Active Power Filter In Distribution Power System	National Conference on Recent Innovations in Electrical Engineering College	2016	ISBN: 9789383038497	MREC(A)	Malla Reddy Engineering College (Autonomous)

3.4.4 Number of books and chapters in edited volumes/books published per teacher during the last five years (5)

3.4.4.1: Total number of books and chapters in edited volumes / books published, and papers in national/international conference-proceedings year wise during last five years

Sl. No.	Name of the teacher	Title of the book/ chapters published	Title of the paper	Title of the proceedings of the conference	Year of publication	ISBN/ISSN number of the proceeding	Whether at the time of publication Affiliating Institution Was same Yes/NO	Name of the publisher
1	K. Ramesh	--	Analysis, Design and Implementation of A Bi-Directional Double Boost DC-DC Converter With Coupled inductor Technique	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
2	P. Ganesh	--	Dual Mode Mechanism With Input Voltage Feed Forward for the Two-Switch Buck-Boost DC-DC Converter	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
3	V. Sumadeepthi	--	Comparison of PI and RST Controllers in Double-Fed Induction Generator For Wind Energy Conversion Systems	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)

4	K. Anitha Reddy	--	Adsptive Fuzzy Logic Controller For permanent Magnet Synchronous Motor With non Linear Friction	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
5	S. Bharathi	--	Synchronous Static Series Compensator (SSSC) on Enhancement of Voltage Stability and Power Oscillation Damping for Unbalanced System	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
6	K. Chetaswi	--	Lyapunov Design Based MIT Rule for Model Reference Adaaptive Control Systems	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
7	K. Chetaswi	--	Optimal Design Technique Based on Linear Quadratic Gaussian Theory	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
8	M. Lakshmi swarupa	--	Optimal Location of FACTS devices Considering Cost of Installation and System Loadability by Using Particle Swarm Optimization technique	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)

9	M. Lakshmi swarupa	--	Fuzzy Logic Based Maximum Torque Control For a Single Phase Induction Motor	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
10	T. Sanjeeva Rao	--	Fuzzy Logic Controller Based BLDC Motor Drive With Source Side Power Factor Correction	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
11	T. Sanjeeva Rao	--	Simulation of Standalone Inverter for Distribution System With Fuzzy Control	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)
12	K. Anand Kumar	--	Fuzzy Logic Control of Reduced Rating DVR with A Battery Energy Storage System	International Conference on Emerging Trends in Science, Technology & Management (ICETSTEM 2015)	2015	--	Yes	Malla Reddy Engineering College (Autonomous)

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Department of Mechanical Engineering

Details List of Publication for A.Y. 2019-20

S.No.	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Is it listed in UGC Care list/Scopus/Web of Science/other, mention	Academic Year
1	Friction and wear behaviour of NiCr/Sic based composites	Katla Rajendra	Mechanical Engineering	Journal of engineering ,computing and architecture	2020	1934-7197	Scopus	2019-20
2	Exploration of indispensable properties of textile-grade glass fibres/white caustic treated banana fibre hybrid composite	Dr.A.Raveendra	Mechanical Engineering	Elsevier(Materials Today)	2020	2214-7853	Scopus	2019-20
3	Numerical study of the heat dissipation of rectangular heat sink under natural convection with different slots	M.Vijay Kumar	Mechanical Engineering	International Journal of Mechanical and Production Engineering Research and Development	2020	2249-6890	Scopus	2019-20

4	Design and Analysis of Petrol Engine Crown Coated with Alsic and Brass	S.Rammohan Reddy	Mechanical Engineering	The International journal of analytical and experimental modal analysis	2020	0886-9367	UGC	2019-20
5	A study report on Fabrication of Hitech-Highway	Nuvvula Harini	Mechanical Engineering	International journal of Innovative research in science, engineering and technology(IJIRSET)	2020	2319-8753	UGC	2019-20
6	A Lithophane Model Making Process to 3D Printers	SiddavatamRammohan Reddy	Mechanical Engineering	International Journal of Mechanical Engineering and Technology (IJMET)	2020	0976-6340	UGC	2019-20
7	Comparison of Shear Rigidity of Epoxy and Vinyl Ester Reinforced Hybrid Honeycomb Core	A.Paul Praveen	Mechanical Engineering	Material Today: Proceesings	2020	2214-7853	Scopus	2019-20
8	Design and Analysis of 4 Cylinder Piston and Connecting Rod Assembly	P.Santhipriya	Mechanical Engineering	IJAST	2020	2005-4238	UGC	2019-20
9	Smart Applications using Robotic and Iot Technologies in Fighting against Pandemic Covid19 in Medical and Societal Sectors	C.Chandrasekhara	Mechanical Engineering	International Journal of Innovative Technology and Exploring Engineering (IJITEE)	2020	2278-3075	Scopus	2019-20

10	Resultant surface roughness of 5% and 10% A17075SiC MMC by using Friction Stir Welding	D.S.Ch. Mouli	Mechanical Engineering	Journal of Xi'an of Architecture & Technology	2020	1006-7930	Scopus	2019-20
11	Synthesize and wet condition based characterizations of GRP / Lye treated sisal fiber hybrid composite	T.Naresh Kumar	Mechanical Engineering	Material Today: Proceesings	2020	2214-7853	Scopus	2019-20
12	An Experimental Investigation of mechanical properties of Teak wood rust and tamarind kernel powder reinforced plymer composite	S.C.Sireesha	Mechanical Engineering	International journal of innovative research in science Engineering & Technology	2020	2319-8753	UGC	2019-20
13	Investigation of the Deep Drawability of Aluminium Sheets by Finite Element Numerical Simulation	Mrs.A. Aruna Jyothi	Mechanical Engineering	IJIRSET	2020	2319-8753	UGC	2019-20
14	'Mechanical Behavior& Analysis of Epoxy, Al2O3 Composites'	K. Bharadwaja	Mechanical Engineering	International Journal of Engineering and Advanced Technology	2020	2249-8958	Scopus	2019-20
15	Dry Sliding Wear Behaviour of Aluminium 7075/SiC/MoS2 Composites at Room Temperature	Dr. Dhatreyi Boyina	Mechanical Engineering	Journal of Engineering, Computing and Archiyecture	2020	1934-7197	UGC	2019-20
16	Influence of variable speed on performance and emission Characteristics of diesel engine using fish oil biodiesel blends	M.vijay Kumar	Mechanical Engineering	International Journal of Recent Technology and Engineering	2020	2277-3878	Scopus	2019-20

17	Optimisation Of Scram Jet Strut Injection	Vasili Srinivas	Mechanical Engineering	Journal of Engineering, Computing and Architecture	2019	1934-7197	UGC	2019-20
18	Thermal Investigation of Hybrid Nano based Phase Change Materials to Cater Cooling Needs for Energy Systems	Yogesh Madaria	Mechanical Engineering	Journal of Engineering, Computing and Architecture	2019	1934-7197	UGC	2019-20
19	Mechanical and Material Properties of Areca/Epoxy Composite	T. Naresh Kumar	Mechanical Engineering	International Journal of Innovative Technology and Exploring Engineering (IJITEE)	2019	2278-3075	Scopus	2019-20
20	Experimental Investigation for Performance Enhancement of Household Refrigerator using Phase Change Material	Yogesh Madaria	Mechanical Engineering	Journal of Engineering, Computing and Architecture	2019	1934-7197	Scopus	2019-20
21	Optimization of Process Parameters on EDM of Titanium alloy	BhikshaGugulothu	Mechanical Engineering	Material Today: Proceesings	2019	2214-7853	Scopus, WOS	2019-20
22	Influence of drinking water and graphite powder concentration on electrical discharge machining of Ti-6Al-4V alloy	BhikshaGugulothu	Mechanical Engineering	Material Today: Proceesings	2019	2214-7853	Scopus, WOS	2019-20
23	Reinforcing Adhesive Plastic-Coated Grins through FRP Compounds	T. Naresh Kumar	Mechanical Engineering	International Journal of Engineering and Advanced Technology	2019	2249-8958	Scopus	2019-20

24	Observation of different experimental parameters effect using friction stir welding through simulation of tailor welded blanks	Aruna Jyothi Anumula	Mechanical Engineering	International Journal of Recent Technology and Engineering	2019	2277-3878	Scopus	2019-20
25	Assessment of dynamic properties of hybrid ribbon reinforced multifunctional composite sandwich plates: Numerical and experimental investigation	A.Paul Praveen	Mechanical Engineering	Thin Walled Structures: Elsevier	2019	-	WOS	2019-20
26	Tensile, Flexural and Surface Hardness Properties of Wool Grit/Silicone Polymer Composites	T. Naresh Kumar	Mechanical Engineering	International Journal of Innovative Technology and Exploring Engineering (IJITEE)	2019	2278-3075	Scopus	2019-20
27	Experimental Research on Abaca/Agave/ Fly ash Nano Powder Reinforced Hybrid Composites	T. Naresh Kumar	Mechanical Engineering	International Journal of Innovative Technology and Exploring Engineering	2019	2278-3075	Scopus	2019-20
28	Experimental Research of Silane Treatment on Bamboo and Aramid Hybrid Composites	T. Naresh Kumar	Mechanical Engineering	International Journal of Engineering and Advanced Technology	2019	2249-8958	Scopus	2019-20
29	Effect of Chemical Treatment on Alpaca Fleece Reinforced Polymer Composites	T. Naresh Kumar	Mechanical Engineering	International Journal of Engineering and Advanced Technology	2019	2249-8958	Scopus	2019-20

30	Experimental Research on Natural Fiber Reinforced Polymer Composite Material Composites	T. Naresh Kumar	Mechanical Engineering	International Journal of Innovative Technology and Exploring Engineering (IJITEE)	2019	2278-3075	Scopus	2019-20
31	Effect of Chemical Treatment on Ramie / Rattan /Silicone Polymer Composites	T. Naresh Kumar	Mechanical Engineering	International Journal of Engineering and Advanced Technology (IJEAT)	2019	2249-8958	Scopus	2019-20
32	Machining Characteristics of Natural Fiber Particle Reinforced Polymer Composite Material using Artificial Neural Network	T. Naresh Kumar	Mechanical Engineering	International Journal of Innovative Technology and Exploring Engineering	2019	2278-3075	Scopus	2019-20
33	Characterization of Roselle & Kevlar hybrid Composites	A. Raveendra	Mechanical Engineering	International Journal of Engineering and Advanced Technology	2019	2249-8958	Scopus	2019-20
34	Experimental Research of Wire Cut EDM for SR & MRR using Taguchi Method	A. Raveendra	Mechanical Engineering	International Journal of Engineering and Advanced Technology	2019	2249-8958	Scopus	2019-20
35	Studies on friction stir welding of Aluminium plates 2014-T6 and 6061-T6	D.S. Chandra Mouli	Mechanical Engineering	Proteus Journal	2020	0889-6348	Scopus	2019-20

36	Manufacturing of Foot step power generation by using rack and pinion motion with suspension spring	Mr. S. Udaya Bhaskar, A. Paul Praveen	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
37	Pneumatic based bike gear changing	Mr. S. Udaya Bhaskar, Mr. N Rishi Kanth, Mr. Yogesh Madaria	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
38	Rack and pinion motion-based Head light tilting system	Dr.Zaheer Ahamed T, A. Paul Praveen, N. Rishi Kanth	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
39	Railway track based power generation with rack and pinion mechanism	Dr.Zaheer Ahamed T, , Mr. S. Udaya Bhaskar, A. Paul Praveen, N. Rishi Kanth, Mr. Yogesh Madaria	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
40	SOLAR Grass cutting machine	Mr. N Rishi Kanth, Ms.N.Harini	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
41	Solar Powered refrigeration system	Ms.N.Harini, A Vijaya Krishna	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20

42	STUDY OF ABRASIVE JET MACHINE	A Vijaya Krishna, Mr. Balaji Krushna.P, Mrs. S.C. Sireesha	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
43	Thermo electric refrigerater	D.S.CH.Mouli, Sri Deepthi Immaneni	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
44	VENDING MACHINE	S. Udaya Bhaskar, Mr. Sandeep Mulabagal	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
45	WIND ENERGY VEHICLE	S. Udaya Bhaskar, Ms. S.C.Sireesha	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
46	WIND MILL BASED WATER PUMPER	Mr. P.Praveen Babu, Ms. S.C.Sireesha	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20
47	WIND WATER PUMPING	Mr. N Rishi Kanth, Mr. S. Udaya Bhaskar, Yogesh Madaria	Mechanical Engineering	The International journal of analytical and experimental modal analysi	2019	0886-9367	UGC	2019-20

48	FABRICATION OF RICE PLANTING MACHINE OPERATED MANUALLY	Mr. P.Praveen Babu, Ms. S.C.Sireesha	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
49	FABRICATION OF SOLAR CAR	S. Udaya Bhaskar, Ms. S.C.Sireesha	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
50	FABRICATION OF SOLAR SEED SPRAYER	S. Udaya Bhaskar, Mr. Sandeep Mulabagal	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
51	FUEL THEFT PREVENTION IN MOTORCYCLES USING SOLENOID VALVE	D.S.CH.Mouli, Sri Deepthi Immaneni	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
52	IMPLEMENTATION OF ARTIFICIAL EYE FOR INTELLIGENT LINE FOLLOWING	Mr. Balaji Krushna.P, A Vijaya Krishna	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
53	KINETIC ENERGY RECOVERY SYSTEM IN BICYCLE	Ms.N.Harini, A Vijaya Krishna	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20

54	Motorized Grass cutting machine	Mr. N Rishi Kanth, Ms.N.Harini,	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
55	MULTI-PURPOSE MACHINE	Mr. N Rishi Kanth, B Indrakanth	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
56	PNEUMATIC AUTO FEED DRILLING MACHINE	Mr. N Rishi Kanth, Mr. S. Udaya Bhaskar	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
57	Quick Lifting Jack with Gear Arrangement	Mr. N Rishi Kanth, Mr. S. Udaya Bhaskar	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
58	RF Based farmer friendly Agricultural Robot with motorized shovel control System with automatic seed dispensing system	A. Paul Praveen, Dr.Zaheer Ahamed T	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20

59	SEEDING MACHINE	Mr. N Rishi Kanth, Mr. S. Udaya Bhaskar	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20
60	SHOCK ABSORBER	A. Paul Praveen, Mr. S. Udaya Bhaskar	Mechanical Engineering	Journal of Interdisciplinary Cycle Research	2019	0022-1945	UGC	2019-20

Friction and Wear behaviour of NiCr/ SiC based composites

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Abstract: *Ni based Metal matrix composites (MMCs) have attained growing importance in industries and advanced technologies, for tribological applications because of their potential uses in the automobile, aerospace especially for applications to sliding parts.In this project 95 % of Nickel chromium (NiCr) based composite containing 5 % Silicon carbide(SiC) is reinforced in different percentages prepared by powder metallurgy method. In powder metallurgy we used ball milling method for proper mixing of combined powders followed by compaction and sintering. These samples are compacted at 3 different pressures for each sample 60 KN,70 KN,80KN respectively. The samples after compaction are sintered using different times 60min,90min,120min for constant temperature 1000^0c.The prepared samples were examined for micro structural and mechanical properties like hardness and compressive strengths which are important properties for materials.For tribological studies the friction and wear behavior is examined by using pin on disk tribological set up. This showed that tribological properties got improved by increasing the loads and sintering time of NiCr and SiC composites at the temperature of 1000 ^{0}c. The best comprehensive properties of tribology are being obtained when the sample prepared by load of 80KN and sintering time of 120 min which exhibited wear rate(1.1 x $10^{-5}$$mm^3$/Nm) and lowest friction coefficient (0.56).*

Keywords: **Metal matrix composites ,Wear rate ,Friction Coefficient**

1.INTRODUCTION

In the recent trend ,the Nickel based reinforced composites had been the best for the industrial applications namely aerospace, marine and automobile and many more.Various techniques had implemented to improve the microstructure and to obtain desired mechanical properties.The overall aim of the reinforced composites is to be the better performed engineering materials.The reinforced composites which in progress improves the quality of the material and also progress the better international market share.The market demand for high performance ,stiffness and strength of the materials is increasing rapidly with the optimized cost and weight of the materials. The function of the composites is to enhance work ability and to improve the physical and mechanical properties .It possess hight strength ,good ductility and high strength to weight ratio, low thermal expansion coefficient .The composite possess excellent wear resistance ,better fatigue strength and high temperature creep resistance.The composites will be either in the form of metal,ceramic ,plastic and the reinforcement will be in the form of fibre or particles.[1-4].

The reinforcement can be used in the form of metals,carbides and oxides. At present many reasearches are done to improve the metal matrix composties(MMC).Many methods for developing the metal matrix composites are done namely Metal injection moldings ,friction stir process, Liquid fabrication method, solid state fabrication method,mechanical alloying. The metal matix can be reinforced by numerous reinforcements with variety of types like graphite, SiC, Al2O3, TiO, MgO, SiO2, B4C, TiC, WC, h-BN and C in the form of particulates, whiskery structures or fibrous matter.[5-6]

Nickel alloy has wider applications in aerospace ,marine and turbine engines for their excellent tribological and mechanical properties at elevated temperatures.The nickel alloy has its higher density and creep resistance limit for their future applications. However ther nickel based composites can reduce density and meanwhile improve mechanical properties and high temperature of nickel matrix which makes to have the wider applications int market for pumps, valves, marine and aerospace industries and the overcome the problems of the nickel based composites and become cost effective.[7]

R.Tiwari also investigasted that the effect of chromium addition also increased the yield strength and the hardness of the Ni-Al alloys[8]. From the recent trend, SiC has been used as new reinforcing material and is successful in improving the tensile properties. SiC posses good electrical conductivity, thermal , chemical stability,high mechanical strength and low friction properties.It is observed that the addition of SiC can strengthen a metal matrix and improves many more mechanical properties. The grain structure of the MMCs also could be improved by adding SiC[9-10]. The author investigated that the combinations of Ni(1-3.5%)-SiC at different weights and loads found as the ideal combination for the strength and plastic properties[12].The combinations are mainly done by sintering techniques which improved hardness and decreased the density of the composite.It has found that the wear rate of the combinations decrease with the increase in the temperatures[6].The microstructure has become finer with the combinations of Ni-SiC than before. The tensile strength and the hardness got increased by these combinations(13-15).Xinmin investigates pin on disc tribological studies for good and accurate results for wear rate and friction coefficients for standard steel gear materials.[16].

In this research ,several NiCr-SiC composite samples were prepared by Ball milling method and with UTM(Ultra sonic testing machine).Then followed by different loads and sintering temperatures to eludicate the changes in the microstructure and mechanical properties.One major goal of this research is to investigate the strenghteing capabilities if SiC for NiCr metal for improving the the strength and hardness.To investigate the best wear rate and friction coefficients of the samples on Pin on disc machine.To obtain redefined grain structures .

2 .1 Material and Methods

2.1.1 Preparation of Ni- Based composites

The composition of 95% Ni-Cr and 5% of SiC is taken for the preparation of sample. These powders were mixed by Ball milling method.The powders taken according to their respective weights were blended using a blender for uniform distribution of particles i.e 475 grams of Ni-Cr and 25 grams of SiC was blended in a blender. The specimen was made using a die made of EN32 with diameter 12mm. For making of each specimen, 8 gm of blended powder mixture was taken. The powder was weighted using an electronic balance with least count of 1gm. The powders were handelled very carefully to avoid

oxidation and reaction with atmospheric gases. Acetone was used for cleaning of die and zinc stearate was used for lubrication purpose of die. The powder was compacted in the die using 'UNIVERSAL TESTING MACHINE'with maximum capacity of 4000tons ,by applying appropriate loads. During the compaction process,the punch speed was carefully controlled since high force will produce a very less density of specimen so the life of the specimen is less .An ejector was also used for removal of specimen from the die..About 9 samples were prepared by 3 different loads each of 60KN,70KN,80KN by the mixture of NiCr and SiC composites. After compaction Green compacts were rolled in nylon tape to prevent oxidation.



Fig 2.1 Green compacts

Flowchart representing process methodology:

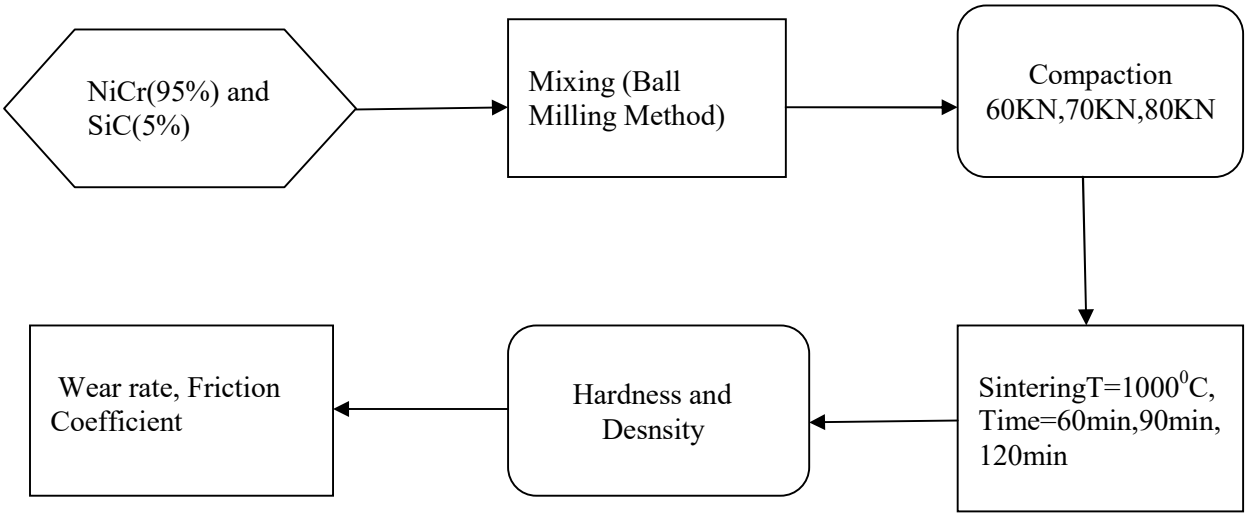

Fig 2.2 Experimental process methodology

2.1.2 SEM Analysis

In the below SEM analysis we can see that Ni-Cr powder mixture consists of 8.57% of oxygen ,2.57%of silicon and 75.69%of Ni. Very low percentage of impurities where found in the powder. similarly in the SEM analysis of SiC it was observed that no impurities were present in the powder. There was no oxygen content in the powder. As a result oxidization of Si and C to SiO2 and CaCO3 could be prevented.

Thus during the making of specimen, the properties of Si and C could be retained in the composite material and prevent any reaction taking place between the powders because of oxidization.(17)

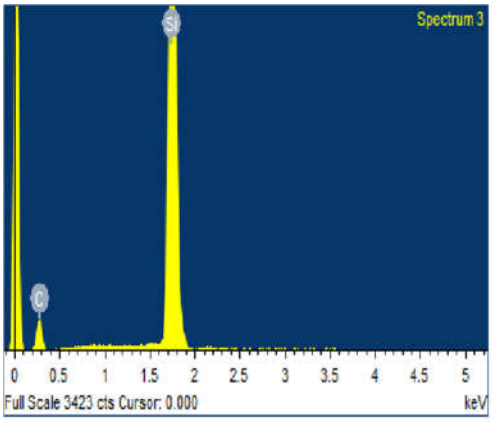

Fig 2.3 SEM micrograph of Sic powder mixture

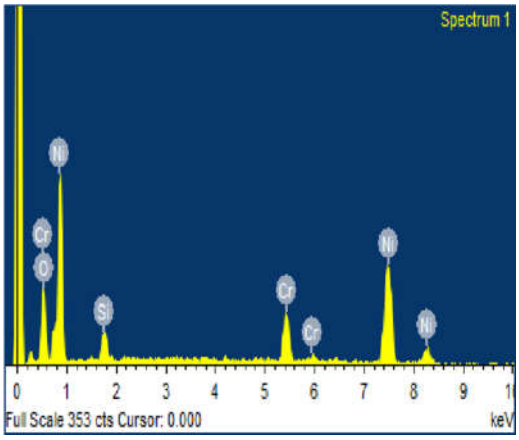

Fig 2.4 SEM micrograph of Nicr powder mixture

2.1.3 Sintering

The prepared green compact samples did not have enough strength, to improve the strength of the green sample go for sintering process. The compacted green samples where sintered in tubular furnace in presence of vacuum..In Sintering process green compacts which was prepared by Compaction was heated at a temperature of 1000°C employed. The specimen were soaked for a time of 60min,90min and 120minrespectively. A pressure of -0.95 bar is created in the tubular furnace to prevent oxidation of specimens.After completion of sintering process samples were cooled in the furnace itself to the room temperature, then the samples taken out from the furnace and the mechanical tests for characterization.A chiller was used for circulation of cold water through vacuum O rings.

2.1.4 Wear rate measurement

Wear rate of the 9 specimens were conducted on Pin on disc setup of Magnum model-TE-165.The specimens were cleaned with acetone before wear tests. A 20 N load is applied at the back holder of the machine and the sample is adjusted at the pin. The wear and tear of the machine is set to zero and the set time of 15 min of machine set for experiment. The disc rotates at the speed of 1000rpm. The disc starts to rotate when the start button is pressed until the time which is already set for the machine.After rotated for the required time on the pin on disc machine the sample gets wear and it is removed from the pin and tested for further purposes. The tests are repeated 3 times and the average value is taken.The same processes is carried out for the same 9 samples respectively.

Table 2.1 Different loads used for compaction and sintering temperature and soaking time at constant temperature of 1000 ^{0}c is given below.

Samples	Load (KN)	Sintering time (min)
1	60	60
2	60	90
3	60	120
4	70	60
5	70	90
6	70	120
7	80	60
8	80	90
9	80	120

Table 2.2 Tribological test parameters used in this experiment

Tribological parameters	Experimental conditions
Applied load (N)	20
Rotational speed(rpm)	1000
Sliding speed(m/s)	10
Specimen diameter (mm)	8
Pin diameter (mm)	8
Pin length (mm)	30
Temp(^{0}C)	25±2
Humidity(%)	67±2

3 Results and Discussions

3.1 Microstructure and Mechanical properties of Ni-Based composites

Metallographic studies of the composite specimen Ni-Cr/SiC produced and specimen made up of Ni – Cr after sintering was carried out .From the above microstructures of the specimen we can observe that SiC was uniformly distributed in Ni-Cr/SiC composite material because of ball milling used for mixing of the powders. Uniform distribution of the elements results in the specimen exhibiting better properties than that of specimen produced by non-uniform distribution of the elements.

Microstructure obtained of the composites are relatively dense. It is observed two different phases in the microstructures Gray phase ,deep gray phase. Gray phase is rich in NiCr and the deep gray phase is rich in SiC composites. The incorporation of SiC composite on to the NiCr resulted in decrease in the density(13). This shows that with the increasing compaction pressure and increasing sintering time as considered from table 2.1 ,the microstructures of the resulting samples became very dense and the poristy

became less.The microstructure became more denser because the bonding between the molecules become stronger and it is seen in the microstuructures as the compaction pressure and sintering time increases.

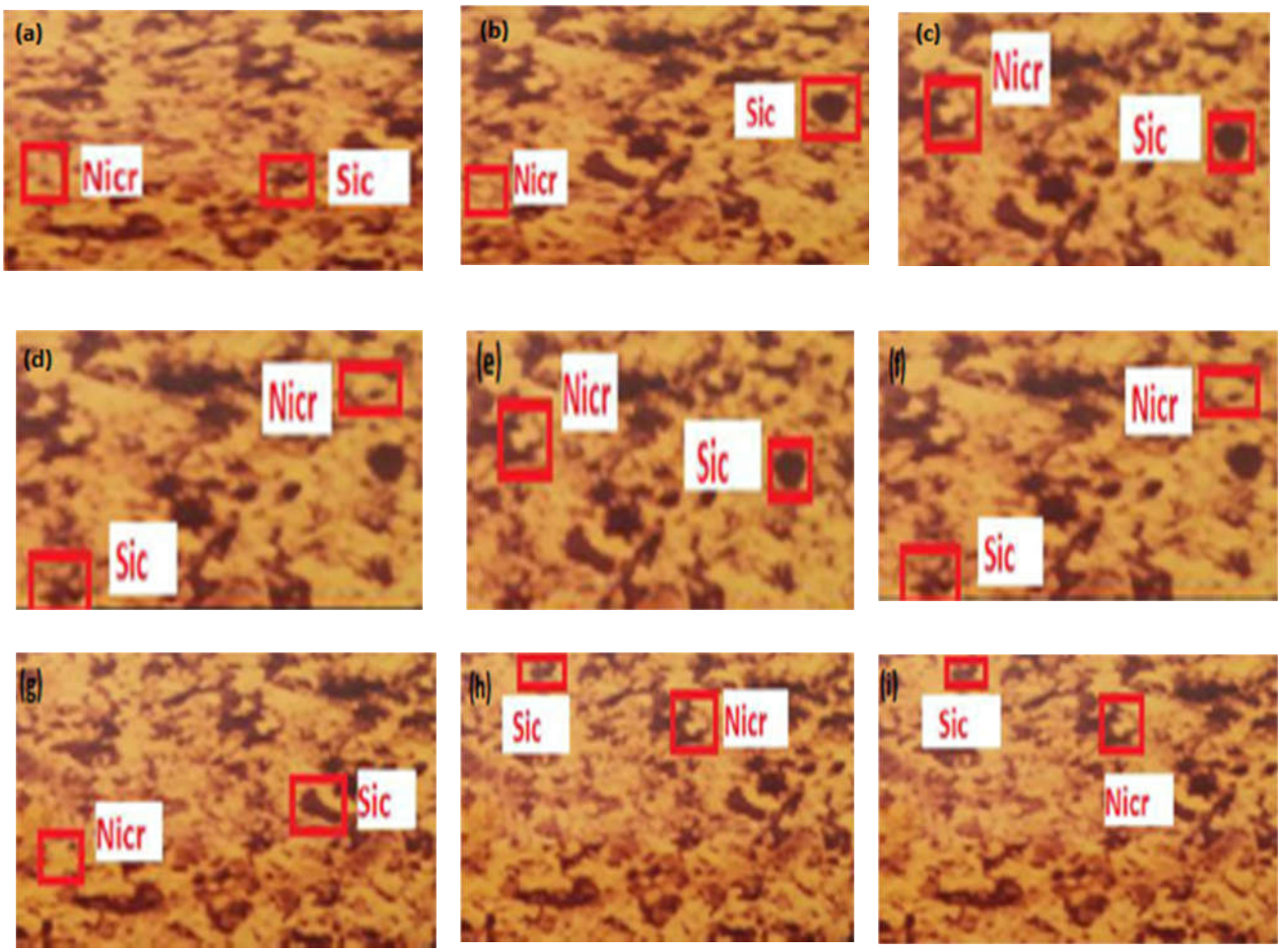

Fig 3.1 Microstructures of specimens tested after sintering (a) Microstructure of 60KN load and 60min sintering time ; (b) Microstructure of 60KN load and 90 min sintering time ; (c) Microstructure of 60KN load and 120 min sintering time; (d) Microstructure of 70KN load and 60 min sintering time ; (e) Microstructure of 70 KN load and 90 min sintering time ; (f) Microstructure of 70 KN load and 120 minisintering time; (g) Microstructure of 80KN load and 60 min sintering time; (h) Microstructure of 80KN load and 90 min sintering time ;(i) Microstructure of 80KN load and 120 min sintering time.

3.2 Measurement of hardness and density

Hardness is considered as the key factors of the wear tests. Greater the hardness the lesser will be the wear rate of the material. There are different methods to find the hardness but finally they give the same results .Ductility of the specimen is found by measurement of the hardness hardness . Brinell scale is used for the measurement of the hardness.This tests uses 10mm(0.39in) dia steel bar as indentor with 3000kgf force.For harder material tungsten carbide ball is used instead of steel bar as an indentor. The test method used is ASTM E 10-2018 .The ball diameter used is 2.5mm and the load used is 15.625 kg.The Brinell hardness teast method is used to determine the hardness of the specimens.The specimens were polished using grades of emery sheet before hardness testing

process.The hardness were measured at three different points and average of the hardness was taken. Densities of the specimens are measure using the Archimedes method.

Table 3.1 Results of hardness and densities

Samples	Hardness	Desnities (g/cm^3)
1	30.3	5.521
2	31.3	4.4991
3	32.7	4.957
4	31.2	5.225
5	32.5	5.125
6	33.7	5.071
7	32.7	5.202
8	33.4	5.019
9	34.5	4.852

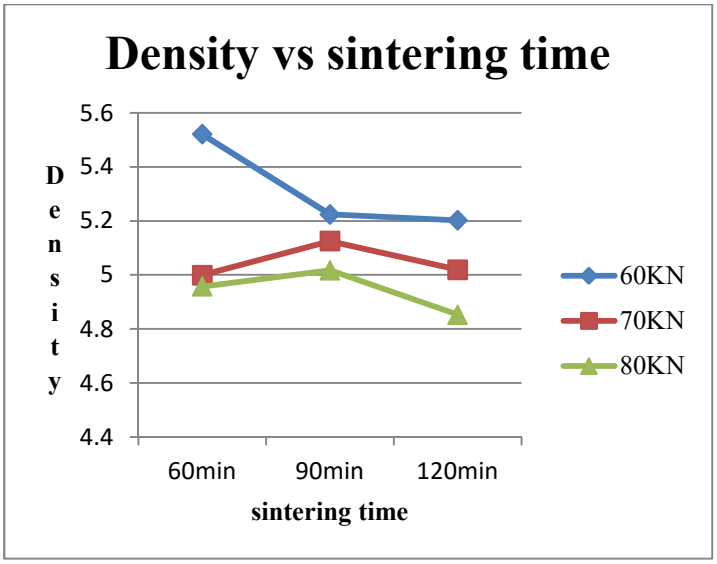

Fig 3.2 Density vs sintering time results of the specimens with the compaction loads of 60KN,70KN,80KN

The fig 3.2 shows that the density variation with the sintering time, it can be clearly seen that as the sintering time increases, the density is getting decreased, this is because as the sintering time of the material increases the porosity of the material will become lesser therefore the density will be decreased. The density variation for 60KN load decreased from 5.521 to 5.202 (g/cm^3). Similarly for 70KN load , the density got decreased from 4.4991 to 5.019(g/cm^3). Similarly for 80KN load ,density got decreased from 4.957 to 4.852(g/cm^3)..This shows that as the sintering time and compaction pressure increases the density will be reduced.

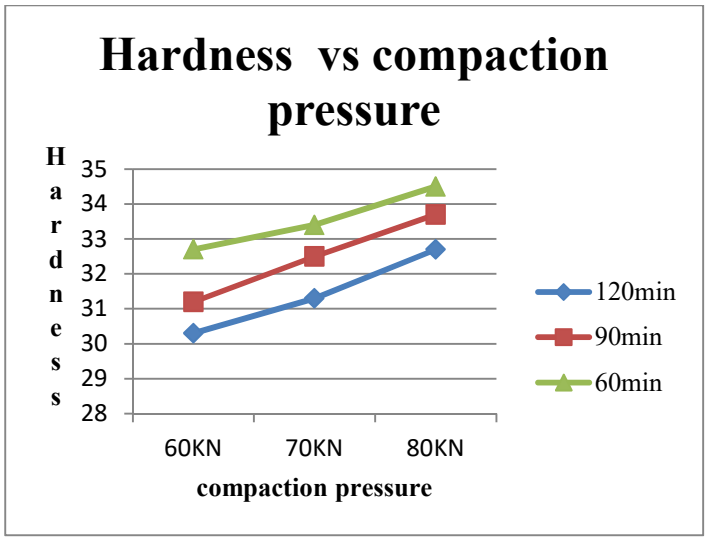

Fig3.3 Hardness vs compaction pressure results of the specimens with variation of sintering times of 60min,90min,120min.

The fig 3.3 describes the variation of hardness and the compaction pressure at 60min,90min and 120min sintering time.From the graph ,it is clear as the compaction pressure increases, then the hardness is also increasing.This is because as the pressure increases, the bonding between the molecules increases ant the material becomes harder. Therefore the hardness is getting increased as the compaction pressure increases, the hardness for 60min sintering time is varied from 30.3 to 32.7.The hardness for 90min sintering time is varied from 31.3 to 33.4.The hardness for 120min sintering time is varied from 32.7 to 34.5.

3.4 Tribological properties of NiCr and SiC based composites

The experiment process parameters are taken from below table. The wear rate ,friction force and coefficient of friction values are calculated for the 9 specimens at different conditions on pin on disc machine. From the below table we can observe clearly that the wear rate values tends to decrease from 3.1×10^{-5} mm^3/Nm to 1.1×10^{-5} mm^3/Nm. It is observed that as the compaction pressure and the sintering time increases ,the wear rate values are getting decreased[11]. This is because as the compaction pressure and the sintering time gets increased, the bonding between molecules gets increased therefore the specimen becomes harder and therefore the hardness of the specimen gets increased and the porosity of the specimen also gets decreased[18-20].As the hardness of the material gets increased the chances of the wear of the material gets decreased. Therefore the result demonstrates that specimen with the lowest compaction pressure and the lowest sintering time has the highest wear rate of 3.1×10^{-5} mm^3/Nm and the specimen with the highest compaction pressure and the highest sintering time has the lowest wear rate of 1.1×10^{-5} mm^3/Nm.

From the below mentioned table 3.2 we can observe that the coefficient of friciton values are higher for higher wear rate of about 0.58 and the coefficient of friction values are lower for the lower wear

rate of about 0.32 .This result demonstrates that as the densities of the specimens increases the coefficient of friction values decreases.(21)

Table 3.2 Representation of tribological parameters

Load(KN)	Sintering time(min)	Wear($x10^{-5}mm^3/Nm$) rate	Friction force(N)	Coefficient of friction
60	60	3.1	13.8	0.58
60	90	2.9	13.2	0.53
60	120	3.0	13.7	0.55
70	60	2.5	12.8	0.49
70	90	2.2	12.6	0.45
70	120	2.0	12.6	0.43
80	60	1.5	11.2	0.39
80	90	1.3	10.1	0.37
80	120	1.1	9.9	0.32

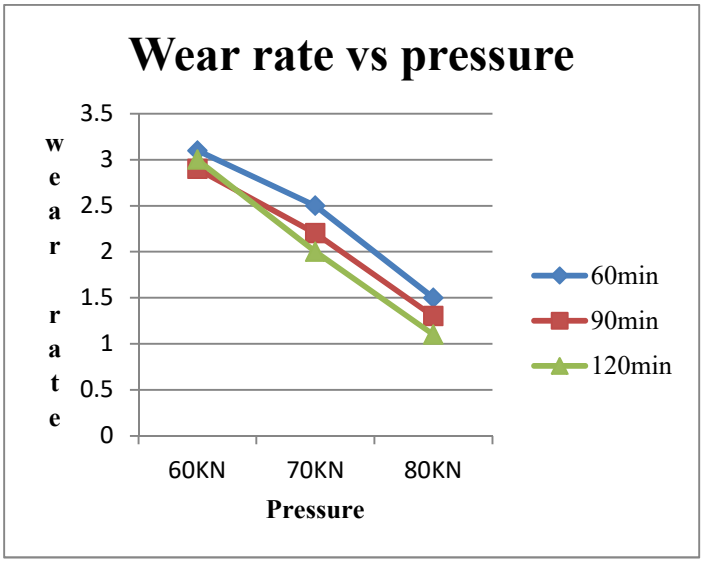

Fig 3.4 Wear rate vs compaction pressure results of the specimens with the variation of sintering times of 60min,90min,120min

From the fig 3.4 ,it is clear that as the pressure increases from 60KN to 80KN, the wear rate is getting decreased, for the sintering time of 60min the wear rate is getting decreased from (3.1 - 1.5) x 10^{-5} mm^3/Nm and for the sintering time of 90min,the wear rate is getting decreased from (2.9-1.3) x 10^{-5} mm^3/Nm and for the sintering time of 120min the wear rate is getting decreased from (3.0-1.1) x 10^{-5} mm^3/Nm. From the fig 3.4 it shows that the material with highest compaction pressure and the highest sintering time has the least wear rate of 1.1 x 10^{-5} mm^3/Nm.

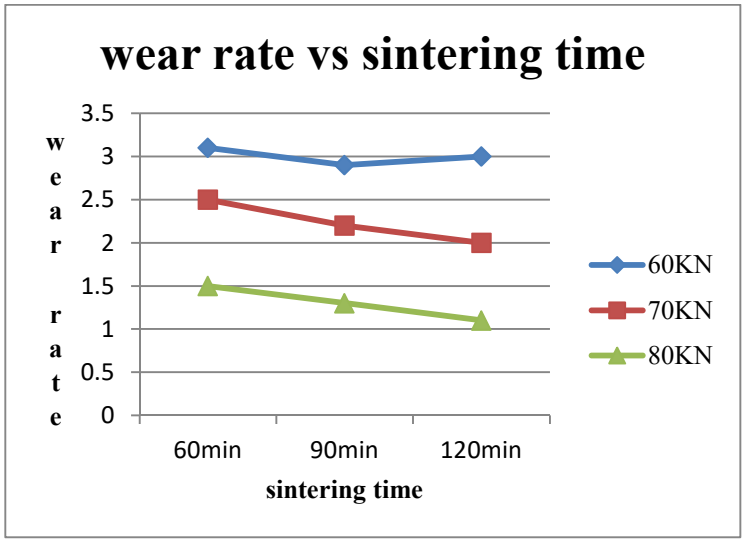

Fig 3.5 Wear rate vs sintering time results with the variation of the pressures of 60KN,70KN,80KN

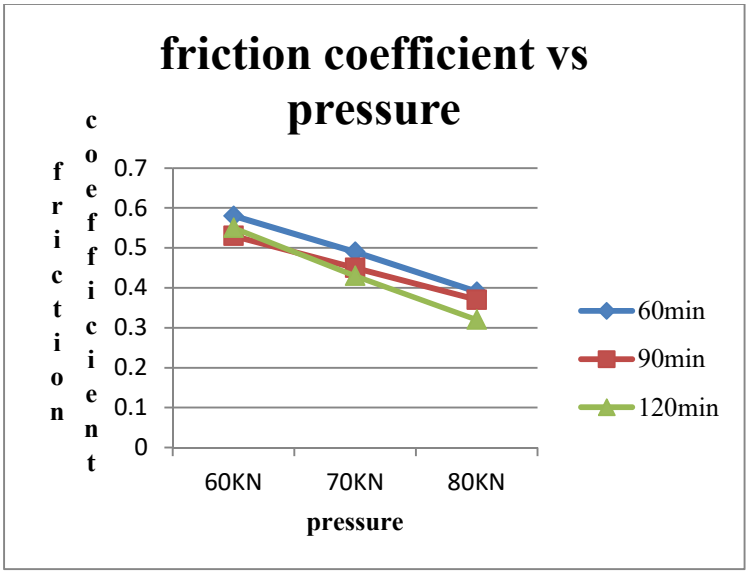

Fig 3.6 friction coefficient vs pressure results with the variation of sintering time of 60min,920min,120min

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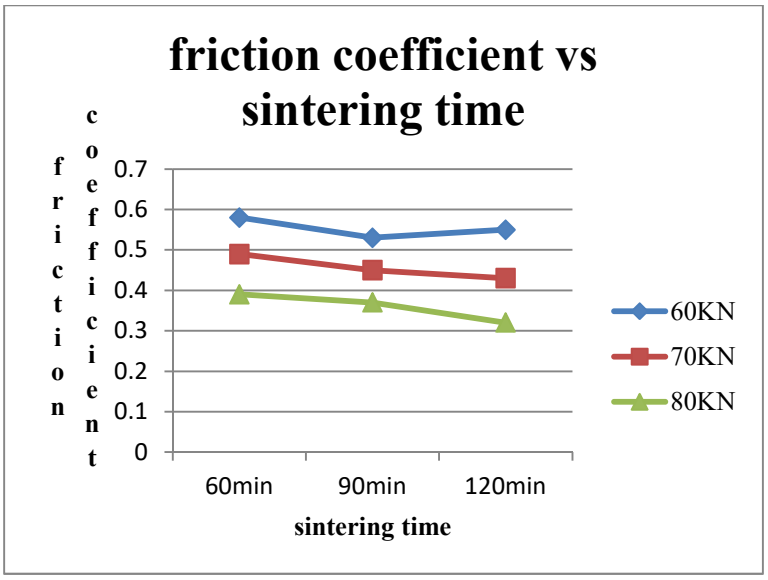

Fig 3.7 friction coefficient vs sintering time results with the variation of pressure of 60KN,70KN,80KN

From the fig 3.5 ,It is clear that as the sintering time is getting increased from 60min to 120min the wear rate is getting decreased. For the pressure of 60KN the wear rate is getting decreased from (3.1-3.0) x 10^{-5} mm^3/Nm. For the pressure of 70KN the wear rate is getting decreased from (2.5-2.0) x 10^{-5} mm^3/Nm. For the pressure of 80KN the wear rate is getting decreased from (1.5-1.1) x 10^{-5} mm^3/Nm. From fig 3.5 it shows that the material with highest compaction pressure and the highest sintering time has the least wear rate of 1.1 x 10^{-5} mm^3/Nm.

From the fig 3.6 ,it is clear that as the pressure increases from 60KN to 80KN,the friction coefficient values is getting decreased. For the sintering time of 60min ,the friction coefficient values are getting decreased from 0.58 to 0.39.For the sintering time of 90min, the friction coefficient values are getting decreased from 0.53 to 0.37.For the sintering time of 120min the friction coefficient values are getting decreased from 0.55to 0.32.From the fig 3.6 it is clear that the material with highest sintering time and the higest pressure has the least friction coefficient of 0.32.

From the fig 3.7 ,it is clear that as the sintering time increases from 60min to 120min,the friction coefficient values is getting decreased. For the pressure of 60KN the friction coefficient values are getting decreased from 0.58 to 0.55.For the pressure of 70KN load the friction coefficient values are getting decreased from 0.49 to 0.43.For the pressure of 80KN load the friction coefficient values are getting decreased from 0.39 to 0.32.From the fig 3.7 it is clear that the material with highest sintering time and the higest pressure has the least friction coefficient of 0.32.

Conclusions

The tribological studies of NiCr/SiC are being studied using wear test process ,the main conclusions of this Nicr/sic composites are as follows

1. The microstructures of the specimens are equally distributed as applied for compaction pressures of 60KN,70KN,80KN and sintering times of 60min,90min,120min.

2. The hardness of the specimen is getting increased as the pressure is getting increased.
3. The density of the specimen is getting decreased as the sintering time is getting increased.
4. The wear rate of the specimens are getting decreased when the pressure is increased and similarly the wear rate of the specimens are getting decreased when the sintering time is increased.
5. The friction coefficient values are getting decreased when the pressure is increased and similarly the friction coefficient values are getting decreased when the sintering time is increased.

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Exploration of indispensible properties of textile-grade glass fibers/white caustic treated banana fiber hybrid composite

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ABSTRACT

The need of Materials based research always exist due to its demand at all times. But the supply is limited. In particularly, the supply of material is limited for specific applications. Light weight low strength applications are very wide. This investigation focuses the natural fiber hybrid with artificial fiber based hybrid composite preparation. The banana fibers are used to prepare the composite with Textile-Grade Glass Fiber. The banana fiber is here treated with specific concentration of caustic in the distilled water. The composites synthesized with treated and untreated banana fibers. The alternate fashion of horizontal and vertical is followed for fibers' orientation. The bio epoxy is employed as matrix material with mix of hardener. The prepared composite are characterized by water absorbability, tensile properties, flexural properties and shock absorption capacities.
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1. Introduction

The application of composite materials is obvious [1]. Day by day the supply of conventional materials supply is diminished [2]. The existing materials sometimes disqualified as it does not meet the particular application [3]. To fulfill the demand the researchers invent new materials. [4] almond shell powder employed to prepare the particulate composite [5]. The powder of skin removed tamarind seeds suggested for fabricating composites. [6] proved that the treated banana fibers will improves the mechanical properties and experimented. [7] preferred to use of banana fibers treated with caustic solution and selected jute fiber for hybrid composite laterally they suggested banana fiber treated by mallic acid with Textile-Grade Glass Fiber [8]. [9] reported a methodology for third axis reinforcement that is prevention of de-lamination by stitching before compression for removing the excess rasin and air gaps and for ensuring predefined uniform thickness. The caustic treated banana fiber and the artificial Textile-Grade Glass Fiber with specific number of layers and pre defined best bonding orientation of fibers are focused in this research [10].

2. Materials and methods

2.1. Composite matrix

The matrix materials are mainly consists of selectively obtained and specially prepared high quality banana fiber, the commercially available high quality Textile-Grade Glass Fiber for reinforcement [11]. The low cost, best match for banana fiber based composite's bonding agents, the cashew nut cell oil is employed as resin and also bought the suitable hardener for the same [12]. the Fiber, its Tensile Strength (MPa), its Density (kg/m^3), its Young's Modulus (MPa) and Flexural Modulus (MPa) are in the order of as follows Banana Fiber, 54, 1350, 3487, 2000–5000, Glass Fiber 2500–3500, 2.5, 70,000, 70,000–73,000, respectively [74–76]. The poly vinyl acetate is employed as releasing agent [71–73]. The high quality banana fiber was prepared from the naturally harvested banana

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stems by rolling, combing and drying; further the fiber qualities were enhanced by chemical treatment [13].

2.2. Quality addition in banana fiber

The low cost and appreciable enhancement was achieved through caustic treatment [14]. Here it was preferred that 1% of caustic volume fraction with distilled water [15]. The high quality banana fibers soaked in the solution for 240 min followed by drying on open space with normal sunrays (do not being at hot sunrays) [67–70] for 120 min that is dried in the morning 8 AM to 10 AM. After that the fibers cut to 5 cm long [16].

2.3. Synthesis of hybrid composite

The preferred selective sequence of layers and orientation of fibers on each layer are alternate fashion of horizontal and vertical [18,19]. A chromium-plated MS, Square shaped molds (of side 30 cm) are placed in the molding table [20–23]. The parting (Wax) agent applied on the mould which will facilitate release the finished [24–27]. Beadings at the corners of models are maintained the preplanned gap [28,29]. The preplanned length of 50 mm followed for both banana fiber and Textile-Grade Glass Fibers [64–66]. The Textile-Grade Glass Fibers used for extreme layers that top and bottom [30]. In between layers banana but their fashions are alternate orientation of fibers in horizontal and vertical directions [31]. The layers are bonded with just prepared paste of mix of 10 part of resin and one part of hardener [32]. Finally entire composite panel was compressed in CTM and kept in the compressed position for 3 to 4h [17], by which the voids filled up, air bubbles removed and excess resin content also removed [33]. Then panels allow drying in sun light with weight for avoiding bending due to shrinkage while drying [34,35]. Hence the composite samples are prepared by the combination of compression mounding and manual layup technique [36–40].

Table 1
Toughness of dry and wet hybrid composites.

Characterization criteria	Treated	Untreated
Observed Energy in joules	12.48	7.95



Fig. 1. Sample specimen of hybrid composite for characterizing properties under impact load.

3. Characterization

3.1. Toughness based Characterization of hybrid composite

The Toughness of the materials is usually characterized by Impact Test Method [28–35]. Charpy Test setup is employed in this investigation [41–44]. The specimen prepared under the standard of ASTM D256 to the dimensions of 2½ × ½ × 1/8 Cubic Inches [45–54]. The energy observed by the specimen is observed. And tabulate in Table 1 [61–63]. The specimen is shown in Fig. 1 [58–60]. The investigation ambient conditions are room temperature and 50% the average RH [55–57].

4. Results and discussions

4.1. Shock absorbability

The impact load or shock load based test namely charpy is employed for this investigation. The results reveal that impact strength of the treated banana fiber based hybrid composites got improved (Refer Fig. 2). That is treated fiber based composite is stronger in withstanding shock load than untreated fiber based hybrid composite (Refer Fig. 2).

5. Conclusion

The exploration of indispensible property of textile-grade glass fibers/white caustic treated banana fiber hybrid composite is dis-

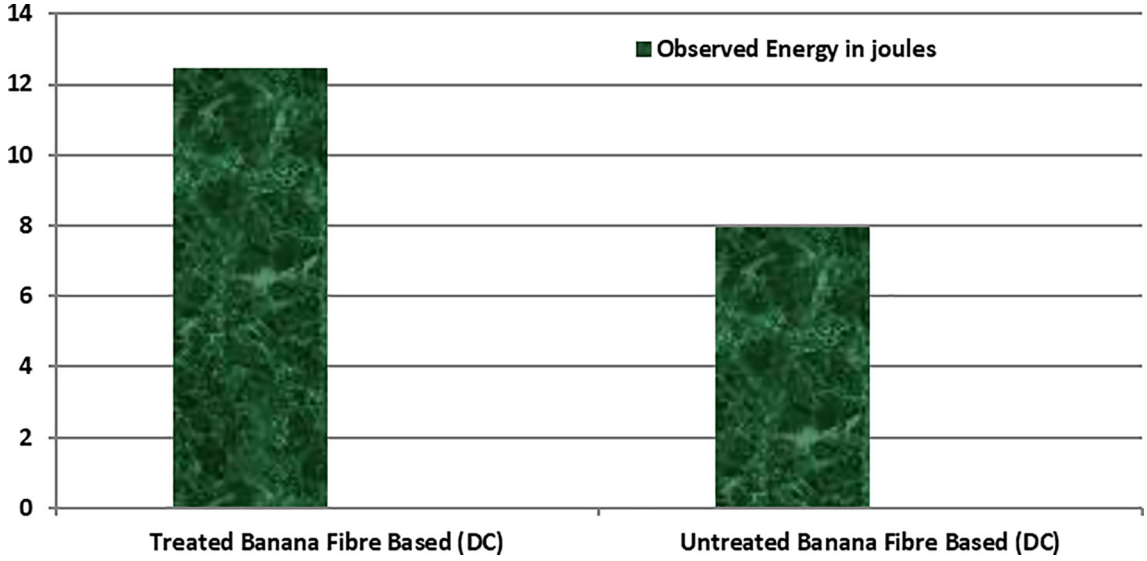

Fig. 2. Impact strength of treated and untreated banana fiber based hybrid composite.

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cussed in this paper. The natural abundant Banana fiber and one of the artificially strong Textile-Grade Glass Fibers were hybrid here with bio resin and hardener matrix to form the hybrid composite panels. In which the banana fiber is selectively processed and specially treated for enriching the proposed composite strength. It was experimentally proved that the proposed treated banana fiber based composite performed well and also it was tested in the wet condition and found that the composite increases its strength by absorbed moistures.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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NUMERICAL STUDY OF THE HEAT DISSIPATION OF RECTANGULAR HEAT SINK UNDER NATURAL CONVECTION WITH DIFFERENT SLOTS

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ABSTRACT

In the present scenario, the digital life and its usage are increasing rapidly. In all electronics, electrical current flow through the resistive elements says electric chip. When the current flowing through it, the heat is generated under natural convections. Due to the heat generation in electronic parts, the components will be failure during the temperature rise. In power electronics, chips face thermal heat removal challenges. For better conditions and performance, care must be taken to cool chip systems. There is an effective way to remove the heat whenever the heat sink attached above the chip it removes the heat efficiently and it keeps the chip lower in temperature. The performance of the heat sink is related to its slots. In this research work, for numerical simulation under particular plate-fin, with slots work improved than the plane surface, different slots shape enhanced to find better one of the rectangular fins heat sink.

KEYWORDS: Cooling; Fins; Natural Convection; Numerical Simulation & Electrical Components

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Original Article

1. INTRODUCTION

In every electricalequipment's the flow of current performs based on different functions running in electronics. Whenever current flows thorough a small element in the electronics heat generated. About proper action ofcomputer electronics heat dissipation is moreserious characteristics can be taken after designing and insertion.Heatgeneration is an irreversible process, heatmust be removed with the purpose of maintains the continuous operations. Natural convection, pure conduction or radiation to cools electrical components near some ranges of present electronic devices required more complicated and powerful systems manage with heat. So innovative heat sinks by higher extended surface and more conduct materials, coolant flowing is keys to reduce the hotter spots.

In this research, the attempt was made on enhancing the electronics cooling by use of CFD analysis. The main objectives of current study are to get set of correlations different slots of plate fin heat sink. Based on this some the literature was carried out which has beed discussed further. Chang J e [1] year of 2001 conducted CFD analysis on heat sink with minimum air flow rate on 30 w socket in CPU of desktop computer. A fan is used in the power supply used for complete moment in chassis. For direct air flow over the CPU in the duct then inlet air vents of the power supply. In this ductmore than 10ºC reduction of the CPU case of temperature relative to an unducted design. CFD analysisresultswere confirmed by experimental and predicted CPU casetemperatures agreed with in the 62.90ºCof the experimental value for the ductedcases. At this point they describe the methodologies of CFD analysis's for the heatsink. Project and define the experimentalprocedures to validate the prediction. In year 2005 Prabhu. L [2]Here the

analysis on different geometry of fin design by using ANSYS workbench to analyse the heattransfer performance of the fins those are rectangular, circular and square. Here related to the base temperature heattransfer rate can be compared. Complete material was prepared with Aluminium.

2. TYPES OF COOLING TECHNIQUES

The common problems in product design and get the efficiency of electronics. In electronics some generate heat to reduce the heat there is a treatment known as thermal cooling techniques. Those are passive, active cooling techniques.The Passive cooling technique use natural convection, conduction, radiation to cool the electronic components and the active cooling technique requires the uses of energy exactly dedicated toward cooling the components. The mechanical controlled subsystem provides activecooling. Active cooling techniques provide more cooling capacity. They allowtemperaturecontrol it could be cool down to low surrounding temperatures. An example of active cooling technology work in devices creates a large amount of heats those are computers, gaming devices, televisions.Thepassive cooling technique subsystem is not supported by mechanical equipment's. Conventional passive cooling includes the application of efficient heatspreaders and heatsinks to the electronic packages. Several other novels and advanced cooling techniques used in liquid cooling devices, which pump chilled liquid over specialized CPU mounted heat spreaders. Those fluids are not electrically conductive but they are having excellent heat transfer rate.

3. OBJECTIVES

- The aim of the research work is to investigate through the convective heattransferrate from the heatsink surface to the surroundings, thereby cooling the device.
- Investigate the various fin designs compare overall heattransferrateof the different slot designs of the fins by the use of natural convection
- Analyse the thermal analysis results of each design and find out the best one.

Comparison of the heat transferrate of the rectangular fins with the numerical values. The goal of this study is to achieve clear collection of connections for all slots of flat fin heat exchangers, addition of rectangular slots. Finally, the review of our efforts to create a single connection provides the best results.

4. CFD ANALYSIS PROCESS

In order to perform CFD analysis, the problem must be interpreted and analytical information will be used to explain it mathematically. The CFD software packages would then represent this information and articulate the specified question in technical terms. In the end, the machine will complete the calculation given in the CFD program, and the analyst will analyze, and understand the results of the calculation. Under this theory, three main key componentsperformed to execute a CFD simulation.

Problem Identification

- State the objective of modelling.
- Identify a good designed region.

Pre-Process

- Create a proper geometry model to define the domain.
- Construct a mesh (grid).
- Set up physics (physical structures, materials dominant properties).
- Set of contexts, original and boundary conditions.
- Define the configuration of solvers (numeric schemes, convergence controls).

Using the Solver

- Compute and track approaches before integration takes place.

Post – Analysis

- Examine the data using qualitative counter plots or quantitative XY plots.
- Require modifications to a grid - connected-alone model or grid analysis.

5. BASE MODEL OF HEAT SINK

a. Specifications of Heat Sink

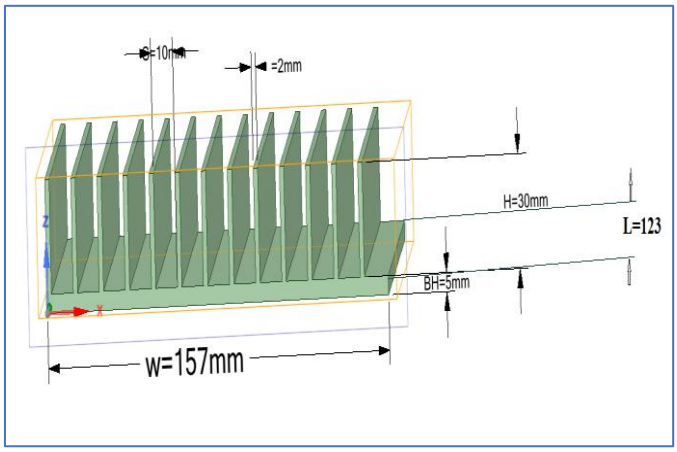


Figure1: Base Model.

Table1: Model Specifications

Specifications	Dimensions
Baseboard Dimensions	123×157mm
Fin Thickness (T)	2mm
Fin Height (H)	30mm
Fin Spacing (S)	10mm
Number of Fins	13
Parameters	Air, aluminium material
Base Height (BH)	5mm
Fluid	Air

The key features of the heat sink are presents in shown in figure1. In this paper fluid is air and material aluminium ispresented. The flat platform size is length (L) and width (w) is 123×157 mm. Thethickness (T) of each fin is 2 mm. Fin heights (H) for all designsare30mm. The base thickness (BH) is 5mm and the fin spacing (S) is6mm.The material used of the

design is Aluminiumwith 13 fins was provided.

Table 2: Material Properties

Property	Aluminium
Density(ρ) (kg/m^3)	2700
Thermal conductivity (w/mk)	202.4
Specific Heat(Cp) (J/kg k)	871
Specific Weight (g/cm^3)	2.7
Melting Point (^{0}C)	660.32
Boiling Point (^{0}C)	2470
Electrical Conductivity (m/ohm-mm^2)	36
Heat of Vaporization (KJ/mol)	284
Molar Heat Capacity (J/mol-K)	24.20

Table 3: Fluid Properties

Property	Air
Oxygen (O_2)	23.2 in volume percentage
Nitrogen (N_2)	75.5 in volume percentage
Argon (Ag)	1.3 in volume percentage
Specific heat(Cp) (KJ/kgK)	1.005
Specific heat (Cv) (KJ/kgK)	0.717
Density(ρ) kg/m3	1.229
Thermal conductivity (mW/m-k)	24.35
Viscosity(v) (cSt))	13.49

A. Mathematical Formulation

By way of boundary layer calculations, the convections are as follows.

Continuity equation

$$\frac{\partial(\rho u)}{\partial x}+\frac{\partial(\rho v)}{\partial y}=0 \tag{1}$$

Momentum Equation:

$$\rho(u\frac{\partial(u)}{\partial x}+v\frac{\partial(v)}{\partial y}=g(\rho zz-\rho)+\frac{\partial}{\partial y}(\mu\frac{\partial(u)}{\partial y}) \tag{2}$$

Energy Equation:

$$\rho Cp(u\frac{\partial(t)}{\partial x})+v\frac{\partial(t)}{\partial y}=\frac{\partial(k\frac{\partial(t)}{\partial y})}{\partial y} \tag{3}$$

The aspect ratio is the most important parameter influincuing the heat and fluid flow when deciding the heat transfer.

The heat* transfer* rate* inside the enclosure is defined as follow:

$Q=hA(T_{wall}-T_f)=mCp\Delta t$ (4)

where,

m= mass flow rate, kg/s

Cp= Specific heat rate, KJ/kg K

Δt= Temperature difference, ^{0}K

h=Convective heat transfer coefficient (w/m^{2}K)

h =Nuk/L (5)

where,

h=Convective heat transfer coefficient(w/m^{2}K)

Nu = Nusselt number

K= Air thermal conductivity (w/m^{2}K)

L= Characteristics length of the channel(m)

Prandtl number:

Pr=ν/α (6)

Prandtl number is dimension less number it's used to explain the thermalboundary layers and relative thickness of velocityfor the natural convection.

B. Boundary Conditions

The boundary position will be set because the pressure inlet is in the state of the atmosphere. The boundary state of the pressure outlet included the calculation of the residual pressure at the outlet boundary.The meaning of the common static pressure is used only at the same time as the flow is subsonic.If the flow needs to become locally supersonic, the stated pressure will no longer be used and the pressure will be extrapolated from the internal flow. Enable other flow quantities to be extrapolated from the inside. A set of backflow conditions is often specified for the reverse flow path at the pressure outlet boundary during the solution phase.Converging problems can be reduced if you assign rational values for the backflow quantity. In the design, colours are indicating for inlet and outlet of pressures as well as heat sink and wall. The boundary condition as shown in figure2.

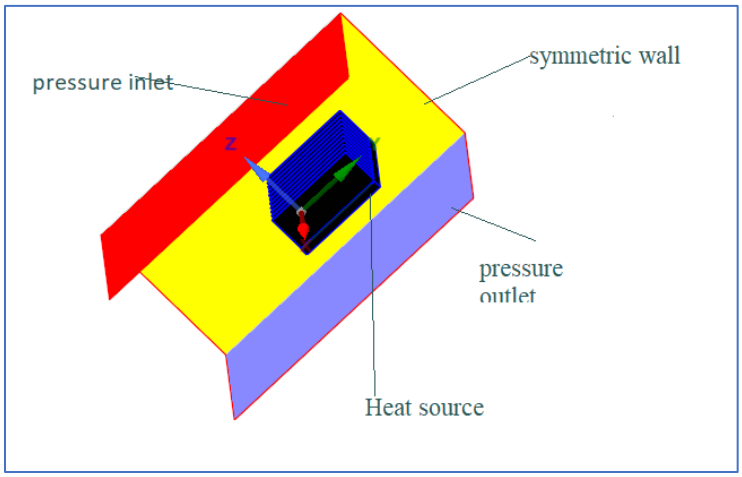


Figure 2: Boundary Condition.

6. OPTIMIZATION OF BASE MODEL

In the heat sink base model, the rectangular heatsink positioned below the atmospheric condition in the laminar flow regime to reduce the temperature with different shapes to the dissipation of heat input as 20w. By using different models to evaluate the less temperature along with the different slots designs are shown in figure 3.

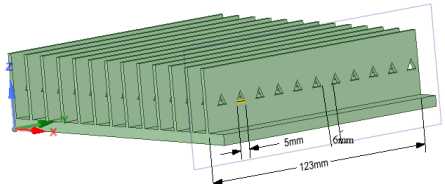


Figure 3(a): Triangular slots

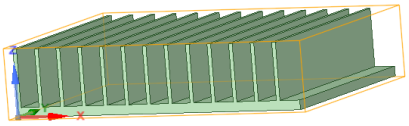


Figure 3(b): Finns without slots

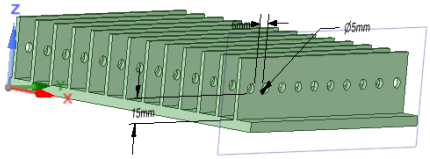


Figure 3(c): Circular slots

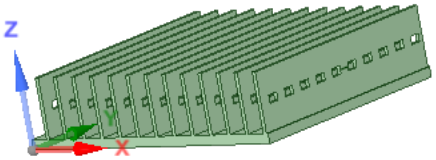


Figure 3(d): Rectangular slot

Figure 3: Different Orientations of Heat Sink

Table 4: Optimization of Model Dimension

Geometryt		Dimensions	Vertical dimensions	Horizontal dimensions
Circular slot		5mm	15mm	6mm
Triangular slot		5mm	15mm	6mm
Rectangular slot	Length	Width	15mm	6mm
	7mm	5mm		

7. RESULTS AND DISCUSSIONS

- **Thermal Analysis of Heat Sink**

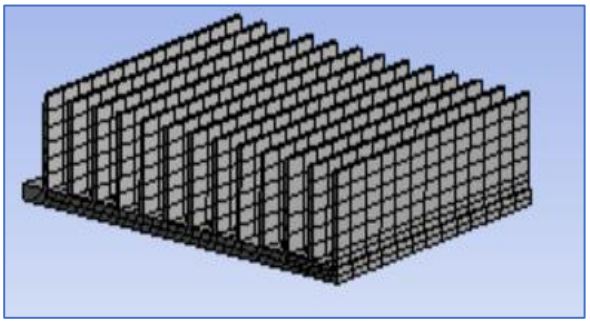
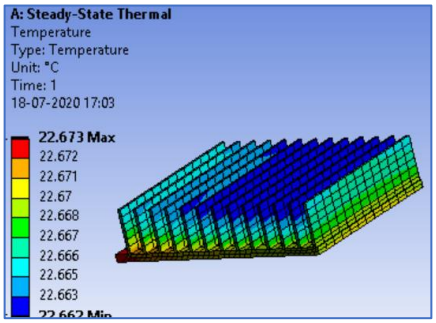


Figure 4(a): Meshing Model for Rectangular Fins without Slots.



Fgure 4(b): Temperature Variation for Rectangular Fins without Slots.

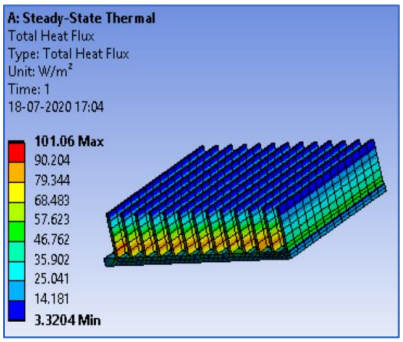


Figure 4(c): Heat Flux for Rectangular Fins without Slots.

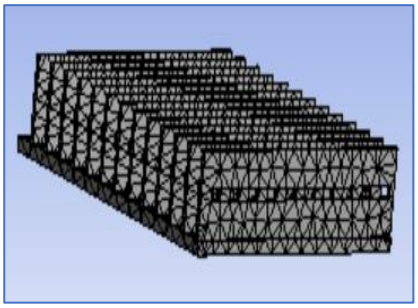


Figure 4(d): Meshing for Retcangular Fins with Rectangular Slots.

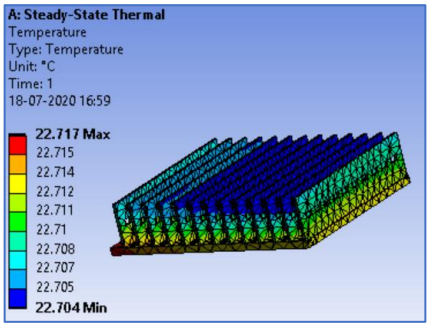


Figure 4(e): Temperature Variations for Rectangular Slots.

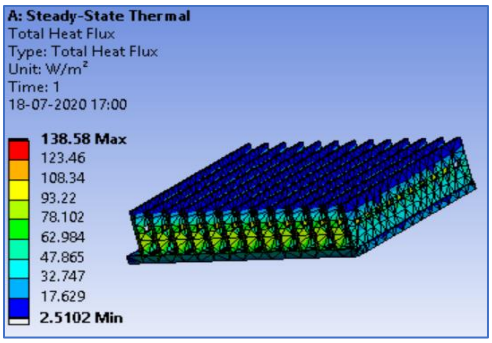


Figure 4(f): Heat Flux Variation for Rectangular Slots.

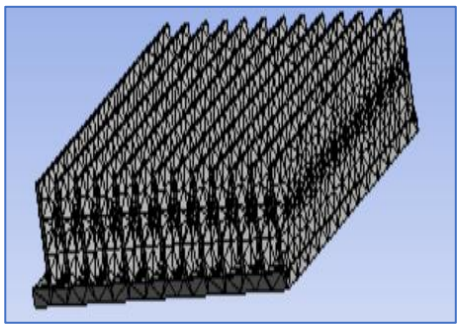


Figure4(g): Meshing for Rectangular Fins with Circular Slots.

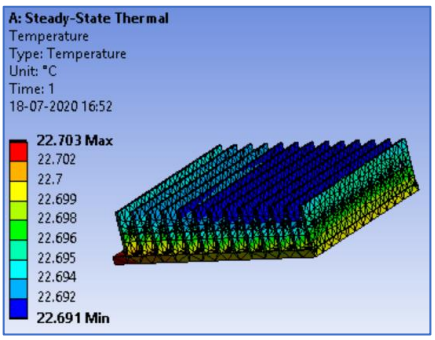


Figure 4(h): Temperature Variation for Rectangular Fins with Circular Slots.

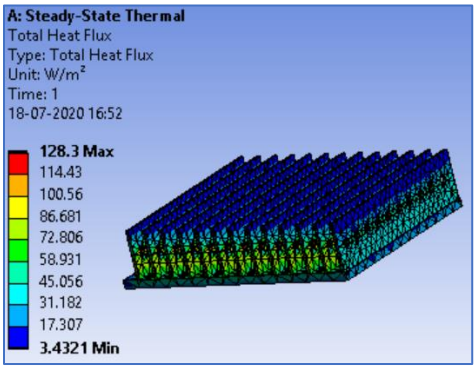


Figure 4(i): Heat Flux Variation for Rectangular Fins with Circulat Slots.

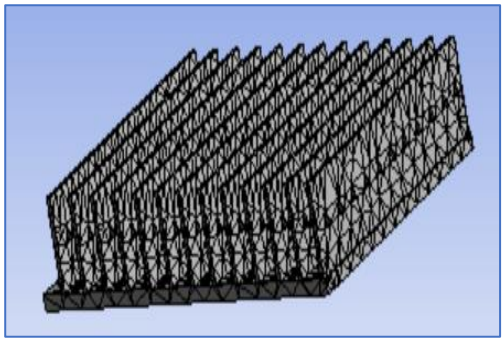


Figure 4(j): Meshing Model for Rectangular Fins with Triangular Slots.

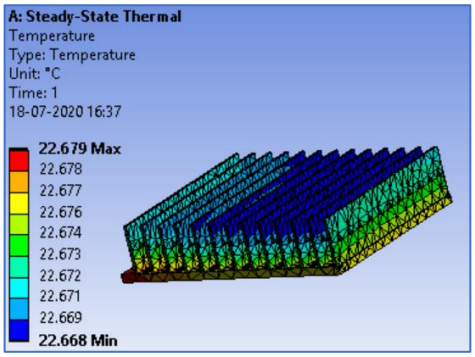


Figure 4(k):Temperature Variations for Rectangular Fins Triangular Slot

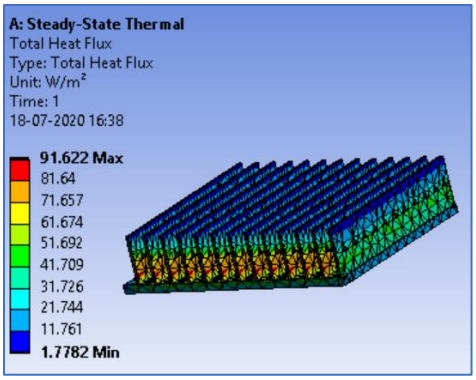


Figure 4(l): Heat Flux Variation for Rectangular Fins with Triangular Slots

The Figures from 4(a) to 4(l) shows the results of Thermal analysis of heat sink which remainedagreed out using after applying all the parameters such as boundaries condition as temperatures and convection.from the above analysis with different orientations compared and rectangular fins with triangular slots got lowest rising temperatures for this we analys the CFD analysis.

Table 5: Numerical Analysis of the Temperature Result

S. No.	Geometry	Number of Fins	Heat Input(watts)	Minimum Temperature of the Models	Maximum Temperature of the Models
1	Without slots	13	20w	295.809 K	259.873 K
2	Rectangular slots	13	20w	295.704 K	259.867 K
3	Circular slots	13	20w	295.691 K	259.853 K
4	Triangular slots	13	20w	295.668 K	295.829 K

From the above table represents the numerical analysis of the temperature results of heat sink of rectangular fins with different orientation effects. In this heat sink consists of 13 numbers of fins with 6 mm spacing between each fin and applied heat input 20w to the every geometry. The below figure 5 has shown that by introducing the slots in rectangular chips the temperature has got reduced. It is further noted that for the triangle slots has shown better results as compared to other modified chips.

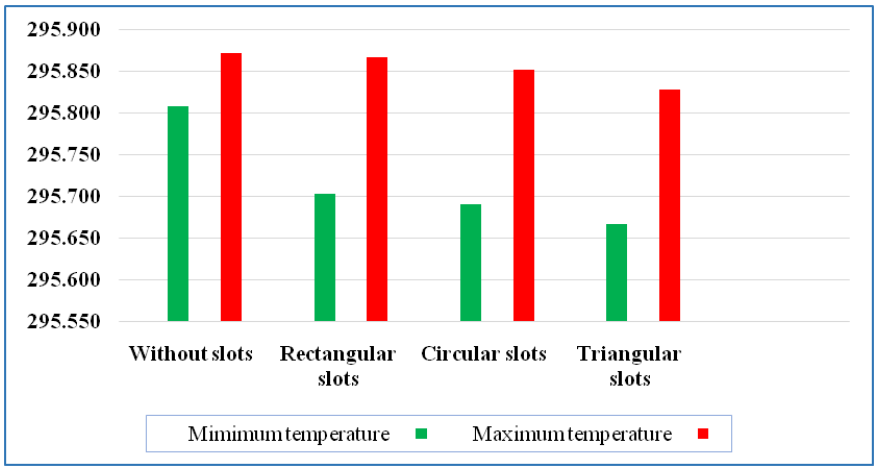


Figure 5: TemperatureVariation for Various Models.

- **CFD Analysis of heat sink**

Below showing figure reperesents the meshing of rectangualr fins with triangular slots which includes heat source.This geometry created in ansys fluent applied unstructured fine mesh and applying all above boundary conditions and parameters we got heat transfer rate and post processing results.

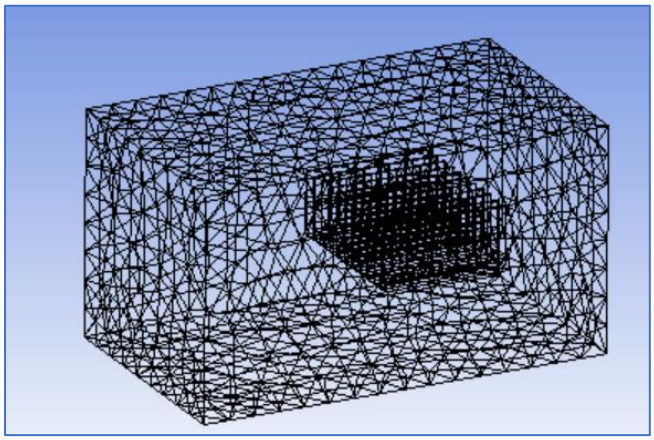


Figure 5(a): Meshing Geometry of Rectangular Fins with Triangualr Slots.

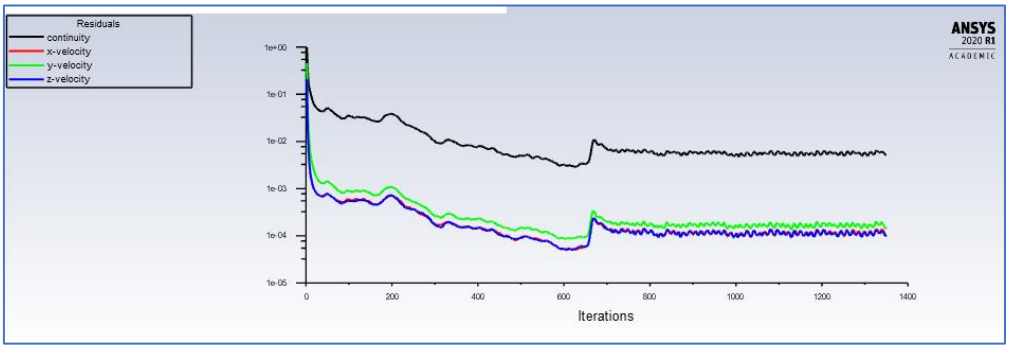


Figure 5(b): Iteration for Converging Graph.

Above figure shows converging graph and conclusion of different cases has been solved.Iterations were taken by using governing equations.Momentum equations from the velocity of x,y,z directions and energy equation.Taken laminar flow and applying boundary conditions to the parameters to the post processing results given below.

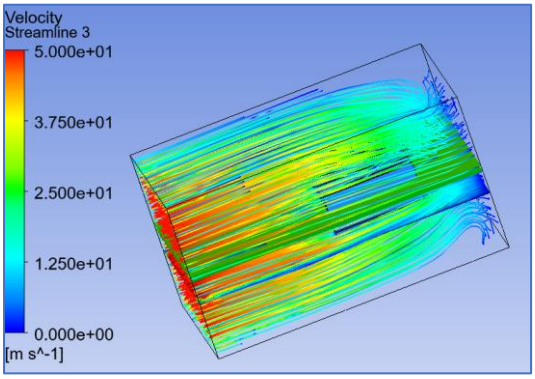


Figure 6: Streamline Flow for a Rectangular Fins with Triangular Slots.

8. CONCLUSIONS

In this paper, the numerical simulations of fins with as well as without slots are taken into consideration with various orientations such as Circular slots, Rectangular slots and Triangle slots to evaluate the increasing temperature of the chip. As of the simulation results, fins with the slotsare operating comparable or even higher under a few orientations, when as compared without slots. Various slots with rectangular fins studied it shows different results, these all slots are compared by plane fin. After comparison of slots and plane fin triangle slot is sustained less temperature of the chip when compared with the remaining slots.

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DESIGN AND ANALYSIS OF PERTOL ENGINE CROWN COATED WITH ALSIC AND BRASS

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1. Introduction

The cylinder responds in chamber to finish cyclic occasions and transmit gas pores to wrench shaft through interfacing bar. Cylinder is most significant part in an interior burning motor. The working state cylinder in inward ignition is so most noticeably terrible. During burning stroke fuel get lighted with assistance of flash fitting. Because this ignition of gases in chamber warm disfigurement mechanical twisting causes cylinder breaks, tortuosity so forth. It is remarkably basic look at examine pressure appropriation, temperature dispersion, heat move, warm burden, mechanical burden so to limit pressure, limit warm pressure and various loads on running situation cylinder. Interior ignition motor tube is made Al composite. This makes distinction between running and structure clearances. In this examination right off bat we draw cylinder model in Catia programming lastly cylinder is investigated in ANSYS programming.

There are two steps involved in this study:

1. Creating an IC Engine Piston by Using Catia Software.

2. To perform structural and thermal analysis piston by using ANSYS software.

1.1 Piston:

Cylinders Built with highlights that show clear capabilities during motor activity. The cylinder head or crown gains weight and energy brought about by ignition system. The faster directional changes because cylinder pin zone is displayed for lot more power. It undergoes warm extension bring on replace warmth since

head to body cylinder. Cylinder pin zone depends on warmer development cylinder in different areas. This results from warm development characteristics cast aluminum compound and mass in cylinder pin area.

1.2 Issue Statement:

In light writing study performed, adventure into this exploration is spurred by way that Pistons are required to have superior attributes and better exactness they should continue high temperature and stresses. Cylinder skirt may show up misshapening at work, which as rule causes split on upper finish cylinder head. Because disfigurement, best pressure focus is caused on upper finish of cylinder, circumstance turns out to be increasingly genuine when firmness cylinder isn't sufficient, break by and large showed up at point A which may bit by bit expand and even reason parting along cylinder vertical. The pressure conveyance on cylinder chiefly relies upon misshapening of cylinder. Along these lines, so to decrease pressure focus, cylinder crown ought to have enough solidness to lessen distortion. Exponential examination of cylinder is tumultuous and not extremely exact work. Definite hypothetical investigation of cylinder qualities is extremely troublesome. With the utilization fast PCs and numerical strategies, cylinder examination can be made utilizing CAE. That is reason pressure examination is performed utilizing reenactment programming. In this way, FEA will be done for standard cylinder model utilized in diesel motor and streamlining similar will be completed.

1.3 Objective

The fundamental target present work is discovering propose ideal material for cylinder dependent on quality economy thinking about material weight and dimensional issues simultaneously. Subsequent to producing precise limited component model, procedure for streamlining work process was characterized. Focus enhancement was to reach at least warm worries in cylinder.

The proposed work included following steps:

- Study of writing survey of different work detailed.
- The cylinder is planned by method and detail which are set in engine structure information hand books.
- CAD model Piston is made utilizing different apparatuses in catia v5
- Comparison outcome got in above advance for various materials.

- Choosing ideal structure dependent on material and another parameter.

2. LITERATURE REVIEW

Vinay V. Kuppast1 , Dr.S.N.Kurbet2 , H.D.Umeshkumar3 , Adarsh B.C4, al [2013]A warm analysis piston for its effect on secondary vibration, gas power because firing an IC motor in room causes cylinder to move with required vibration and auxiliary motions. The motion cylinder required from TDC to BDC is directly in nature. This movement seeks for an explanation movement of motor units. Optional movement because the transverse movement cylinder when cylinder moves from TDC to BDC and other ways. The auxiliary motion cylinder is considered normative hotspot for cylinder slap, thus affecting chamber dividers that cause motor vibration and turbulence. In the present test, laborious effort is made to understand effect of heat on fuel inside chamber, cylinder deformation, and heat concerns induced in cylinder. This misshaping cylinder inside chamber causes the hole between the chamber cylinder to fluctuate and the cylinder moves horizontally sway powers. The transverse movement cylinder in chamber is watched tentatively by estimating hole among cylinder and chamber at push side burden condition. Limited component examination (FEA) is considered extraordinary compared to other numerical instruments to display break down physical frameworks. FEA is done to discover cylinder distortion because of warm burden on cylinder for temperature information got from tests. The three dimensional cylinder is demonstrated in CATIA V5 R19 and examined in ANSYS 12 solver. The reproduction results are utilized to anticipate impact of temperature on cylinder twisting its optional movement which are chief wellspring of motor vibration and commotion.

V G Cioată, I Kiss, V Alexa and S ARațiu, al. [2017], Mechanical and warm examination of inside burning motor cylinder utilizing Ansys, The cylinder is one most significant segments of interior ignition motor. Cylinder flop primarily because of mechanical burdens and warm anxieties. In this paper is dictated by utilizing limited component strategy, stress and relocation conveyance due pipe gas weight and temperature, independently and joined. The FEA is execute by CAD and CAE indoctrination. Outcomes are contrasted those acquired by investigative technique and ends have been drawn.

1 KANCHARLA RAJA SEKHAR, 2 G. VIJAY PRAKASH, al. [2016]. Thermal analysis of a piston, A cylinder is

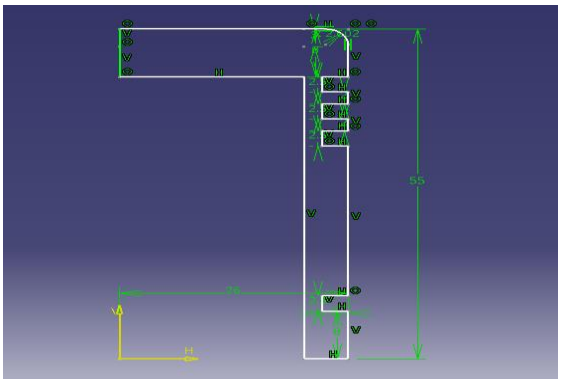
segment Responsive motors, responsive siphons, gas blowers and air chambers, among other comparative instruments. It consists moving section chamber, which is gastightened by cylinder rings Piston that move combustive gases capacity to interfacing pole. To improve proficiency motor there is need to learn about cylinder. Cylinders that are typically made up with amalgam steels that show mesh safe against warm loads and basic burdens. In the task we plan cylinder by utilizing strong works 2016 structure programming and we did basic burden examination and warm investigation by applying different materials, for example, composites on cylinder in ansys workbench programming.

To create good bonding between ferrous metals and aluminum composite liquid metal, process of heat plunge. To improve wetting and steel embedding, first coat with small layer aluminum. Because its unrivaled working efficiency, high warmth conductivity, high protection from wear, elastic iron is used as alloy (BirigtHudelmaier 2000).

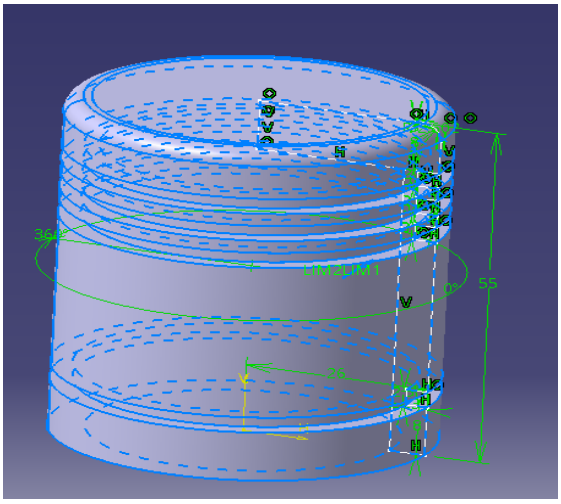
3. CATIA

PROCEDURE OF DRAWING ENGINE CYLINDER

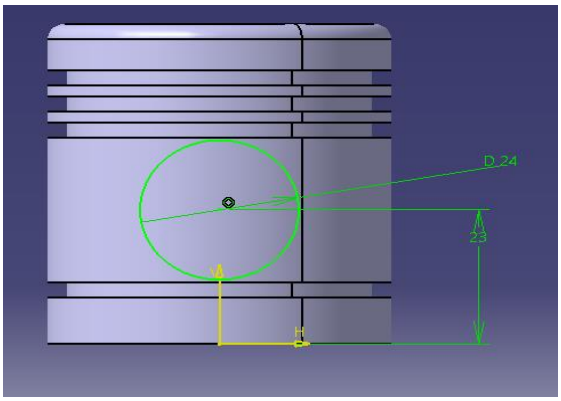
Draw the sketch by using profile command.



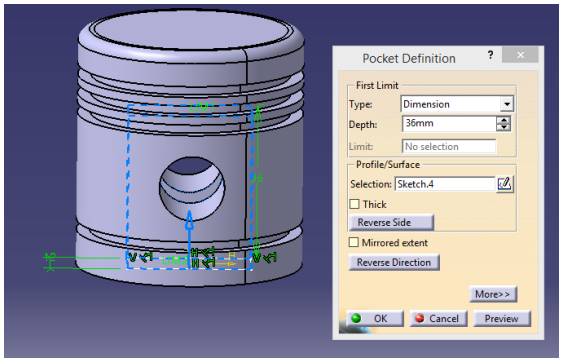
SHAFTING THE SKETCH



AFTER SHAFTING THE SKETCH



CREATING A WRIST PIN HOLE ON PISTON

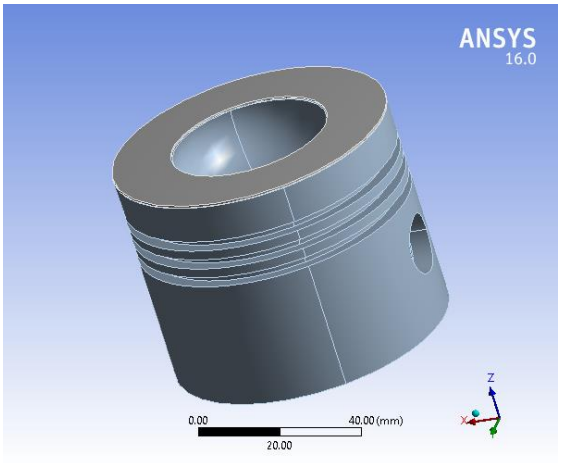


4. ANSYS

ANSYS is widely used finite component test (FEA) programming bundle. Finite Element Analysis is numerical technique to rebuild mind-blowing framework small bits (size client is assigned). The production realizes conditions under which these parts are handled and all unfolds; Giving comprehensive clarity on how framework works. At that time these grades can displayed in arranged or graphical structures. This type investigation can be used for an unreasonably complex structure and regularization framework for regular inspection by hand. Frameworks that fit this class cannot be overly red due their geometry, range operating conditions.

ANSYS is measure FEA that shows apparatus in automatic engineering division at several schools. ANSYS is also use in civil and electrical engineering, just like Physics and Chemistry offices.

ANSYS provides practical method for investigating performance elements or policies in virtual area. This kind item development is named Virtual Prototyping.



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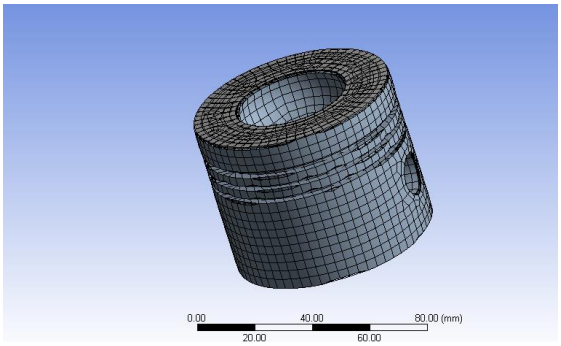
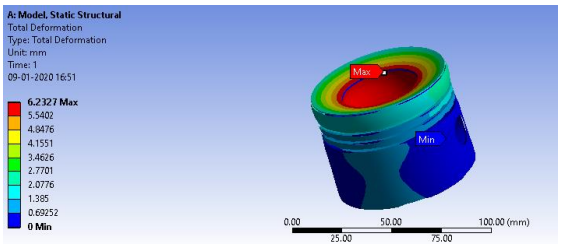


4.1 Static structural:

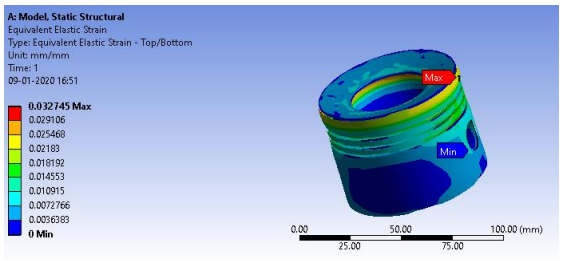
Material

- **brass alloy CZ108**
- **Aluminum Alloy**

Total Deformation



Equivalent Elastic Strain



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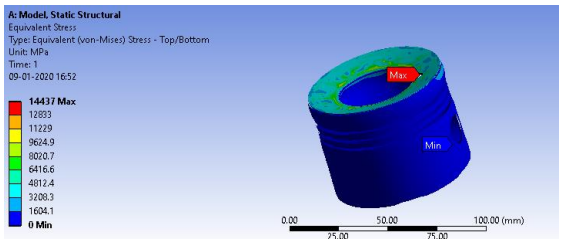
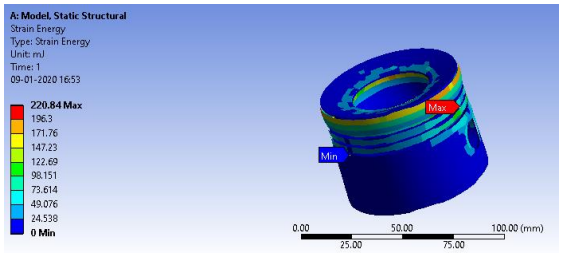
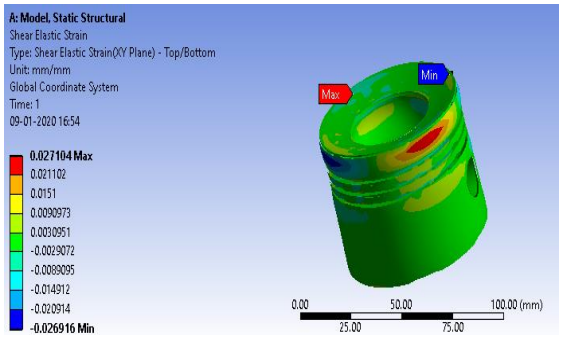


Strain Energy



Shear Elastic Strain



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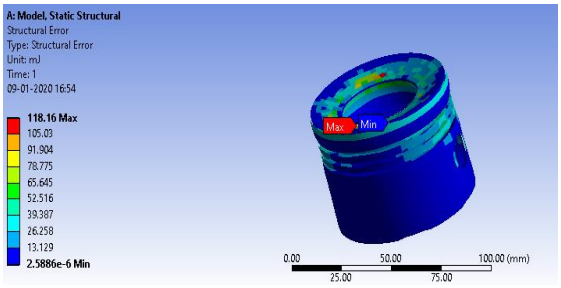
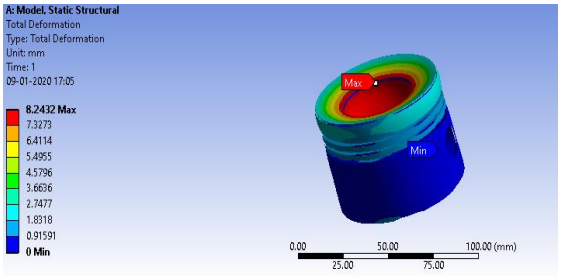


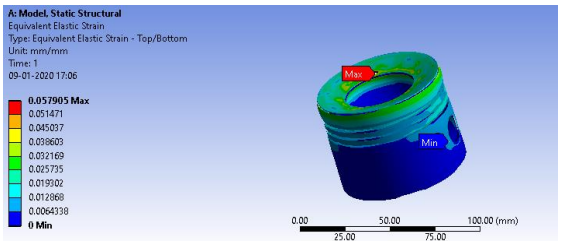
Material Data

- **Aluminum Alloy**

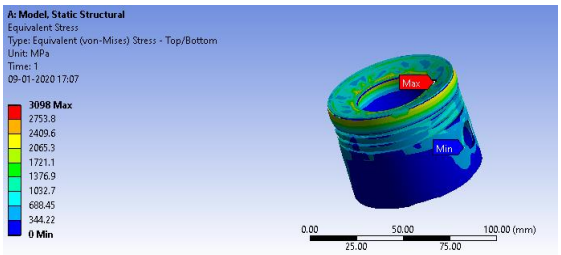
Total Deformation



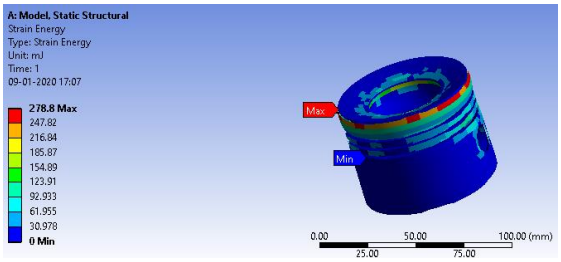
Equivalent Elastic Strain



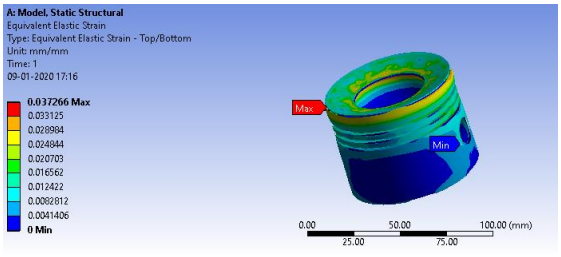
Equivalent Stress



Strain Energy



Shear Elastic Strain



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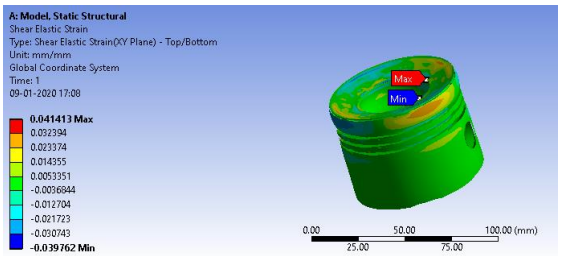

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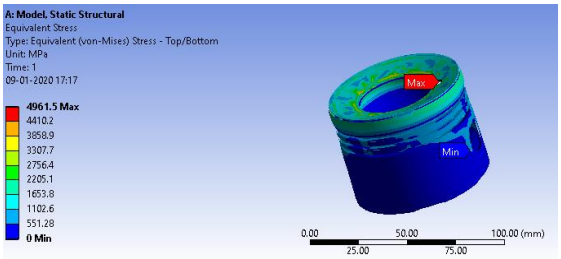
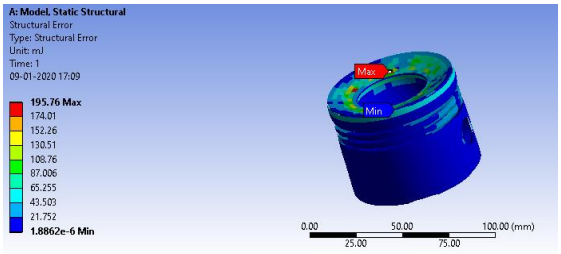
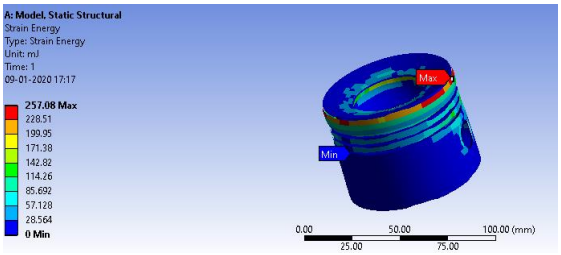


Strain Energy



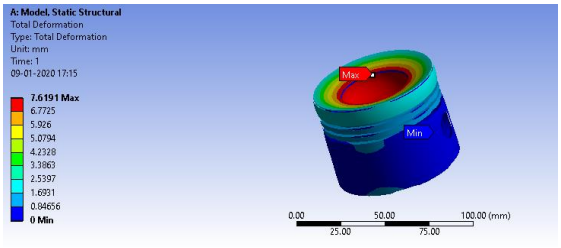
Material Data

- **aluminiumsilcon carbide**
- **Aluminum Alloy**

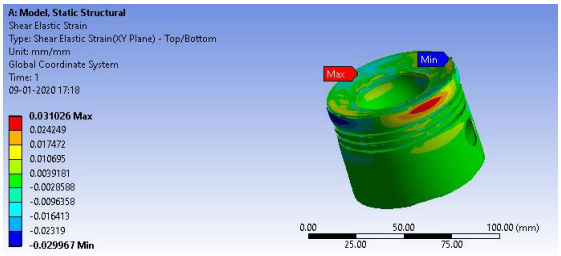


Shear Elastic Strain

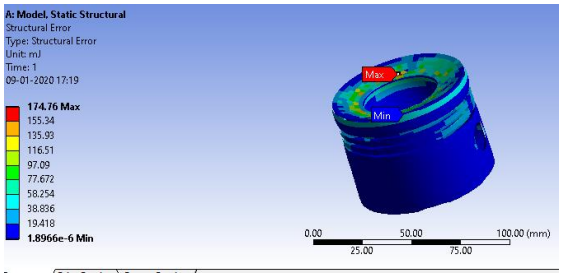
Total Deformation



Equivalent Elastic Strain



Structural Error

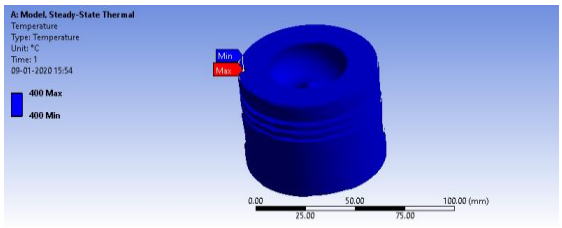


4.2 Thermal analysis:

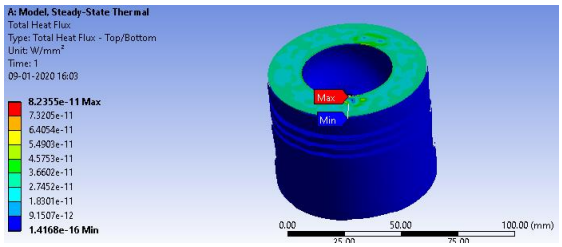
Material Data

- **Aluminum**

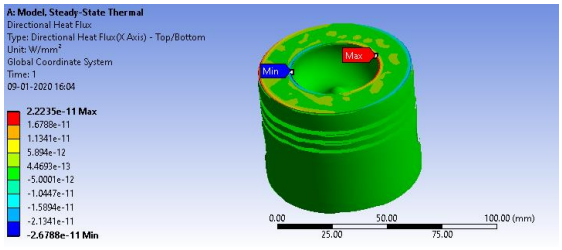
Temperature



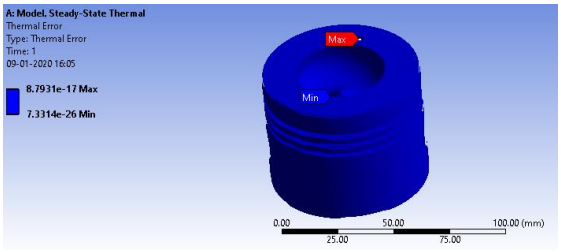
Total Heat Flux



Directional Heat Flux



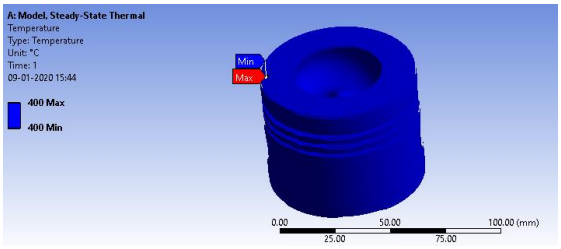
Thermal Error



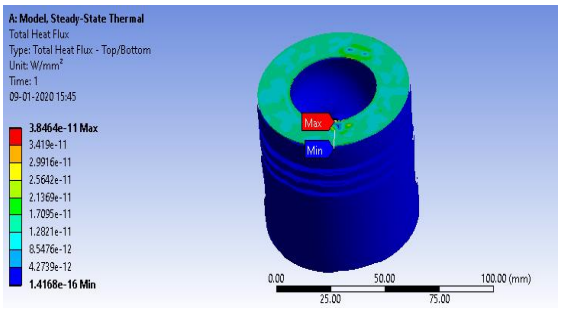
Material Data

- **Brass**
- **Aluminum**

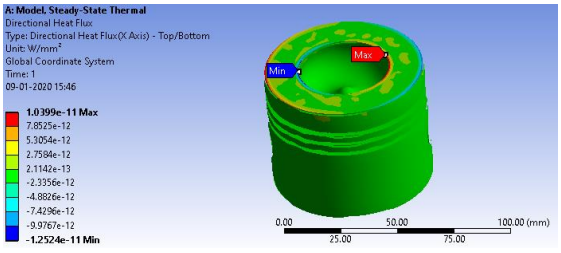
Temperature



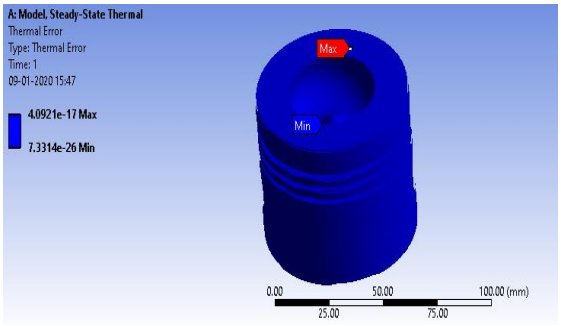
Total Heat Flux



Directional Heat Flux



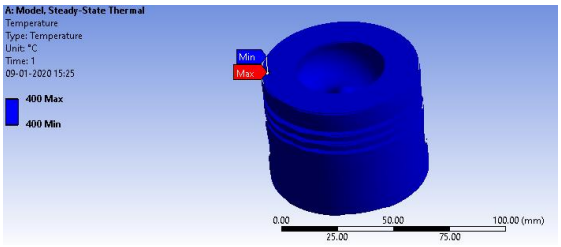
Thermal Error



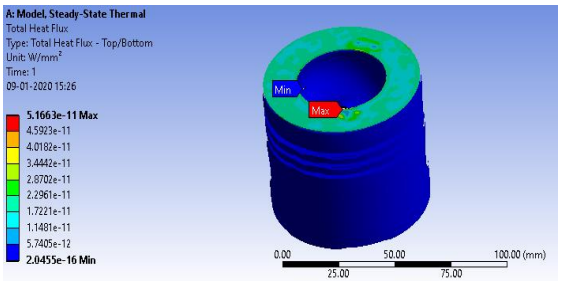
Material Data

- **Silicon**
- **Aluminum**

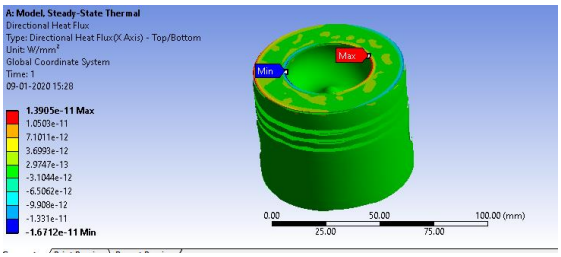
Temperature



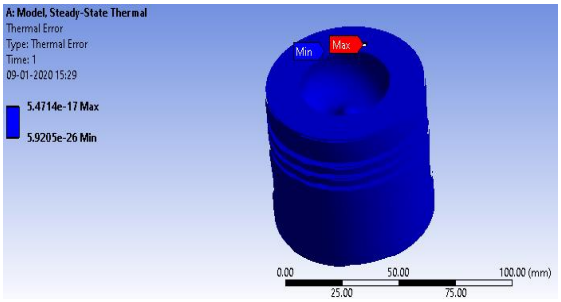
Total Heat Flux



Directional Heat Flux



Thermal Error



5. RESULTS

STRUCTURAL ANALYSIS

Brass alloy

Object Name	Total Deformation	Equivalent Elastic Strain	Equivalent Stress	Strain Energy	Shear Elastic Strain	Structural Error
State	Solved					
Results						
Minimum	0. mm	0. mm/mm	0. MPa	0. mJ	-2.6916e-002 mm/mm	2.5886e-006 mJ
Maximum	6.2327 mm	3.2745e-002 mm/mm	14437 MPa	220.84 mJ	2.7104e-002 mm/mm	118.16 mJ

Aluminum Alloy

Object Name	Total Deformation	Equivalent Elastic Strain	Equivalent Stress	Strain Energy	Shear Elastic Strain	Structural Error
Results						
Minimum	0. mm	0. mm/mm	0. MPa	0. mJ	-3.9762e-002 mm/mm	1.8862e-006 mJ
Maximum	8.2432 mm	5.7905e-002 mm/mm	3098. MPa	278.8 mJ	4.1413e-002 mm/mm	195.76 mJ

Aluminum silicon carbide

Object Name	Total Deformation	Equivalent Elastic Strain	Equivalent Stress	Strain Energy	Shear Elastic Strain	Structural Error
State	Solved					
Results						
Minimum	0. mm	0. mm/mm	0. MPa	0. mJ	-2.9967e-002 mm/mm	1.8966e-006 mJ
Maximum	7.6191 mm	3.7266e-002 mm/mm	4961.5 MPa	257.08 mJ	3.1026e-002 mm/mm	174.76 mJ

THERMAL ANALYSIS

Aluminum Alloy

Object Name	Temperature	Total Heat Flux	Directional Heat Flux	Thermal Erro
Results				
Minimum	400. °C	1.4168e-016 W/mm²	-2.6788e-011 W/mm²	7.3314e-026
Maximum	400. °C	8.2355e-011 W/mm²	2.2235e-011 W/mm²	8.7931e-017

BRASS ALLOY

Object Name	Temperature	Total Heat Flux	Directional Heat Flux	Thermal Erro
Results				
Minimum	400. °C	1.4168e-016 W/mm²	-1.2524e-011 W/mm²	7.3314e-026
Maximum	400. °C	3.8464e-011 W/mm²	1.0399e-011 W/mm²	4.0921e-017

SILICON ALLOY

Object Name	Temperature	Total Heat Flux	Directional Heat Flux	Thermal Erro
Results				
Minimum	400. °C	2.0455e-016 W/mm²	-1.6712e-011 W/mm²	5.9205e-026
Maximum	400. °C	5.1663e-011 W/mm²	1.3905e-011 W/mm²	5.4714e-017

6. CONCLUSION

- Modelling and investigation of cylinder has been done in Catia and Ansys programming.
- Simulation has done on cylinder, With various materials individually.
- After considered cylinder result we can presume that aluminum Has better warm warmth motion esteems and low distortion.
- Ceramic materials is giving better low warm blunder esteems looking at aluminum
- Ceramic materials is low weight high quality qualities.

7. FUTURE WORKS

In view time and capacity, work in proposal has few deficiencies.

1) When demonstrating cylinder, overlook main ring fixed with iron ring, affect weight on primary ring.

2) Is not perfect when all DOF piton pin, create more pressure effect aftereffect investigation.

3) Analyze temperature field by count observational recipe rather than trial estimation; it might be few impacts on outcome.

4) When work brace, utilizing default to get examination result isn't exactness on certain pieces of cylinder.

For further work, limitation state cylinder pin can superior substantially other improved, trusted very well may nearer genuine circumstance cylinder. What's more, in conditions permit, trial approach can be utilized to decide convection coefficient cylinder to get reasonable temperature field.

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A Study Report on Fabrication of Hitech-Highway

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ABSTRACT: The effects of vehicular pollution are felt at many levels. This type of pollution does not just affect one particular area of the environment, but several other areas as well. The elimination of vehicular pollution is simply not going to happen. Instead there have been other attempts made in the prevention of vehicular pollution. One such method is explained here in the project work called as the hi-tech highway.

The hi-tech highway consists of an overhead catenary system that will run along the outside lanes of both sides of the road, sort of like the overhead wires that provide power to electric buses, trolleys, trains, etc in cities. Specially outfitted hybrid or all-electric trucks can attach to the system using automated current-transfer devices. Once connected, the vehicles will pull all their power from the overhead lines, effectively becoming emission-free vehicles. Hi-tech highway vehicle turns the future of electric-driven freight transport into reality. In normal operation, hi-tech Highway vehicle draws electric energy from a catenary system using an adaptive established contact with the overhead wire. Wherever if there is no overhead line, the hi-tech Highway vehicle will automatically switch over to their diesel-hybrid drive system. This means that they can be used just as flexibly and universally as conventional vehicle.

The demo model of the project is constructed with a four wheel chassis (vehicle) and is driven by a DC motor. Once the start button is pressed, the mechanical structure will be lifted that is driven by suitable electro mechanical components to make contact with the hi-tech highway line. The vehicle diesel drive mechanism is demonstrated by driving the vehicle through the battery. Once the hi-tech highway mechanism is started, supply from the battery to the motor is disconnected and is connected from the hi-tech highway lines to run the vehicle. The running motor condition of conventional drive or the hi-tech highway drive will be displayed in the LCD that is interfaced to the microcontroller. Depending on the connection establishment with the hi-tech highway, an input is fed to the controller by which the controller switches the supply to the motor through a relay contact automatically. The vehicle is equipped with obstacle detecting sensors in front to stop the vehicle automatically when any obstacle is detected.

In addition, the hi-tech highway line is powered through solar energy with automatic highway lighting system using sensors. The highway lights are automatically controlled depending on the vehicle movement and by sensing the natural light (day or night) to save the precious energy.

KEYWORDS: Hi-tech highway, vehicular pollution, automated current-transfer devices, DC motor, solar energy.

I. INTRODUCTION

With most major auto manufacturers now actively developing electric vehicles, the drive towards a zero emission personal electric transportation future seems very much on the horizon. Road pollution doesn't just come from cars of course; freight vehicles are also major players in choking our highways and byways. Siemens is currently testing a possible solution in Germany that's based on proven railway and tram technology but has been adapted for trucks on roads. Heavy goods vehicles have been fitted with a newly-developed pantograph that can automatically rise to meet overhead cables and transfer electric power to hybrid diesel/electric power trains. Energy recovered from regenerative braking can also be fed back into the system for re-use by other vehicles.

The hi-tech Highway concept is a two part system. The first involves the rollout of a two pole catenary system along one or more lanes on freight transport routes that caters for two-way electricity transmission and ensures a reliable power supply by feeding the overhead wire via container substations. The substations used in the current test project feature a medium-voltage DC switching system, a power transformer, a rectifier and a controlled inverter (for the feedback of the electric energy generated by regenerative braking for real time).

The field trial in Germany is reported to have confirmed full performance potential, independent of weather, conditions and load. The concept proved to be at least as flexible as existing fuel-based road freight transport solutions thanks to the maneuverability of the mobile pantographs, with reduction in carbon dioxide, nitrogen oxide, soot and noise pollution and added fuel efficiency benefits. Keeping up with the flow of traffic doesn't appear to have been a problem

either, with speeds of up to 90 km/h (55 mph) being reached without difficulty under direct transmission of electric power.

For the first time ever, electric trucks powered by overhead cables will run to reduce carbon dioxide emissions. The hitech-highwayelectrifies selected traffic lanes using an overhead cable system. As a result, trucks can be supplied with electricity in the same way as trams. The "e-trucks" are equipped with a hybrid drive system and intelligent current collectors. Powered by electricity from overhead cables, they produce no emissions when operating in the local area. On roads without overhead cables, the vehicles use an electric drive system which can be powered by diesel, compressed natural gas, a battery or with other energy sources. The current collector allows the vehicles to overtake and automatically dock and undock at speeds of up to 90 kilometers per hour.

II. RELATED WORK

The hi-tech-highway concept is particularly effective from an environmental and economic point of view on heavily used and relatively short truck routes, e.g. between ports, industrial estates, freight transport centers and central transshipment terminals. The intention is to set up a "zero emission corridor" for shuttle traffic between the two sea ports and the inland rail transshipment centers around 30 kilometers away. This will help to ease the pressure on the environment in a region which is plagued by smog. The aim is to eliminate local emissions completely, reduce the use of fossil fuels, cut operating costs and establish a basis for using the system on a commercial basis in the future.

The mechanical transmission section can be designed with DC motors or stepper motors, depending up on the load, suitable motors can be selected. Here instead of using stepper motors, high speed reduction gear mechanized DC motors are used, the advantage of using these types of motors is a) increased torque b) consumes less power.

In the present system 12V DC motors are used in which one is used for the vehicle movement and the other for the catenary system lifting mechanism i.e., up and down to dock and undock with the electric lines. These motors are built in with reduction gear mechanism; the maximum speed of the motor is 60 RPM, so that the vehicle runs at low speed for demo purpose.

Motors are controlled depending on the input signals provided to the controller through the push buttons. The enable signals produced by the microcontroller are fed to L293D, specifically designed to drive DC motors. Each motor driver consists of four transistors in an H-bridge configuration, controlled by the microcontroller IC. In each section (out of four switching circuits) two transistors are used to increase the current rating. The L293D is capable of driving the motor at a maximum current of 600 milli-amps. The H – Bridge IC designed to operate from 5V DC to 30V DC, hence any DC motor with in this range can be interfaced with this chip. Description of the project work and the components is provided in the further chapters.

The H – Bridge chip is called as a DC motor driver and a single chip can drive two DC motors. In this project work one motor is used to drive the catenary system thorough the H – Bridge IC and the vehicle driving motor is operated by a relay to switch supply between the electric lines and the battery of the vehicle. To control these motors, four switches (push buttons) are connected in the input of the controller.

III. METHODOLOGY

Let's start with the name, H-bridge. Sometimes called a "full bridge" the H-bridge is so named because it has four switching elements at the "corners" of the H and the motor forms the cross bar. The basic bridge is shown in the figure above. The key fact to note is that there are, in theory, four switching elements within the bridge. These four elements are often called, high side left, high side right, low side right, and low side left (when traversing in clockwise order).

The switches are turned on in pairs, either high left and lower right, or lower left and high right, but never both switches on the same "side" of the bridge. If both switches on one side of a bridge are turned on it creates a short circuit between the battery plus and battery minus terminals. If the bridge is sufficiently powerful it will absorb that load and your batteries will simply drain quickly. Usually however the switches in question melt.To power the motor, turn on two switches that are diagonally opposed. The current flows and the motor begin to turn in a "positive" direction. Switch off these two switches and switch on other two switches diagonally in other direction then the motor starts rotating in opposite direction. Actually it is quite simple, the tricky part comes in when we decide what to use for switches. Anything that can carry a current will work, from four SPST switches, one DPDT switch, relays, transistors, to enhancement mode power MOSFET's.

One more topic in the basic theory section is quadrants. If each switch can be controlled independently then we can do some interesting things with the bridge, some folks call such a bridge a "four quadrant device" (4QD). If we built it out of a single DPDT relay, we can really only control forward or reverse. We can build a small truth table that tells us for each of the switch's states, what the bridge will do. As each switch has one of two states, and there are four

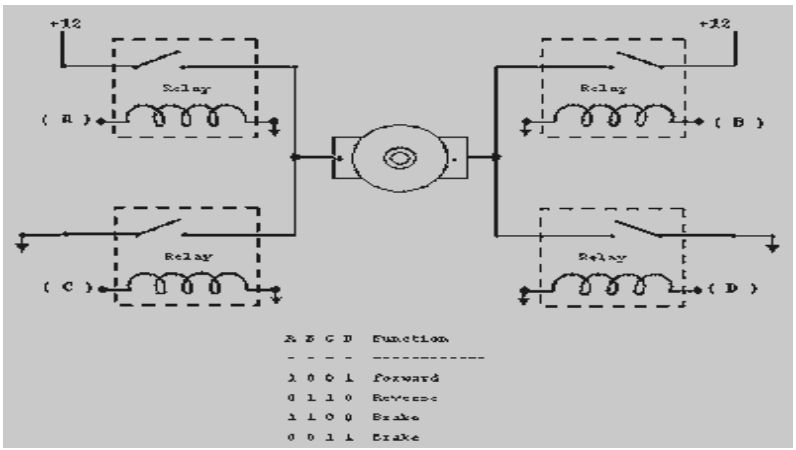
switches, there are 16 possible states. However, since any state that turns both switches on one side on is "bad", there are in fact only four useful states (the four quadrants) where the transistors are turned on.

High Side Left	High Side Right	Low Side Left	Low Side Right	Quadrant Description
On	Off	Off	On	Forward Running
Off	On	On	Off	Backward Running
On	On	Off	Off	Braking
Off	Off	On	On	Braking

In the above table the last two rows describes condition about short circuit the motor that causes the motors generator effect to work against it. The turning motor generates a voltage, which tries to force the motor to turn the opposite direction. This causes the motor to rapidly stop spinning and is called "braking" on a lot of H-bridge designs. Of course there is also the state where all the transistors are turned off. In this case the motor coasts freely if it was spinning and does nothing if it was doing nothing.

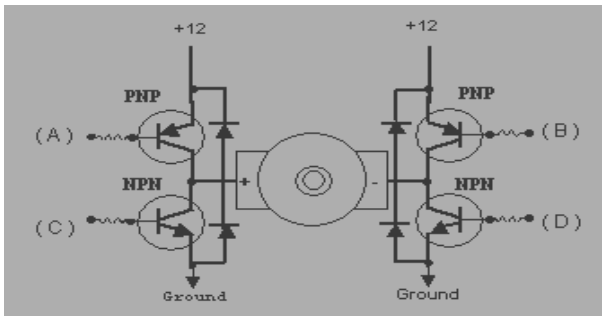
1. **Using Relays:**

A simple implementation of a H Bridge using four SPST relays is shown. Terminal A is High Side Left, Terminal B is High Side Right, Terminal C is Low Side Left and Terminal D is Low Side Right. The logic followed is according to the table above.**Warning:** Never turn on A and C or B and D at the same time. This will lead to a short circuit of the battery and will lead to failure of the relays due to the large current.



2. **Using Transistors:**

We can better control our motor by using transistors or Field Effect Transistors (FET's). Most of what we have discussed about the relays H-Bridge is true of these circuits. See the diagram showing how they are connected. We should add diodes across the transistors to catch the back voltage that is generated by the motor's coil when the power is switched on and off. This fly back voltage can be many times higher than the supply voltage.
Don't turn on A and C or B and D at the same time.



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Transistors, being a semiconductor device, will have some resistance, which causes them to get hot when conducting much current. This is called not being able to sink or source very much power, i.e.: Not able to provide much current from ground or from plus voltage.

MOSFET's are much more efficient, they can provide much more current and not get as hot. They usually have the fly back diodes built in so we don't need the diodes anymore. This helps guard against fly back voltage frying our ICs.

To use MOSFET's in an H-Bridge, we need P-Channel MOSFET's on top because they can "source" power and N-Channel MOSFET's on the bottom because they can "sink" power. It is important that the four quadrants of the H-Bridge circuits be turned on and off properly. When there is a path between the positive and groundside of the H-Bridge, other than through the motor, a condition exists called "shoot through". This is basically a direct short of the power supply and can cause semiconductors to become ballistic, in circuits with large currents flowing. There are H-bridge chips available that are much easier, and safer, to use than designing our own H-Bridge circuit.

L293D Dual H-Bridge Motor Driver

L293D is a dual **H-Bridge** motor driver, so with one IC we can interface two DC motors, which can be controlled in both clockwise and counter clockwise directions. Since the device is having four half 'H' Bridges, thereby if required four motors can be driven through this single device, moreover the task is to run all four motors in one direction only. **L293D** has output current of 600mA and peak output current of 1.2A per channel. Moreover for protection of circuit from back EMF output diodes are included within the IC. The output supply (VCC2) has a wide range from 4.5V to 36V, which has made **L293D** a best choice for DC motor driver.

IV. EXPERIMENTAL RESULTS

In this IC there are two different power supplies (Vcc1 and Vcc2). Vcc1 is for logic input circuit while Vcc2 is supply for the output circuit. This means that we should apply about 5V to Vcc1 and whatever voltage required by the motor (up to 36V max for this IC) to Vcc2. Each Half H-Bridge has an individual Ground. So we must ground the terminal corresponding to the Half H-Bridge, depending up on the circuit design, if required all four terminals of bridges can be connected to the ground.

Each Half H-Bridge has an Input (A) and output (Y). Also there are enable pins to turn on the Half H-Bridges. Once a Half H-bridge is enabled, then the truth table is as follows:

INPUT A	OUTPUT Y
L	L
H	H

So we just give a High level when we want to turn the Half H-Bridge on and Low level when we want to turn it off. When the Half H-Bridge is on, the voltage at the output is equal to Vcc2.

If we want to make a Full H-Bridge, we must connect the motor (or the load) between the outputs of two Half H-Bridges and the inputs will be the two inputs of the Half H-Bridges.

Suppose we have connected Half H-Bridges 1 and 2 to form a Full H-Bridge. Now the truth table is as follows:

INPUT 1A	INPUT 2A	OUTPUT 1Y	OUTPUT 2Y	Description
L	L	L	L	Braking (both terminals of motor are Gnd)
L	H	L	H	Forward Running
H	L	H	L	Backward Running
H	H	H	H	Braking (both terminals of motor at Vcc2)

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V. CONCLUSION

We have designed and implemented a prototype module; and the results are found to be satisfactory. Since it is a prototype module, a simple moving vehicle is constructed. In future this can be implemented not only on highways but also on the normal roads with the electric line.

While designing and developing this proto type module, we have consulted few experts those who are having knowledge in Mechatronics, and these professionals working at different organizations belongs to Hyderabad helped us while fabricating this project work. Since it is a prototype module, much amount is not invested. The whole machine is constructed with locally available components, especially the mechanical components used in this project work are procured from mechanical fabricators and they are not exactly up to the requirement. Some of the modifications must be carried out in design to make it as real working system.

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A LITHOPHANE MODEL MAKING PROCESS TO 3D PRINTERS

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ABSTRACT

This paper focuses on to convert photographs into embossed 3D models and then bring them to life using a 3D printer. A Lithophane is a 3-dimensional generation of a 2-dimensional image and 3D representation of a photo can be seen only when it is illuminated from behind. Turning images into 3D objects give us more feeling and literally adds a new dimension. The lithophane can be manufactured by the way of an automated additive manufacturing process, such as 3-D printing. lithophanes are a simple way to enhance your favourite photos. 3D printed photos also known as 3D Printed lithophanes, are an extremely unique and creative application. The process adopted in lithophane is FDM technology, in which different the materials like PLA (polylactic acid), ABS (acrylonitrile butadiene styrene), etc. By heating the filament material to its melting point and it is deposited layer by layer. Combination of many layers will give us a final 3D Printed model.

Keywords: Lithophane Printing Process, Lithophane Model,3D Printer, FDM Process & PLA.

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1. INTRODUCTION

We all know how precious to us the photos and images in our life. transforming these photos into Lithophanes that will light up your image as the lithophane lits up when light passes through it. With 3D Printing Technology today we can easily transform images into a 3D model. 3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. In an additive process, an object is created by laying down successive layers of material until the entire object is created.

Rapid prototyping is the fast fabrication of a physical part, model or assembly using 3D Computer Aided Design (CAD). Rapid prototyping technologies are being used in various fields of engineering. These technologies are:

1.Fused deposition modelling (FDM) 2. Stereolithography (SLA)
3.Laminated object manufacturing (LOM) 4.Selective laser sintering (SLS)

FDM works on an Additive principle of laying down melted material in layers to create objects. Material from the filament spool gets extruded towards the nozzle, heated up and then laid layer over layer to form the 3-Dimensional object. FDM is also known as fused filament fabrication (FFF)

The 3D printers that work on FDM technology consist of the printer platform, a nozzle (also called as printer head) and the raw material in the form of a filament. When the FDM printer begins printing, the raw material is extruded as a thin filament through the heated nozzle. It is deposited at the bottom of the printer platform, where it solidifies. The next layer that is extruded fuses with the layer below, building the object from the bottom up layer by layer. The system sends Design-Specific commands to a controller head, which releases the melted thermoplastic accordingly. This process is repeated layer by layer based on specific design coordinates. The molten material becomes a solid object as soon as it is exposed to a cooler environment.

3D printing significantly challenges mass production processes in the future. This type of printing is predicted to influence industries, like automotive, medical, education, equipment, consumer products industries and various businesses.

2. LITHOPHANE DESIGN

Lithophanes can be created in a variety of software tools like 3DP. Rocks, Lithophane maker, Photoshop etc. In this paper, the 3dp.rocks/Lithophane website is preferred because It is simple to use and has 8 different layouts for model design. It makes easy to upload a photo and download a model for 3D printing but for best results, the photo should be edited.

Procedure to be followed:

- Open 3dp.rocks website
- Click on the Images tab and then upload your image. Once the image has been uploaded, it will generate a lithophane model
- Once you return to the Model tab, you'll notice your lithophane is almost ready. You can choose different layouts for your lithophane.
- Select setting tab→ Model Setting →Change parameters like size, Thickness, border etc. →click on the model tab and click on Refresh (This would ensure that the print comes out to your preferred dimensions)
- Select setting tab→ Image Setting →Change negative image to positive image→ click on the model tab and click on Refresh.
- Finally, click "Download" in the Model tab. The browser will download the STL file.

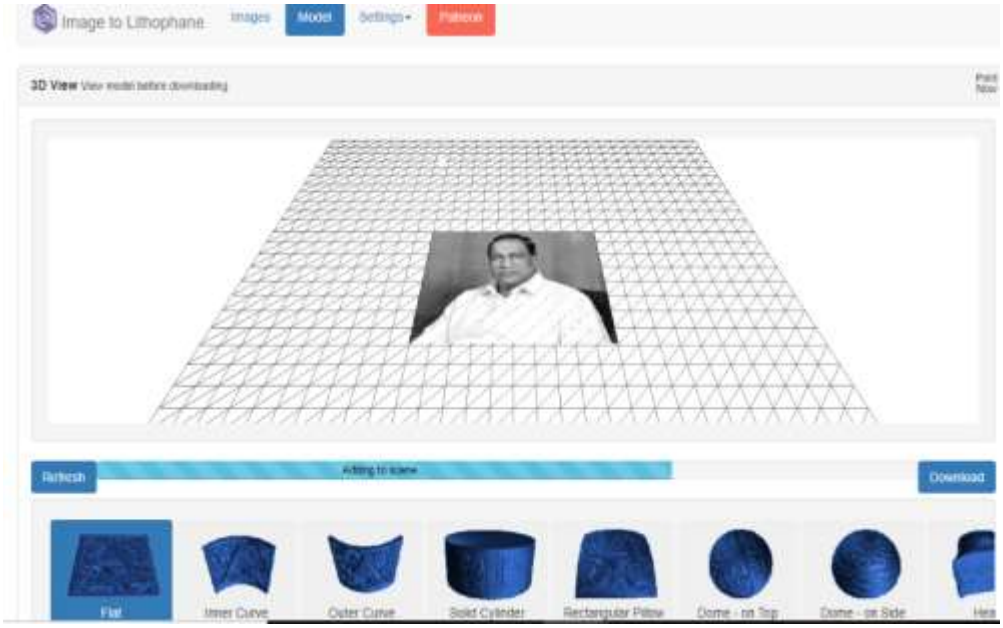

Figure 1 Image Uploading

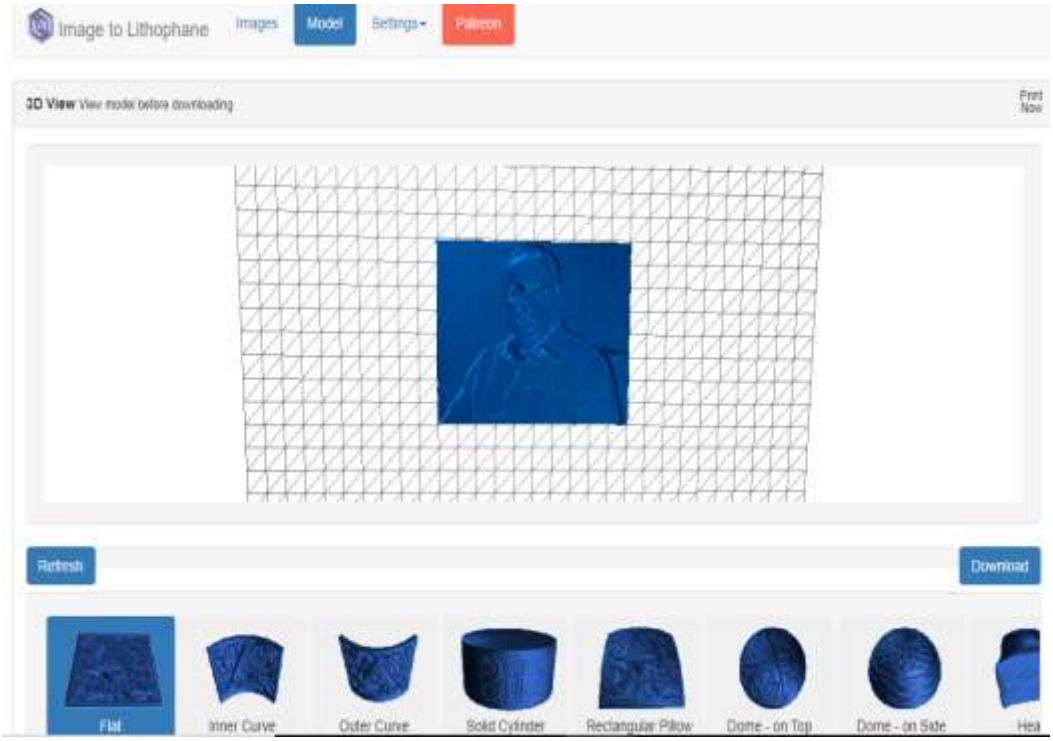

Figure 2 Image to Lithophane Conversion

3. MODEL SLICING AND GENERATION OF G-CODE

There are many 3D slicing software's available on the market. these are CURA, Slic3r, idea Maker, Z-Suite, MakerBot Print etc. Cura 3D is one of the many. Cura was developed, hosted and maintained by 3D printer company Ultimaker. Cura is slicing software for 3D printers. The STL or OBJ file can then be imported into the Cura software .it is slices model into layers to create a file known as G-Code, which is the code that a 3D printer understands. This G-Code is just a text document (in essence) with a list of commands for the 3D printer to read and follow such as hot-end temperature, move to the left this much, right that much etc.

As every printer has a different setup, print area, build plate and nozzle size, the Cura slicing software needs to know these hardware details in a printer profile. Once it has the required details, you can then specify settings like layer height and thickness. (shown in Table1) Based on the vital stats of the printer and your settings, Cura will calculate the path the printhead needs to take to print your model and produce a list of instructions for the printer. These instructions are saved in that G-Code file. The G-Code can then be saved to an SD card or sent to the printer over wireless or cable depending on the printer directly from Cura.

Steps to be followed:

- Open STL file in CURA by Clicking the “Load” button in the top left-hand corner of the viewport.
- The 3D model appears on the platform.
- Rotate and scale the model as per the requirement by Clicking the respective command icons in the lower left-hand corner of the viewport.
- Select “Save Toolpath” to create G Codes for the part. Save the file that is generated, in an SD card.

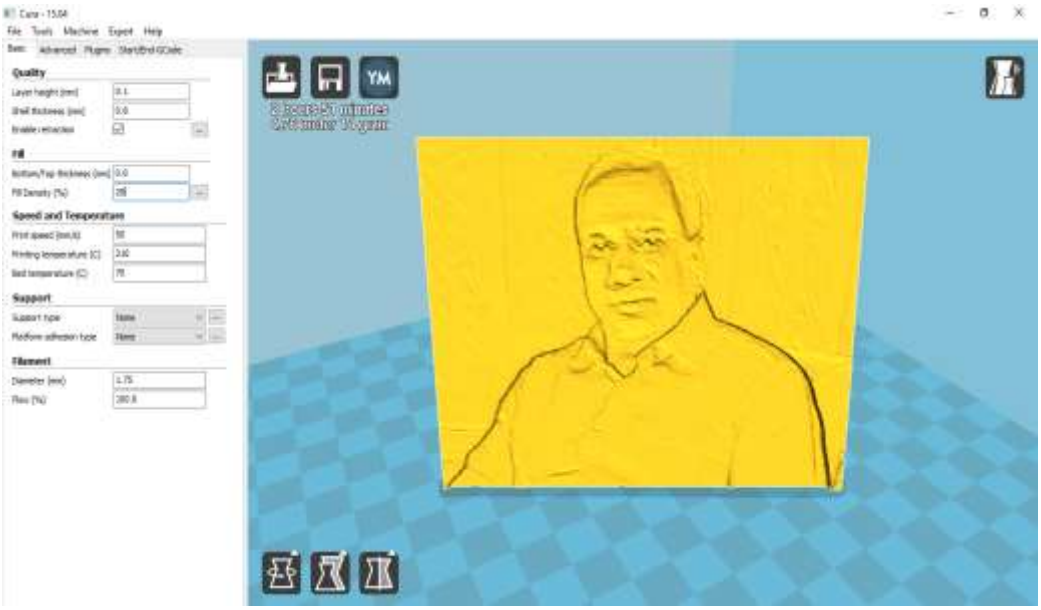

Figure 3 3D Model in CURA

4. LITHOPHANE PRINTING PROCESS

3D Printing is the process where liquid molecules, powder or granulated material is solidified and joined to achieve the desired shape and size in three-dimensions. Normally it’s done one layer at a time to make sure the proportions of 3D are maintained. 3D printing companies include (Brahma3, Thinl3D, JGroup Robotics,3Ding etc.) those companies that manufacture and distribute 3D printers. Most also offer 3-D printing services and some even conduct training programs for 3D printing. 3D printing has the power to change the entire industrial landscape because you don't need to make or buy special moulds or tools. 3Ding is one of India's Largest Manufacturer of 3D Printers of the FABX & Hydra. I used HYDRA- 200 to Print Lithophane. The listed parameters have to enter manually by selecting Machine Tab→Add new machine in Cura software.

Specifications	Hydra 200 Pro
Build Volume	200 * 200 * 200 mm3
Bed Temperature	70^0 C
Print Speed	20 – 80 mm/s
Nozzle size	0.4mm
Connectivity	USB, SD Card
Max. Temp.	300^0 C
Weight	13.5 kg
Power Consumption	60 –80 W
File Type	STL
Material	PLA
Software	Cura
Filament Diameter	1.75mm



Figure 4 Setup

The following procedure may be used to operate the 3D Printer:

- Switch on the 3D printer and allow it to stabilize. Insert the SD card with the G Code file into the SD port of the printer.
- Press the knob on the 3D printer to get the options. Rotate the knob to scroll the options. Select “Preheat PLA” from display by pressing the knob. Wait to get a pre-set temperature of 210^0C.
- Heating melts the plastic in the nozzle that might have been left from previous work. Use a wire strip to clean and clear the nozzle then Feed the PLA material to the extruder through filler to the nozzle.
- Remove and clean the magnetic plate. Fix the plate on bed and adjust the height if necessary.
- Press the knob to navigate through options and select “Print from SD”. Choose the G Code file from SD to be printed. 3D printer will heat the bed automatically and return to the home position. This process may take a few minutes.
- Now, 3D Printer prepares the model and start printing. Wait till the completion of a model on the bed. After model printing, select “Disable Steppers” by using the knob and Rotate the middle slider of the bed to lower the bed.
- Remove the magnetic plate from the bed and Use a knife or a sharp tool to remove the model from the plate.

There are a number of variables that can affect your lithophane including the filament used, model thickness, slicer settings and light source. You can experiment by printing multiple lithophanes and adjusting the z-height.

5. 3D PRINTED LITHOPHANE

The printed lithophane is shown below. I have printed a photo of my Chairman Sri. Ch. Malla Reddy Garu. It looks like a flat piece of plastic with a few scratches on it, but put it in front of a light source like the sun, and you'll see an image.



Figure 5 LIGHT OFF



Figure 6 LIGHT ON

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Comparison of Shear Rigidity of Epoxy and Vinyl Ester Reinforced Hybrid Honeycomb Core

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Abstract

In this study, the dynamic shear properties of a composite honeycomb core material made of glass fiber reinforced (epoxy resin and vinyl ester) polymers without and with reinforcement of carbon nanotubes are investigated. The carboxylic acid functionalized multi-walled CNTs were randomly dispersed into an organic solvent (extra pure acetone) to split and add homogeneously into the vinyl ester resin by using the ultra-sonication technique®. The honeycomb composite test materials were made through the high carbon- chromium corrugation honeycomb die using the vacuum-assisted hand-layup technique. The vibration analysis of honeycomb materials was performed experimentally to obtain the shear moduli along the corrugation (G_{xz}) and joining (G_{yz}) directions based on the dynamic approach. The results showed that the reinforcement of CNTs in the composite honeycomb materials would enhance the shear moduli significantly without any modifications in the mass of the honeycomb structure. The strong interfacial bonding and random addition of CNTs in the composites improve the shear properties considerably than that of honeycomb without CNT reinforcement. This result provides the guidelines for the modern designer on increasing the shear properties of the honeycomb composite structures using the CNT reinforcement.

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*Keywords:*CNT; GFRP; honeycomb core, composite structure, vinyl estercomposite, epoxy composite, vibration analysis, shear moduli, dynamic approach

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Nomenclature

CNTs	Carbon nanotubes
HCC	Honeycomb core
MWCNTs	Multi Walled-Carbon nanotubes
GFRP	Glass fiber reinforced polymer
CFRP	Carbon fiber-reinforced polymer
ASTM	American Society for Testing and Materials
wt	Weight
%	Percentage
ω	Angular frequency
ω_{hxz}	Natural frequency along corrugation direction
ω_{hyz}	Natural frequency along joining direction
FRF	Frequency response function
DAQ	Data acquisition
l_c	HCC length
w_c	HCC width
h_c	HCC height
m	Solid block mass
h_m	Solid block depth
a_c	HCC cell side
s_c	HCC cell size
t_c	HCC Cell wall thickness
E_z	Young's modulus
I_{mx}	Moment of inertia
G_{xz}	Corrugation direction
G_{yz}	Joining direction

1. Introduction

The honeycomb structures are widely being employed in aircraft, helicopters, military, rockets, railroad vehicles and especially in automobile structures because of their customized mechanical properties and improved damping capability which couldn't be achievable in isotropic as well as laminated composite sheets. Though, the usage of these type of materials is inadequate due to their limited viscoelastic and damping capability of the hexagonal honeycomb composites. Since the invention of CNTs by Iijima [1], due to their unique mechanical properties, excellent thermal conductivity, and electrical conductivity have got consideration from many designers to manufacture the CNT fortified composites to attain the superior physical properties of the fiber reinforced composites. CNTs are often added to polymers matrices to improve its physical and chemical properties so that they can be used as substitutes for existing materials. Various researches have been carried out in the field of polymer composites. Gupta and Harsha [2] investigated the pinhole defects in CNT-fortified composites using finite element modelling. Armchair and zigzag configurations of CNTs were focused for the analysis. It was observed that Young's modulus reduces with the presence of pinhole defects and the zigzag configuration of CNTs provide a better reinforcement than that of the armchair configuration. Nam et al. [3] studied the effect of CNT diameter on mechanical properties of CNT sheets and composites. The composite material chosen was CNT-epoxy. The reduction in the diameter of CNT increases the properties of both CNT sheets and composites. However, the reduction in the diameter of the CNT did not affect the alignment of CNT. Rawat and Singh et al. [4] examined the impact behavior of CNT based fiber reinforced polymer composites using the LS-DYNA tool for validation. The results from the low and high velocity impact test revealed the existence of CNT fortification in fiber-reinforced composites could offer ahigher impact resistance that of without CNT fortification. Zhou et al. [5] investigated the compression response from composite sandwich structures made of carbon-fiber epoxy and glass fiber epoxy

materials. The compression strength of the carbon composite sandwich structures increases with an increase in corrugation thickness than that of glass composite sandwich structures.

The effectiveness of the elastic properties of the CNT reinforced composites are significantly influenced by ultra sonication and high speed mechanical stirring techniques. Shokrieh et al. [6] used sonication and high-speed mechanical stirring to disperse CNTs into vinyl ester resin, it was found that higher sonication time can lead to the damages of CNTs. Chen et al. [7] incorporated MWCNTs into vinylester resin through high-speed mechanical stirring. The dynamic scanning calorimetry and dynamic-mechanical behaviour tests were carried out to find the curing behaviour of a vinylester with the addition of CNTs. It can be observed that the incorporation of CNTs into vinylester resin could increase the storage modulus and the addition of the initiator in the mixture of vinylester-CNT resin could increase the curing time. Nabinejad et al. [8] presented an experimental study on hybrid composites comprising of multi-walled carbon nanotubes in vinyl ester resin. It can be seen that that at higher percentages of carbon nanotube content, the viscosity of the solution was high and also there was a decline in the flexural strength for higher weight percentages of carbon nanotubes. Gryshchuk et al. [9] studied the electrical, thermal and mechanical properties of the composites. The analysis was carried out for the incorporation of 2 wt% of CNT content in Vinylester (VE), Vinylester-urethane (VEUH) and Vinylester/epoxy (VE/EP). It was found the polymers which have a very firm crosslinking prove to be prone to MWCNTs with high aspect ratios but are suitable for low aspect ratio MWCNTs. Zhu et al. [10] incorporated single walled CNT into Vinylester and then transferred the resin on to glass fibers via vacuum assisted resin transfer moulding process. There was a vast increased in shear strength with 0.015%wt of CNTs and flexural strength also improved. Shokrieh et al. [12] studied the influence of adding various wt. % of multi-walled carbon nanotubes in the vinyl ester composites. The result showed that the addition of least wt. % of CNTs could improve the mechanical properties drastically. However, higher wt.% of CNT content could increase the brittleness of the composites. Wonderly et al. [13] studied the elastic properties of glass fibers and carbon fibers by reinforcing it into the vinylester resin. Various analysis was carried out such as tension, compression, indentation and impact tests on both composites and the results were compared. The carbon fiber composite showed better results than glass fiber composites in all aspects except for transverse tensile strength. Karapappas et al. [14] studied the fracture behaviour of CNT reinforced carbon panel. Three different weight percentages of CNTs were used and dispersed the CNTs into the polymer using high speed mechanical stirring technique. Lower weight percentages of CNTs showed a decrease in fracture properties due to low viscosity while higher weight percentages showed a significant increase in the results. Almajid et al. [15] studied the various mechanical, electrical and thermal characteristics of composites by reinforcing the graphene and CNT into Vinylester resin. The results shown that the CNT samples had better flexural modulus than graphene but graphene samples had better scratch resistance but the resistance declined once the graphene concentration exceeded by 2 wt%. On the other hand, there was a significant increase in corrosion resistance when CNT-graphene composites were coated onto the steel. Rawat and Singh [16] studied the damage tolerance of carbon fiber laminates reinforced with MWCNTs. Different concentrations of MWCNTs were used for the drop-weight test using the Instron-CEAST 9350. It was found that maximum energy absorption was achieved with a minimum CNT doping.

Honeycomb structures have excellent shear strength, bending stiffness and better structural integrity. These structures have excellent fatigue cycles and mostly used in cores of the sandwich panels. Lee et al. [17] studied the mechanical properties and shear deformation of honeycomb composite at elevated temperature. It was found that at high temperature the resin holds the cell walls together and undergoes fracture which leads to the deformation of honeycomb structure. Also, it can be seen that at elevated temperatures the adhesiveness of the resin decreases rapidly due to less binding effect. Banerjee et al. [18] studied various honeycomb cores and found out numerous failure methodologies. The major reasons for failure are considered to be buckling and yielding. Failure maps were constructed for certain core structures based on optimization. It also stated that the addition of reinforcement to honeycomb structures can increase the Young modulus of composite material. Siddiqui et al. [19] studied prepregs of CFRP composites with the addition of carbon nanotubes(CNTs). The effects of surfactant-treated CNTs on cure behavior of epoxy and CFRP prepreg are evaluated. The catalytic activity of CNTs is negligible for a 0.5 wt% filler content. Whereas, it becomes prominent when the CNT content is increased to 1 wt%. The result shown that high speed mechanical stirring and functionalization of CNTs could reduce the viscosity of the CNT-epoxy solution. Sassi et al. [20] investigated experimentally the in-plane properties of adhesively bonded composite joints. It consists of a bi-axial fiber-glass mat in a vinyl ester resin matrix. Samples were tested at four different impact pressures from 1 to

4 bar with strain rates of 210, 312, 528, 713 s^{-1} respectively. The study concludes that the composite materials have shown that strength is dependent on strain rate and dynamic parameters increase with strain rate. Wang and Liu [21] incorporated circular carbon fiber reinforced polymer tubes into a honeycomb core. Detailed mechanical performances were determined and honeycomb cells filled with circular tubes (HFCT) were found to have an increase in energy absorption. Park et al. [22] investigated carbon-fiber epoxy square honeycomb and the parent composite material. The sample was tested in quasi-static compression and dynamic compression at various strain rates using a kolsky bar arrangement. The peak value of wall stress of honeycomb was one third of the parent material for all strain rates. Finite element analysis was done to find out the decrease in wall strength and the cause was found to be stress concentration at slot-root of the honeycomb cell walls. He and Hu [23] studied sandwich panels which include a honeycomb core. The mechanical and structural properties are found out using ASTM standard C393-62. The weight ratio of the whole sandwich structure is deduced and then ASTM Tests are performed. A 50-66.7% weight ratio is decided upon and gives optimum test results. Schwingshackl et al. [24] examined the available methods to find the material property of the honeycomb cores. Since ASTM tests are costly and time consuming, a new method called alternative dynamic approach was adopted to evaluate the honeycomb core. The results obtained through the dynamic approach are on par with existing ASTM test standards. Toozandehjani et al. [25] reviewed different types of composite materials offered for the aerospace industry. An extensive study was conducted with all types of composite materials available and discussed briefly about polymer matrix composite and the reinforcements used. It describes the usage of sandwich panels with the honeycomb core due to their high stiffness to weight ratio which limits the bending.

From the literature, it can be identified that most of there searchers have focused on the evaluation of the elastic properties of honeycomb structures with and without the addition of foam or CNT packed honeycomb core cell pockets made of isotropic/orthotropic materials. However, the evaluation of shear property of CNT reinforced honeycomb core materials has not yet been investigated. These core materials would improve the structural stiffness, honeycomb shear strength and material damping capability considerably without any alteration in the structural mass.

In this study, various shear properties of the various fiber reinforced composite honeycomb materials without and with CNT fortification in vinyl ester and epoxy resins are investigated. The 1 wt% of CNT content is reinforced into the vinyl ester resin and epoxy resin using the ultra-sonication® and hot base heat shearing method. The vibration analysis of various hybrid honeycomb core composite materials were performed to evaluate the shear moduli along the corrugation and joining directions of the hexagonal honeycomb structure using the dynamic approach. Since ASTM tests are costly and time consuming, a new method called dynamic approach was adopted to evaluate the shear properties of the composite honeycomb. Further, the acquired results are well compared with those of vinyl ester and epoxy honeycomb core without the usage of CNTs in the composite material to show the efficiency of using CNT fortification in the regular hexagonal core structure enhancing the stiffness, damping and shear modulus along G_{xz} and G_{yz} directions of the composite structure.

2. Fabrication of Honeycomb Core Composites

The honeycomb cores were fabricated using the functionalized MWCNTs procured from bottom up technologies corporation, Jharkhand® with approximate aspect ratio of 10µm (length) and 17nm (diameter), unidirectional Inter-glassfiber 92145(220 GSM), vinyl ester resin, epoxy resin, hardener at 10:1, benzoyl peroxide as initiator and cobalt naphthenate as promoter. The density of epoxy resin is 1.2 g/cm^3 and vinyl ester resin is 1.8 g/cm^3. The procured CNT – vinyl ester and CNT – epoxy resin matrices were used to prepare the solution. Initially, the CNTs were dispersed into the polymer using heat shearing method. First, 300g of vinyl ester was poured in a 1000ml beaker and heated in the oven at 50°C for 45 minutes. Then, 1 wt% of CNT content were taken in another 1000ml beaker and mixed with 300g of extra pure acetone. This acetone and CNT mixture was stirred at 500rpm for 45 minutes using a mechanical stirrer at room temperature. This was done so that carbon-carbon bonds in CNTs could be disintegrated and dispersed evenly into vinyl ester and epoxy resin matrices. The beaker containing vinyl ester and epoxy resin matrices are takenfromoven and kept aside at ambient condition to attain equilibrium. The acetone and CNT solution are kept inside the oven at room temperature for 60 minutes for the evaporation of acetone existed in both resin

matrices. The 300 g of vinyl ester resin is then added to CNT-Acetone mixture and then stirred at 1500 rpm for 60 minutes, only this time the beaker is kept in chilled water. Similarly, the CNT-epoxy solution was prepared for the fabrication.

The glass fiber was cut with a dimension of 80 mm x 10 mm having [0°/90°] ply orientation for fabrication. The weight of the glass fiber pieces was measured. An equivalent amount of vinyl ester resin is taken and 2 wt. % of hardener, 1 wt% of promoter and initiator are added to the resin. Wax is applied on a smooth surface and 0° glass fiber ply is kept on it. The resin is poured on the glass fiber and spread using a hand roller. Similarly, 90° glass fiber ply is kept on top of the 0° ply and the resin is poured and spread. The stacking sequence of the glass fibers was kept as [0°/90°]. The thickness of the individual layer is 0.19 mm, two plies were used to fabricate a corrugation sheet. A hand layup method was adopted to make the corrugation sheets. The sample is left to rest for 15 minutes. Then the sample is placed inside the high carbon-high chromium honeycomb die and cured for 12 hours. The corrugation sheet was formed after keeping it in the honeycomb die. Following this, the corrugation composites sheets were made using the fiber reinforced CNT-epoxy resin material with the same process carried out for the fabrication of fiber reinforced CNT-vinyl ester corrugation composite sheets are presented in Figure 1.

Further, the fabrication of composite honeycomb structures was carried out using the corrugation sheets of fiber reinforced CNT – vinyl ester and CNT – epoxy resin composites in 0° and 90° ply orientations. The corrugation sheets are then cut at 80 mm length and 10mm width vertically using the ultrasonic SONOFILE® cutter. The half hexagonal strips are then attached together using the Huntsman Araldite2012® to fabricate the composite honeycomb core structures. The test samples of honeycomb core made of glass fiber with and without CNT reinforcement was made with a dimension of 80 mmx 80 mm x 10 mm. Then, the fabricated specimens were kept in the vacuum oven at 75°C for 2 hours to develop a strong bonding between polymer chains of CNT resin matrices of the composite honeycomb materials. The specimen is left to rest for 30 minutes at room temperature after the 2 hours curing process has done for the honeycomb structure.

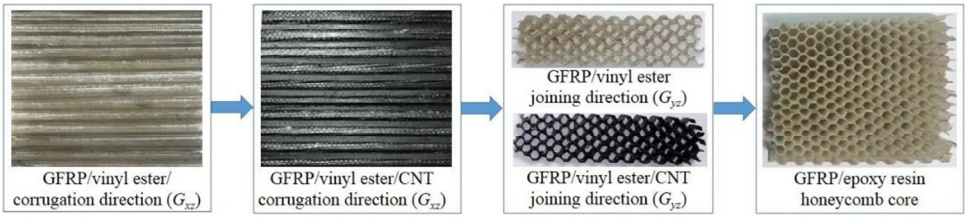

Fig. 1. Steps carried out to fabricate the vinyl-ester and epoxy honeycomb composite with and without CNT fortification

3. Experimental Analysis of Honeycomb Core Composites

The fabricated composite honeycomb structures were used to evaluate the out of plane shear properties along the corrugation and joining directions. The dimensions of the honeycomb core is maintained as 80 mm x 80 mm x10 mm. The test specimens (honeycomb cores) were mounted on the foundation using Huntsman Araldite 2012® and a solid mass is placed on the honeycomb core structure along the transverse direction. The vibration analysis experimental test setup is presented in Figure 2. The dynamic analysis was carried out using the roving Impulse force hammer 086C03 to energize the solid mass rested on the honeycomb core. A miniature transducer, placed in the z-direction, was kept on the sides of the mass to measure the acceleration due to the excitation along the G_{xy} and G_{yz} directions. These signals were amplified into FRF through the 4 channel DAQ-042451. The modal natural frequencies and damping ratio of the test specimens were successively obtained from the dominant peaks from the FRF. The evaluated natural frequency, damping ratio, Young's modulus, moment of inertia, angular frequency and geometrical parameters (Table 1) are substituted in equation 1 to obtain the shear properties of the honeycomb core by using the dynamic approach technique [23].

$$G_{xz} = -\frac{\left(-12I_{mx}\omega_{hxz}^2 h_c + a_c^4\right) m\omega_{hxz}^2 h_c}{\left(3\omega_{hxz}^2 h_m^2 h_c m + 12I_{mx}\omega_{hxz}^2 h_c - a_c^2 E_z\right) a_c{}^2} \tag{1}$$

Where G_{xz} denotes the shear modulus along the corrugation direction. Similarly, the shear modulus G_{yz} can be calculated along the joining direction of the honeycomb core material.

Table 1. Measured geometrical parameters of the composite honeycomb core structures.

Geometrical parameters	HCC length	HCC width	HCC height	solid block mass, *kg*	solid block depth	HCC cell side	HCC cell size	HCC Cell wall thickness
Dimensions are in metre	0.08	0.08	0.01	1.36	0.02	0.006	0.008	0.0006

The results presented in Table 2, shows that the CNT reinforcement in the epoxy honeycomb composite increases the natural frequencies, damping ratios and shear moduli along transverse shear directions *Gxz* and *Gyz* than those of CNT reinforcement in the vinyl ester honeycomb core structure.

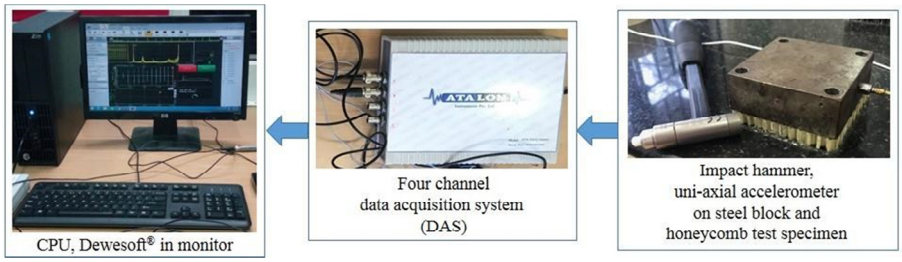

Fig. 2. Photograph of the experimental test setup

Also, the results show that the CNT reinforced honeycomb core structures increase the dynamic responses and shear moduli than those of without CNT reinforcement.

Table 2. Evaluation of natural frequencies, damping ratios and shear moduli of honeycomb composite structures without and with CNT fortification

Type of composite HCC structure	Natural Frequencies (Hz)		Damping ratios (ζ)		Shear moduli (MPa)	
	Corrugation direction, ω_{hxz}	Joining direction, ω_{hyz}	Corrugation direction, ζ_{hxz}	Joining direction, ζ_{hyz}	Corrugation direction, G_{xz}	Joining direction, G_{yz}
GFRP/epoxy/HCC without CNT	692.77	655.57	0.0780	0.0758	183.42	164.30
GFRP/epoxy/HCC with CNT	819.57	755.37	0.0921	0.0870	256.72	216.92
GFRP/vinyl ester /HCC without CNT	587.50	487.50	0.0310	0.0253	131.91	90.82
GFRP/vinyl ester /HCC with CNT	681.25	537.50	0.0541	0.0408	177.37	110.41

It is related to the random distribution of functionalized nanoparticles in the glass fiber reinforced honeycomb material, improves the shear force among the resin matrices and nanoparticles. In addition to this, it is observed that the shear moduli from the corrugation axis are maximum than those of joining axis of the composite honeycomb without consideration of nanoparticles fortification in the epoxy and vinyl ester. It can be due to the enhanced stiffness and better distribution of shear force of the honeycomb composites from the continuous double cell geometry of the hexagonal wall direction.

4. Results and Discussion

The natural frequencies, damping ratio, and shear moduli of the fiber reinforced CNT-epoxy in the honeycomb core materials at the corrugation direction under fixed-fixed end condition increases such as 692.77Hz, 0.0780 and 183.42MPa than that of the without CNT reinforcement. Whereas, the CNT-vinyl ester reinforced in the honeycomb core materials at the corrugation direction under fixed-fixed end condition increases such as 587.50Hz, 0.0310, 131.91MPa than that of the without CNT reinforcement. Similarly, the honeycomb with CNT-epoxy resin and CNT-vinyl ester reinforced in honeycomb core at the joining direction increases than that of the without CNT reinforcement. Further, the results revealed that there is a significant increase in natural frequency, damping ratios, and shear moduli at the corrugation direction than that of the joining direction of the honeycomb structures made of epoxy resin and vinyl ester with and without CNT reinforcement. This can be due to the fact that the corrugation direction (G_{xz}) has a continuous structure, while the assembly of corrugated structure is made into a continuous structure along the joining direction (G_{yz}) by using an adhesive (Huntsman Araldite 2012®).

5. Conclusion

The present study investigates the shear properties of the fiber reinforced honeycomb structures without and with CNT reinforcement in epoxy resin and vinyl ester. The test samples were fabricated with 1 wt% of CNT in the composite honeycomb core materials. The dynamic characterization of honeycomb composite materials has been performed experimentally to determine the out of plane shear properties based on the dynamic approach. The result revealed that the addition of CNT in epoxy honeycomb core increases the shear properties by 28.55% and 24.26% in *xz* and *yz* directions than that of without CNT reinforcement. Similarly, the CNT in vinyl ester honeycomb core increases by 42.70% and 37.99% in *xz* and *yz* directions than that of without CNT reinforcement. This can be related to fact that the strong polymer chain bonding developed between the CNT and resin matrices. However, the CNT-epoxy honeycomb is increased by 30.91% and 49.10% along *xz* and *yz* directions than those of the CNT-vinyl ester honeycomb core. Similarly, the epoxy honeycomb core without CNT reinforcement is increased by 28.08% and 44.72% along *xz* and *yz* directions than those of the vinyl ester honeycomb. It can be due to the poor polymer chain bonding between the fiber and viscous less vinyl ester honeycomb without and with CNT reinforcement. The result demonstrates that the addition of CNT content in the hexagonal honeycomb material increases the natural frequencies, damping ratios and shear moduli due to the improved shear force between the CNT and matrices. Further, it can be observed that the shear properties along the corrugation direction of honeycomb core made of epoxy and vinyl ester with and without CNT is higher than those of the shear properties along the joining direction. This can be due to the improved stiffness and enhanced shear force along the double cell wall in *xz* direction. Therefore, it can be seen that the addition of CNT content in honeycomb core could increase the frequencies, damping ratios and shear moduli simultaneously along both directions of the honeycomb structure considerably.

Acknowledgments

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DESIGN AND ANALYSIS OF 4-CYLINDER PISTON AND CONNECTING ROD ASSEMBLY

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Abstract

The piston of an IC engine is to receive the impulse from the expanding gas and to transmit the energy to the crankshaft via the connecting rod. The piston must also dissipate a large amount of heat from the combustion chamber to the cylinder walls. The aim of this present work is to Design; Assemble the Piston, Connecting Rod; Crankshaft for a 4-stoke air-cooled Engine by theoretical calculations & also to perform the simulation of this mechanism. Modelling of mechanism is carried out Pro/Engineering software & Analysis is performed in ANSYS. Structural analysis and steady state thermal analysis is performed to calculate displacements & thermal stresses under static loads, Vibration response of structure i.e. (natural frequencies & mode shapes) is also checked by using modal analysis and lastly we perform RBD of mechanism to check the behaviour of structure.

1. INTRODUCTION

For many years, internal combustion engine research was aimed at improving thermal efficiency and reducing noise and vibration. As a consequence, the thermal efficiency has increased from about 10% to values as high as 50%. In recent times with recognition of the importance of air quality, there has also been a great deal of work devoted to reducing emissions from engines. Currently, emission control requirements are one of the major factors in the design and operation of internal combustion engines.Shin-Yong Chen, et al in their research paper "Dynamic Analysis Of a Rotating Composite Shaft" One of the key factors in designing a motor built-in high speed spindle is to assemble the motor rotor and shaft by means of hot-fit. Presented in this paper is a study of the influence of a hot-fit rotor on the local stiffness of the hollow shaft. Dynamic analyses of the rotorhollow shaft assembly using contact elements are conducted. The normal contact stress state between the rotor and the hollow shaft is obtained through the use of contact elements with friction effects included. The normal contact stress, considered as the pr-stress between the rotor and the hollow shaft, is then adopted for subsequent modal analyses. the modal analysis results are verified by a modal testing experiment C. Azoury et al presented a report on the experimental and analytical modal analysis of a crankshaft. The effective material and geometrical properties are measured, and the dynamic behaviour is investigated through impact testing. The threedimensional finite element models are constructed and an analytical modal analysis is then performed to generate natural frequencies and mode shapes in the three-orthogonal directions. The finite element model agrees well with the experimental tests and can serve as a baseline model of the crankshaft. R. J. Deshbhratar, et al analyzed 4- cylinder crankshaft and model of the crankshaft were created by using Pro/E Software and then imported to ANSYS software. The maximum deformation appears at the centre of crankshaft surface. The maximum stress appears at the fillets between the crankshaft journal and crank cheeks, and near the central point. The edge of main journal is high stress area. The crankshaft deformation was mainly bending deformation under the lower frequency. And the maximum deformation was located at the link between main bearing journal and crankpin and crank cheeks. So this area prone to appear the bending fatigue crack. Abhishek choubey, and et al have analysed crankshaft model and 3-dimentional model of the crankshaft were created by SOLID WORKS Software and imported to ANSYS software. The crankshaft maximum deformation appears at the centre of crankpin neck surface. The maximum stress appears at the fillets between the crankshaft journals and crank cheeks and near the central point journal. The edge of main journal is high stress area.

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Rinklegarg et al. analyzed crankshaft model and crank throw were created by using Pro/E Software and then imported to ANSYS software. The result shows that the improvement in the strength of the crankshaft as the maximum limits of stress, total deformation, and the strain is reduced. The weight of the crankshaft is reduced .There by, reduces the inertia force. As the weight of the crankshaft is decreased this will decrease the cost of the crankshaft and increase the I.C engine performance.

Sanjay B Chikalthankar et al investigated stresses developed in crankshaft under dynamic loading. In this study a dynamic simulation was conducted on crankshaft, Finite element analysis was performed to obtain the variation of stress magnitude at critical locations. The pressure-volume diagram was used to calculate the load boundary condition in dynamic simulation model, and other simulation inputs were taken from the engine specification chart. This load was then applied to the FE model, and boundary conditions were applied according to the engine mounting conditions. The analysis was done for different engine speeds and as a result critical engine speed and critical region on the crankshaft were obtained. Stress variation over the engine cycle and the effect of torsional load in the analysis were investigated. Results obtained from the analysis are very useful in optimization of the crankshaft.

Sagar R Dharmadhikari, et al made modest attempt to review the optimization of Genetic Algorithm and ANSYS in their research report "Design and Analysis of Composite Drive Shaft using ANSYS and Genetic Algorithm". Drive shaft is the main component of drive system of an automobile. Conventional steel is substituted by composite material which has high specific strength and stiffness. The finite element analysis is used in this work to predict the deformation of shaft. Natural frequency using Bernoulli – Euler and Timoshenko beam theories was compared. The frequency calculated by Bernoulli – Euler theory is high because it neglects the effect of rotary inertia & transverse shear. Hence the single piece High Strength Carbon / Epoxy composite drive shaft has been proposed to design to replace the two piece conventional steel drive shaft of an automobile.

K.Thriveni et al made an attempt this paper to study the Static analysis on a crankshaft from a single cylinder 4-stroke I.C Engine. The model of the crankshaft is created using CATIA-V5 Software. Finite element analysis (FEA) is performed to obtain the variation of stress at critical locations of the crank shaft using the ANSYS software and applying the boundary conditions. Then the results are drawn Von-Mises stress induced in the crankshaft is 15.83Mpa and shear stress is induced in the crankshaft is 8.271Mpa. The Theoretical results are obtained. Von-Mises stress is 19.6Mpa, shear stress is 9.28Mpa. The validation of model is done by comparing with the Theoretical result. FEA results of Von-misses stress and shear stress are within the limits. Further it can be extended for the different materials and dynamic analysis, optimization of crank shaft.

Ashwani Kumar Singh et al conducted statics analysis on a nickel chrome steel and structural steel crank shafts from a single cylinder four stroke engine. Finite elements analysis was performed to obtain the variation of stress magnitude at critical locations. Three dimensional model of crankshaft was created in Pro/E software .The load was then applied to the FE model and boundary condition where applied as per the mounting conditions of the engine in the ANSYS Workbench Abhishek Sharma et al [10] in the present research work vibration analyses have been focused to detect crankshaft fault at the early stage, followed by the literature review of the shaft and the experimental methodologies. A simulation for the study of crankshaft is carried out by acquiring its fault signal and its fast Fourier transform is plotted to show the characteristics frequencies and its harmonics. A comparison of simulated data is also made to validate the experiment based condition monitoring.

2. DESIGN CALCULATION FOR CRANKSHAFT

The configuration of the diesel engine for crankshaft is tabulated in table - 1 belongs, V.Vijayakumar and T.Gopalkrishnan.

TABLE 1 SPECIFICATION OF ENGINE

1	Capacity	Cc
2	Number of cylinders	1
3	Bore stroke	Mm
4	Compression Ratio	
5	Maximum Power	hp
6	Maximum Torque	Nm
7	Maximum Gas Pressure	bar

A . Design of the crankshaft when the crank is at an angle of maximum twisting moment

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(1)Force on piston
F=Area of the bore × Max. Combustion pressure
(2)In order to find the thrust in the connecting rod (FQ), we should first find out the angle of inclination of the connecting rod with the line of stroke (i.e. angle Ø).

$$\sin \emptyset = \frac{sin\theta}{\frac{L}{R}}$$

(3)Thrust in the connecting rod

$$\tan \theta = \frac{F_p}{\cos \emptyset}$$

Thrust on the crank shaft can be split into Tangential component and the radial component.
a. Tangential force on the crank shaft,
b. FT = FQ sin (Θ+ Ø)
c. Radial force on the crank shaft,
d. FR = F cos (Θ+ Ø)
(4) Reactions at bearings due to tangential force is given by
HT1 = HT2 =
(5)Similarly, reactions at bearings due to radial force isgiven by,
HR1 = HR2 =
B . Design Of Crankpin
(1)Let dc = diameter of crankpin in mmWe know that the bending moment at the centre of theCrankpin

$$M_c = H_{R1} \times b_2$$

From this we have the equivalent twisting moment

$$T_e = \sqrt{M_c^2 + T_c^2}$$

(2) We know that equivalent twisting moment

$$T_e = \frac{\pi}{16}(d_c^3) \times \tau$$

(3) Design of crank pin against fatigue loading Accordingto distortion energy theoryThe von Mises stress induced in the crank-pin is,

$$T_e = \sqrt{(K_b \times K_c) + \frac{1}{2}(K_t \times T_c)}$$

(4) Here, Kb = combined shock and fatigue factor forbendingKt = combined shock and fatigue factor for torsion

$$T_e = \frac{\pi}{32} \times d_c^3 \times 6\vartheta$$

3. PISTON MECHANISM

Piston is one of the main parts in the engine. Its purpose is to transfer force from expanding gas in the cylinder to the crankshaft via a connecting rod.

Since the piston is the main reciprocating part of an engine, its movement creates an imbalance. This imbalance generally manifests itself as a vibration, which causes the engine to be perceivably harsh. The friction between the walls of the cylinder and the piston rings eventually results in wear, reducing the effective life of the mechanism. The sound generated by a reciprocating engine can be intolerable and as a result, many reciprocating engines rely on heavy noise suppression equipment to diminish droning and loudness. To transmit the energy of the piston to the crank, the piston is connected to a connecting rod which is in turn connected to the crank. Because the linear movement of the piston must be converted to a rotational movement of the crank, mechanical loss is experienced as a consequence. Overall, this leads to a decrease in the overall efficiency of the combustion process. The motion of the crank shaft is not smooth, since energy supplied by the piston is not continuous and it is impulsive in nature. To address this, manufacturers fit heavy flywheels which supply constant inertia to the crank. Balance shafts are also fitted to some engines, and diminish the instability generated by the pistons movement. To supply the fuel and remove the exhaust fumes

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from the cylinder there is a need for valves and camshafts. During opening and closing of the valves, mechanical noise and vibrations may be encountered.

Pistons are commonly made of a cast aluminum alloy for excellent and lightweight thermal conductivity. Thermal conductivity is the ability of a material to conduct and transfer heat. Aluminum expands when heated, and proper clearance must be provided to maintain free piston movement in the cylinder bore. Insufficient clearance can cause the piston to seize in the cylinder. Excessive clearance can cause a loss of compression and an increase in piston noise.

Piston features include the piston head, piston pin bore, piston pin, skirt, ring grooves, ring lands, and piston rings. The piston head is the top surface (closest to the cylinder head) of the piston which is subjected to tremendous forces and heat during normal engine operation.

A piston pin bore is a through hole in the side of the piston perpendicular to piston travel that receives the piston pin. A piston pin is a hollow shaft that connects the small end of the connecting rod to the piston. The skirt of a piston is the portion of the piston closest to the crankshaft that helps align the piston as it moves in the cylinder bore. Some skirts have profiles cut into them to reduce piston mass and to provide clearance for the rotating crankshaft counterweights.

PISTON

- Temperature at the center of piston head Tc = 2600c to 2900c
- Temperature at the edge of piston head Te = 1850c to 2150c
- Maximum gas pressure p = 15.454N/mm2
- Bore or outside diameter of piston D = 57mm
- Thickness of piston head $t_h = \sqrt{\frac{3pD\hat{}2}{16\sigma t}} = 5.45mm$

PISTON RINGS

A ring groove is a recessed area located around the perimeter of the piston that is used to retain a piston ring. Ring lands are the two parallel surfaces of the ring groove which function as the sealing surface for the piston ring. A piston ring is an expandable split ring used to provide a seal between the piston an the cylinder wall. Piston rings are commonly made from cast iron. Cast iron retains the integrity of its original shape under heat, load, and other dynamic forces. Piston rings seal the combustion chamber, conduct heat from the piston to the cylinder wall, and return oil to the crankcase. Piston ring size and configuration vary depending on engine design and cylinder material.

Piston rings commonly used on small engines include the compression ring, wiper ring, and oil ring. A compression ring is the piston ring located in the ring groove closest to the piston head. The compression ring seals the combustion chamber from any leakage during the combustion process. When the air-fuel mixture is ignited, pressure from combustion gases is applied to the piston head, forcing the piston toward the crankshaft. The pressurized gases travel through the gap between the cylinder wall and the piston and into the piston ring groove. Combustion gas pressure forces the piston ring against the cylinder wall to form a seal. Pressure applied to the piston ring is approximately proportional to the combustion gas pressure.

A wiper ring is the piston ring with a tapered face located in the ring groove between the compression ring and the oil ring. The wiper ring is used to further seal the combustion chamber and to wipe the cylinder wall clean of excess oil. Combustion gases that pass by the compression ring are stopped by the wiper ring.

An oil ring is the piston ring located in the ring groove closest to the crankcase. The oil ring is used to wipe excess oil from the cylinder wall during piston movement. Excess oil is returned through ring openings to the oil reservoir in the engine block. Two-stroke cycle engines do not require oil rings because lubrication is supplied by mixing oil in the gasoline, and an oil reservoir is not required.

Piston rings seal the combustion chamber, transferring heat to the cylinder wall and controlling oil consumption. A piston ring seals the combustion chamber through inherent and applied pressure. Inherent pressure is the internal spring force that expands a piston ring based on the design and properties of the material used. Inherent pressure requires a significant force needed to compress a piston ring to a smaller diameter. Inherent pressure is determined by the uncompressed or free piston ring gap. Free piston ring gap is the distance between the two ends of a piston ring in an uncompressed state. Typically, the greater the free piston ring gap, the more force the piston ring applies when compressed in the cylinder bore.

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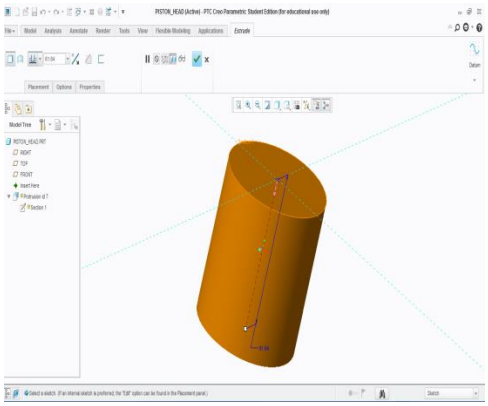
A piston ring must provide a predictable and positive radial fit between the cylinder wall and the running surface of the piston ring for an efficient seal. The radial fit is achieved by the inherent pressure of the piston ring. The piston ring must also maintain a seal on the piston ring lands.

In addition to inherent pressure, a piston ring seals the combustion chamber through applied pressure. Applied pressure is pressure applied from combustion gases to the piston ring, causing it to expand. Some piston rings have a chamfered edge opposite the running surface. This chamfered edge causes the piston ring to twist when not affected by combustion gas pressures.

The piston acts as the movable end of the combustion chamber and must withstand pressure fluctuations, thermal stress, and mechanical load. Piston material and design contribute to the overall durability and performance of an engine. Most pistons are made from die- or gravity-cast aluminum alloy. Cast aluminum alloy is lightweight and has good structural integrity and low manufacturing costs. The light weight of aluminum reduces the overall mass and force necessary to initiate and maintain acceleration of the piston. This allows the piston to utilize more of the force produced by combustion to power the application. Piston designs are based on benefits and compromises for optimum overall engine performance.

- P_W= pressure of the gas on the cylinder wall = 0.042N/mm^2
- σ_t= allowable bending(tensile stress) for cast iron rings = 110Mpa
- Radial thickness $t_1 = D\sqrt{\frac{3pw}{\sigma t}}$=1.93mm
- Axial thickness t_2 = D/10nr = 1.9mm
- nr = no of rings = 3
- width of the top land b1=6.54mm
- Distance between ring grooves,
- $b_2 = t_2$ = 1.9mm
- Total length of the piston
- L = length of the skirt * length of ring section + top land
- Length of ring section = 5 * b_2 or t_2 = 9.5mm
- L = 45.6 + 9.5 + 6.54 = 61.64mm

- Now start the designing of ―Piston ‖, Select Front plane > sketcher > sketching tools, Draw the sketch show below.



- Now select ―circle ‖ in ―sketching tools‖,Draw the profile of piston head with help of design procedure

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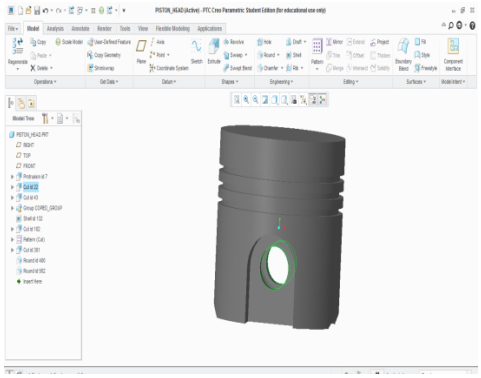


- **Final part model of piston head.**

Designing of Connecting Rod

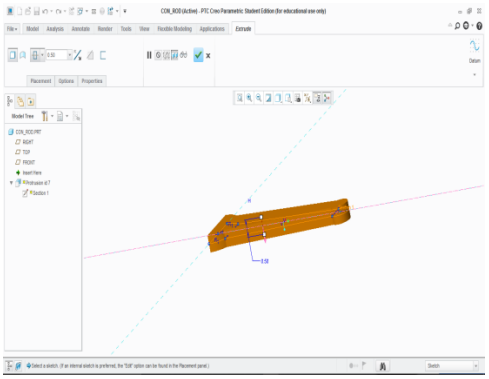
The connecting rod is a major link inside of a combustion engine. It connects the piston to the crankshaft and is responsible for transferring power from the piston to the crankshaft and sending it to the transmission. There are different types of materials and production methods used in the creation of connecting rods. The most common types of connecting rods are steel and aluminium. The most common type of manufacturing processes are casting, forging and powdered metallurgy.

The connecting rod is the most common cause of catastrophic engine failure. It is under an enormous amount of load pressure and is often the recipient of special care to ensure that it does not fail prematurely. The sharp edges are sanded smooth in an attempt to reduce stress risers on the rod. The connecting rod is also shot-peened, or hardened, to increase its strength against cracking. In most high-performance applications, the connecting rod is balanced to prevent unwanted harmonics from creating excessive wear.

The most common connecting rod found in production vehicle engines is a cast rod. This type of rod is created by pouring molten steel into a mould and then machining the finished product. This type of rod is reliable for lower horsepower-producing engines and is the least expensive to manufacture. The cast rod has been used in nearly every type of engine, from gasoline to diesel, with great success.

CONNECTING ROD

- Length of connecting rod = 2times the stroke L = 2 * 58.6 = 117.2mm
- Buckling load ,$W_b = (\sigma_c \, . \, A)/1+a[l/k_{xx}]2$
- Thickness of flange and web of the section t = 3.21mm
- Width of section B=4t=12.84mm
- Height of section H=5t=16.05=16mm
- Area $A=11t^2=113.3mm$
- Height of the big end (crank end)=H_2=1.1H to 1.25H
- H2=20mm
- Height at the small end (piston end)=0.9H
- H_1=14.4mm



- We can made the above sketch with help of line command.

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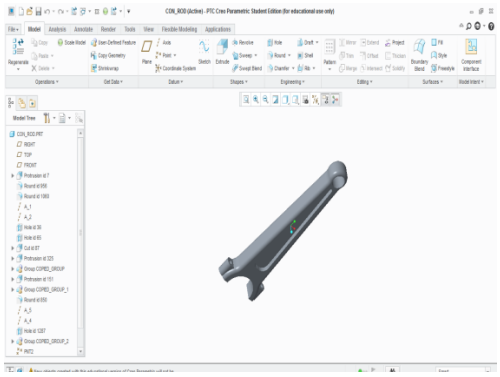

- Final model of connecting rod.

4. INTRODUCTION TO ANSY

The ANSYS program is self-contained general purpose finite element program developed and maintained by Swason analysis systems Inc. The program contain many routines, all inter related and all for main purpose of achieving a solution to an engineering problem by finite element method.

ANSYS finite element analysis software enables engineers to perform the fallowing tasks:

- Build computer model or transfer models of structures, products, components, or system.
- Apply operating loads or other design performance conditions.
- Study physical responses, such as stress levels, temperature distributions, or electromagnetic fields.

Optimize a design early in the development process to reduce production costs.

- Do prototype testing in environments where it otherwise would be undesirable or impossible.

The ANSYS program has a compressive graphical user interface (GUI) that gives users easy, interactive access to program functions, commands, documentation and reference material. An intuitive menu system helps users navigate through the ANSYS program. Users can input data using a mouse, a keyboard, or a combination of both. A graphical user interface throughout the program, to guide new users through the learning process and provide more experienced users with multiple windows, pull-down menus, dialog boxes, tool bar and online documentation.

1. Pre-processor
2. Solutions
3. Post processor

Pre-processing:

The input data for an ANSYS analysis are prepared using a pre-processor. The general pre-processor (PREP 7) contains powerful solid modelling and mesh generation capabilities, and is also used to define all other analysis data with the benefit of data base definition and manipulation of analysis data. Parametric input, user files, macros and extensive online documentation are also available, providing more tolls and flexibility for the analyst to define the problem. Extensive graphics capability is available throughout the ANSYS program, including isometric, perceptive, section, edge and hidden-line displays of three-dimensional structures-y graphs of input quantities and results, and contour displays of solution results.

The pre-processor stage involves the following:

- Specify the title, which is the name of the problem. This is optional but very useful, especially if a number of design iterations are to be completed on the same base mode.
- Setting the type of analysis to be used e.g., structural, thermal, fluid, or electromagnetic, etc.
- Creating the model: The model may be created in pre-processor, or it can be imported from another CAD drafting package via a neutral file format.
- Defining element type: these chosen from element library.
- Assigning real constants and material properties like young`s modules, Poisson’s ratio, density, thermal conductivity, damping effect, specific heat, etc.

Apply mesh: Mesh generation is the process of dividing the analysis continuum into number of discrete parts of finite elements.

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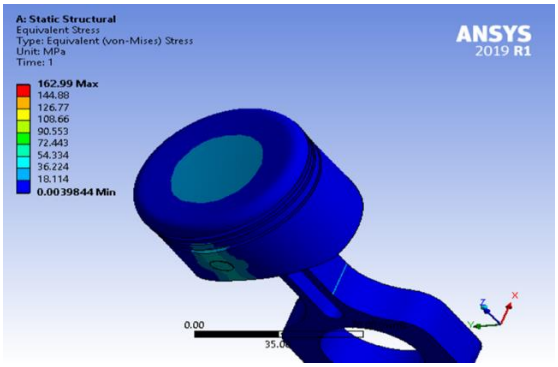
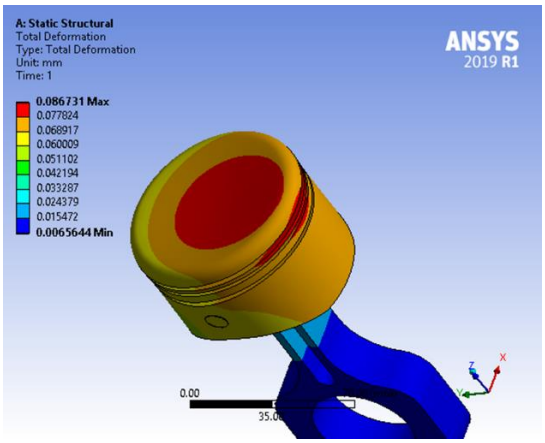
5. RESULTS AND ANALYSIS

EQUIVALENT STRESS



TOTAL DEFORMATION

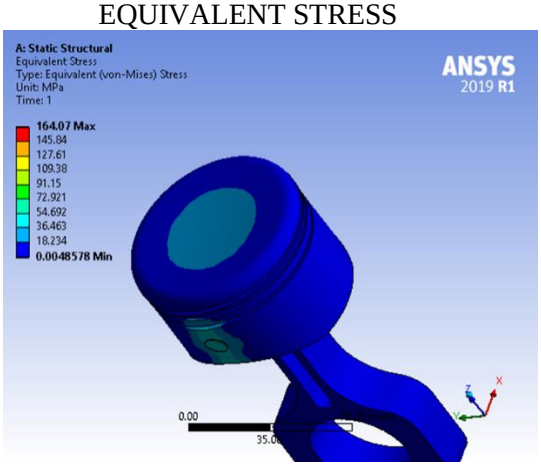


Structural aluminium

- **Properties of aluminium**

Melting point -933.47k
Boilling point-2743k
Density -2.70g/cm^3
Thermal conductivity-237w/(m-k)
Young's modulus -70Gpa
Shear modulus -26Gpa
Bulk modulus -76Gpa
Poisson ratio -0.35

EQUIVALENT STRESS



TOTAL DEFORMATION

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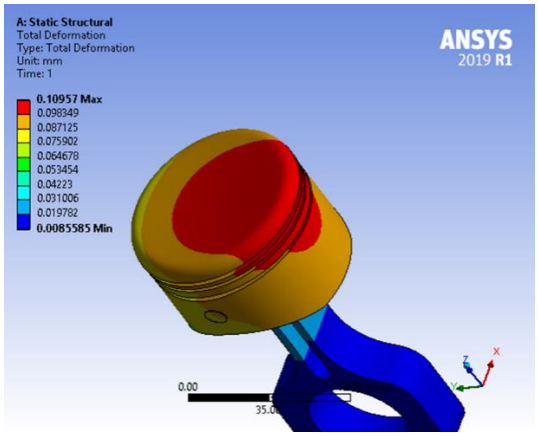
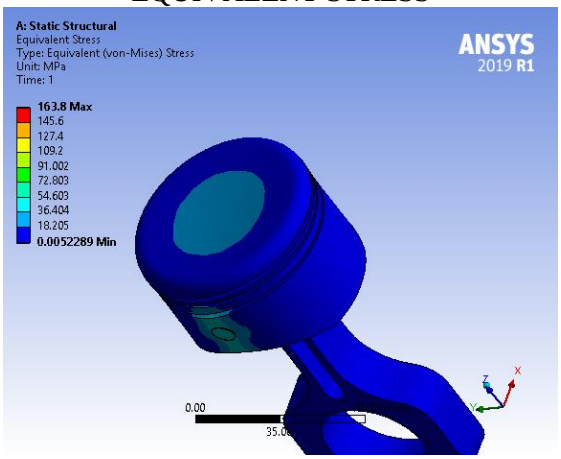


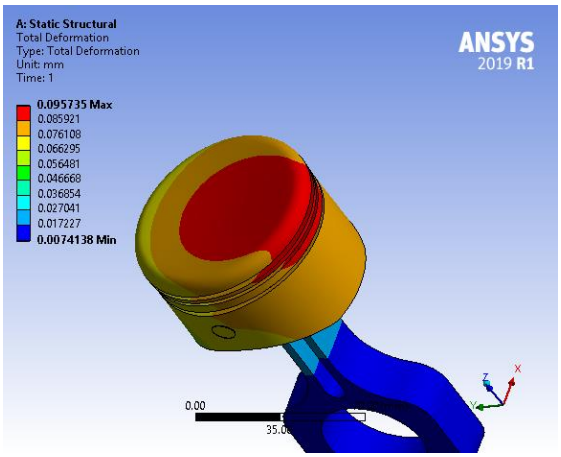
Properties of Copper alloy

Melting point -1357.77k
Boiling point-2835k
Density -8.96g/cm^3
Thermal conductivity-237w/(m-k)
Young's modulus -110-120Gpa
Shear modulus -48Gpa
Bulk modulus -140Gpa
Poisson ratio -0.35

EQUIVALENT STRESS



TOTAL DEFORMATION



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	Structural steel	Aluminium Alloy	Copper Alloy
Max. Stress (N/mm^2)	162.99	164.07	163.8
T.D(mm)	0.086	0.10095	0.095

CONCLUSION:

From the above structural analysis three different materials i.e., structural steel, Aluminium alloy and copper alloy by using ANSYS software. it is observed that the equivalent stress and total deformation varies for every material. From the table it is seen that under same load conditions structural steel has minimum equivalent stress than other two as compared to their material properties. Above Results Shows that FEA Results Conformal matches with the theoretical calculation so we can say that FEA is a good tool to reduce time consuming theoretical Work. The maximum deformation appears at the centre of crankpin neck surface.

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Smart Applications using Robotic and Iot Technologies in Fighting against Pandemic Covid19 in Medical and Societal Sectors

Rajesh. K, M. GopiKrishna, V.R.Rao, P.Pavani, C.Chandrasekhara

Abstract*: During the past few months, the entire world is being suffering with a dangerous deadly virus named Covid19 or Coronavirus. This pandemic corona virus has washed out thousands and lakhs of people all over the world within months' time and made all the countries GDP and economic growth collapsed. Accordingly, in India and other countries an important research and innovation investments have been made by various science and technological laboratories that are collaborated with various private and government stakeholders to find new ways to eliminate or kill the pandemic corona virus in human bodies and society. All over the world, the doctors and scientists are working very hard to reduce the rate of death and control the rate of corona spread. Alternatively, the engineers, entrepreneurs, industrialists, technocrats are sorting out and finding new ways to bridge the gap between science and technology by inventing new methods and measurements in medical, societal and service sectors The purpose of the proposed study is to showcase the opportunities of using engineering technology in biomedical and societal applications taking all over the world caused by the corona attack. The introduction of Robots and IOTs made the industries and firms fully smart automated and digitalized. In other perspective, robots were also serving medical sectors since many years successfully in heart surgeries, fighting cancer cells etc. and making the footprints for further research and developments. An attempt is made to highlight the methods and applications of Robots & IOT's in large extent in medical and societal areas to safeguard from coronavirus

***Keyword*: Coronavirus, Covid19, IOTs, Robots, Virus evolution**
Dur

I. INTRODUCTION

The current scenario point out that the role of using Robotic technology and Internet of things for the outbreak of Covid19 is very crucial and essential in hospital and societal sectors. This pandemic gave a huge disaster in all the countries leaving dangerous footprint for the next coming years. It is the time for engineers, scientists, and researchers to innovate new methodologies, concepts and ideas making the robots and IOT technology to stand in the front line to serve the virus affected people. As covid19 is a deadly disease like Ebola virus which affected many people lives all over the world. This created a need for developing new technology in the field of Robotics and IOT for serving people in various ways, as they are disinfectant to the coronavirus than human beings.

A. Statement of the Problem

Today the entire world is facing a major epidemic with a wide spread of coronavirus originated from Wuhan, China. The majority of countries are under the lockdown facing a severe disaster of losing economy and people on a large scale. In order to reduce the severity of virus spread, there is huge need of deploying Robots and IOT technologies as they stand in the front line saving the human labor to get infected from the coronavirus as these are highly immune to coronavirus. In this view, different types of research and innovation works are to be carried out to safeguard the people and serve the corona affected patients. The main objectives of the study are: To know the evolution of virus. To get awareness about coronavirus. Use of Robotic and IoT technologies.

II. LITERATURE REVIEW

During the Ebola outbreak that began in 2014, the White house office of science and technology policy and National Science foundation, organized workshops to identify various ways in which robots could make a difference. Guang-zhong yang, [1] dean of the institute of medical robotics at Shanghai Jiao Tong University, said during the epidemic, we really need to ensure that we have a global orchestrated sustainable approach to robotics research. Robots could occupy the place of health workers in certain circumstances, like administering tests who are infected with coronavirus and silent infection is the biggest problem. It helps that robots don't get sick and unless they run out of power, they do not sleep-Yang said. Russel Taylor, a roboticist at johns Hopkins University said sending a remotely operated robot to interact with the patient instead could dramatically reduce the risk. After all, robots are immune to biological pathogens and can be efficiently disinfected with harsh chemicals. In this scenario, engineers would not design a robot specifically for the COVID19 pandemic but the trick is to find solutions that can be broadly commercialized for the next system in the ways that they are economical to have around.

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Bill Smart,[1] a roboticist at Oregon State University, explained "you're not directly interacting with the patients where it could go really wrong if the robots breaks, and you're also not denying the patient human contact. He also said robots could still help minimize the risk for front line medical staffers, use of drones by IOT to transport medicine within the hospitals or using robots to deliver meals. Robin Murphy, a roboticist at Texas A&M University, said today investing in robotics development is a lot like investing in a large snowplow. It is expensive and not put to use for much of the year, but when a big snowstorm hits, it proves it worth. It's akin to a problem faced by the scientists who works on vaccines and treatments for emerging infectious diseases. If research into the coronavirus responsible for the outbreaks of SARS and MERS hadn't dried up, options for fighting COVID19 would have been more readily available says many scientists[1]. Computer vision and technology has gotten better, IOT enablers like sensing capabilities, tracking capabilities, scanning capabilities, mobile apps capabilities has gone better, and artificial intelligence has gone even smarter and all this translates into more potential for putting robots into good usage.

III. VIRUS CONTEXT

The study of virus is known as Virology. It is a subfield of microbiology and focuses on the aspects of virus structure, classification and evolution. The word "virus" came from Latin meaning "poison or venom". Viruses were detected after bacteria. Most of viruses range from 20-400NM in size. Special fine filters which hold bacterial cells were impossible to remove infectious agents, which are known as filterable viruses. Viruses have very simple structure and can only be observed by an electron microscope, NMR spectroscopy and X-ray crystallography: the virus particle or virion which has protective outer shell protein and an inner core of DNA (Deoxyribonucleic Acid) or RNA (Ribonucleic Acid). It doesn't need any energy to grow, cunningly it uses biochemical machinery of the host cell to reproduce and the infected cell is killed. The main viral properties are: they are non-living entities, they do not have genetic capability to multiply by division, they cannot make energy or proteins independent of host cell, viral genome are RNA or DNA but not both, they are stable in hostile and dry environment, not damaged by drying, acid, detergent, and heat. It can spread easily via hands, dust fomites, etc., [2] Most of the viruses can be transmitted by respiratory transmission (influenza-A), Faucal-oral transmission (enterovirus), Blood-borne transmission (hepatitis-B), sexual transmission (HIV), animal or insect vectors (rabies). The five basic viral structures are: Icosahedral, enveloped icosahedral, helical, enveloped helical and complex structure shown in the figure (source: Mechanics of microbial disease by Schaechter)

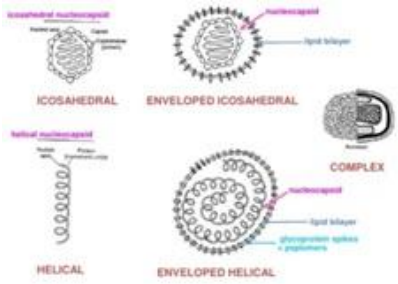

Fig.1. Types of viral structures

Viruses can be classified in many ways: 1.According to host cells they infect-animal, plant, fungal and bacteriophages.2.According to geometrical shape of their capsid, phenotypic characteristics such as morphology, structure, nuclei acid, and viral replication.3. According to Baltimore classification it can be divided into seven categories- double strand DNA viruses, single strand DNA viruses, double strand RNA viruses, positive sense ssRNA, negative sense ssRNA, RNA reverse transcribing viruses and DNA reverse transcribing viruses.4. According to Holmes classification it has three groups- Group-1: Phaginae (attacks bacteria),Group-2:Phytophaginae(attacksplants),Group-3:Zo ophaginae(attacks animals)[3]. The virus infection cycle has following steps: Adsorption or Attachment, Penetration, Biosynthesis of viral nuclei acid and protein, Assembly or Maturation and Release, depicted in the figure:

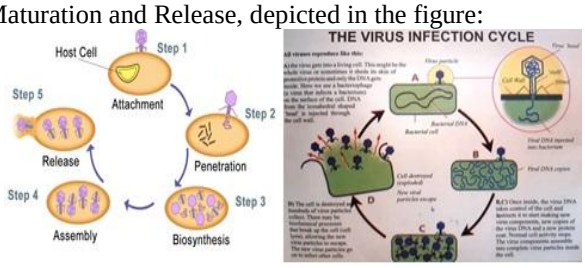

Fig.2. Viral Infection Cycle

In recent decades, several viruses have jumped from animals to human beings and spotted sizable outbreaks, adhering thousands and lakhs of people. The major deadly killer viruses are : Marburg virus (1967, Germany), Ebola virus (1976, Sudan), Rabies virus(1920, India & Africa), HIV virus(1980, Africa), Smallpox virus (1980, Europe), Hanta virus(1993, USA), Influenza (1918, Spanish flu), Dengue(1950, Philippines), Rotavirus(2008), MERS-CoV(2012,SaudiArabia),SARS-CoV(2003,China), SARS-CoV-2(2019, China)[4].

A. Coronavirus Evolution

The name "coronavirus" was derived from Latin word meaning "crown" or "wreath"[48].This name was first used in 1968 by an informal group of virology people in the journal "Nature to designate the new family of viruses." The name refers to the characteristic appearance of an infective form of the virus (virions) which have a large, bulbous surface projection making an image reminiscent of a solar carona [49]. Coronaviruses was first discovered in the year 1930 when an acute respiratory infection of domesticated chickens was shown to be caused by infectious bronchitis virus (IBV)[50]. The structure of Coronavirus is a large spherical particles with bulbous surface projections [51].

The average diameter of the virus particles are about .12 μm (120 nm) and the diameter of the envelope is about .08 μm(80 nm) and the spikes are .02 μm(20 nm) long.

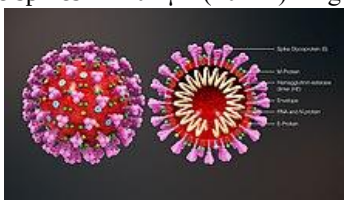

Fig.3. Structure and cross section view of coronavirus

Coronaviruses cause diseases in birds and mammals. But in humans, they cause respiratory tract infections that can range from mild to severe. Mild sickness includes cases of the common cold and fever while more severe sickness can cause severe acute respiratory syndrome (SARS) and sore throat infections. Evolutionary stages: The most recent common ancestor of all coronaviruses was existed as recently as 8000 BCE, implying long term coevolution with bat and avian species [52]. Bats and birds, which are warm-blooded flying vertebrates, are an ideal natural reservoir for the coronavirus pool.

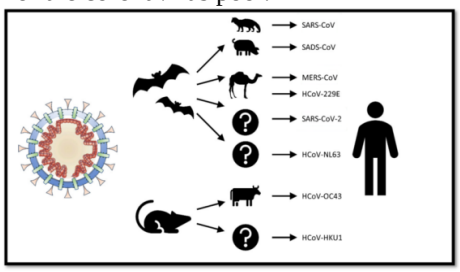

Fig.4. Origin of coronavirus

B. Human Coronavirus

The risk factor of human coronavirus may vary significantly. Some may kill more than 30% of those infected like MERS-CoV, and some were relatively harmless with common cold[53].Some viruses may cause colds with major symptoms like severe fever, sore throat from swollen adenoids [54]. Moreover, seven different species of human coronaviruses are known yet. Out of which four viruses produce symptoms which generally mild and three produce symptoms which are very severe [55].They are 1. Human coronavirus OC43, (HCoV-OC43).2.Human coronavirus HKU1, (HCoV-HKU1). 3. Human coronavirus 229E, (HCoV-229E).4. Human coronavirus NL63, (HCoV-NL63). 5. Middle east respiratory syndrome related coronavirus, (MERS-CoV).6.Severe acute respiratory syndrome coronavirus,(SARS-CoV).7. Severe acute respiratory syndrome coronavirus 2, (SARS-CoV-2). SARS-CoV-2 belongs to large family of viruses SARS-CoV, known as "Coronaviruses" and was first identified in Chinese city, Wuhan in December 2019. These viruses likely originated from bats like SARS-CoV and passes through an intermediate animal before infecting human beings. The disease caused by SARS-CoV-2 called COVID-19. [4]

IV. ROBOTICS CONTEXT

Robotics engineering is a field of engineering which deals with design, construction, application and operation of robots. The mechanism behind robots is called robotics. The robotics goal is to design intelligent machines that help and assist human beings in their day-to-day life and keep us everyone safe and secure. Actually, robotics is an integration of computer, information, electrical, electronic and mechanical engineering. The robotics was derived from the word "robot" means a slave or servant to humans was coined by Czech writer and novelist Karel capek in his paly Rossum's Universal Robots(R.U.R) published in 1920[5].Later Sir Isaac Asimov, a biochemistry professor has proposed three laws and later added zeroth law in his "Runaround "science fiction. Law 0: A robot may not injure humanity or allow humanity to come to harm. Law 1: A robot may not injure human being, unless said by high order law. Law 2: A robot must obey orders given to it by his master. Law 3: A robot must protect itself from its own existence. A robot is defined as a reprogrammable, multifunctional manipulator designed to move materials, parts, tools or specialized devices through variable programmed motions for the performance of variety of tasks [Robot institute of America, 1979] .To design and operate a robot a typical knowledge base system is required: dynamic system modeling and analysis, feedback control system, sensors and signal conditioning, hardware interfacing, actuators and power electronics and computer programming. The key components of a robot manipulator are base, linkage, controller, power conversion unit, sensors, actuators and user interface. Based on the mechanical structure robots are classified as: Cartesian robot which has three linear prismatic joints, Cylindrical robot which has cylindrical coordinate system, Spherical robot which has rotary coordinate system, SCARA which has two rotary and one linear joint and Articulated robot which has three rotary 3d motion just like a human hand.

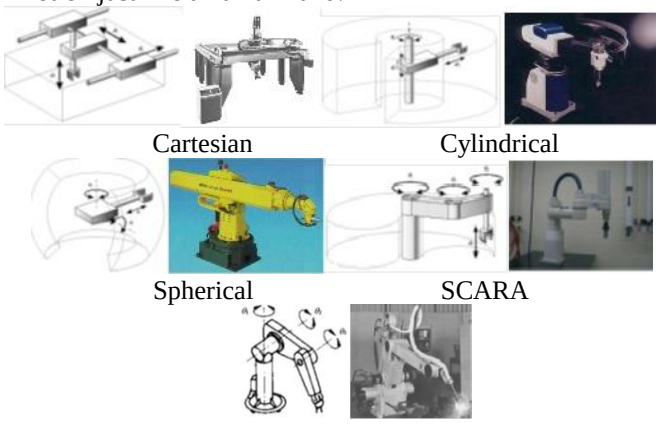

Fig. 5. Classification by mechanical structure [6]

Based on the configuration of robot manipulators, the control systems are designed: limited sequence, playback with point-to-point, playback with continuous path control and intelligent control. The different types of robots have different ways of programming methods such as: lead through (powered and manual) programming, robot programming languages, simulation and off-line programming[7]. Why do we need robots? Tim detert [8] said, we need robots for 4D environments (dangerous, difficulty, dull, dirty) and for 4A tasks(automation,augmentation, autonomous, assistance).The general features and characteristics which should acquire for a robot are: repetitive work cycles, multi shift operations, infrequent changeovers, difficult handling tasks for humans, hazardous work environment for humans and part position and orientation in the work cell.

Bases upon the design, specific task, environment and payloads the current and potential industrial applications include: agriculture, automobile, construction, domestic, entertainment, health care, kitchen automaton, laboratories, law enforcement, manufacturing, military, mining, transportations, utilities, warehouses etc. The usage of robots in various industrial and service sectors in worldwide market is shown below [8].

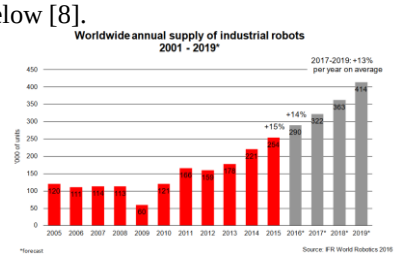

Fig.6. Bar chart of Annual supply of Robots

V. INTERNET OF THINGS CONTEXT

The IOT concept was coined by a member of the Radio Frequency Identification development (RFID) community in 1999, and it has recently become more relevant to the practical world largely because of the growth of embedded and ubiquitous communication, mobile devices, cloud computing and data analytics [9].According to CICSCO, Internet of things is the network of physical objects accessed through through internet, as defined by technology analysts and visionaries. These objects contain embedded technology to interact with internal states or external environment. In simple, it is a network or linking of physical objects. The internet means not only a network of computers, but has evolved into a network of device of all types of sizes of smart phones, vehicles, toys, cameras, home appliances, industrial systems, animals, people, buildings, all sharing and communicating information based on standard protocols in order to get smart real time online monitoring, online upgrades, smart reorganizations, positioning, tracking, process control and online administration[10]. IOT can be categorized into three stages according to the definition: 1.People-to-people(P2P).2.People-to-machines(P2M).3.Mac hine-to-machine(M2M), interacting to internet facilities. The Internet of Things is more than machine to machine communication, sensor networks, wireless sensor networks, , 2G/3G/4G,GSM,GPRS,RFID, WI-FI, GPS, microprocessor , microcontroller, etc. and these are considered as being the enabling technologies that make IOT applications possible. Enabled technologies (ET) considered in [10] can be classified into three broad categories: 1 technologies that enable things to acquire contextual information, 2.technologies that enable things to process contextual information, and 3. Technologies to improve security and privacy. The fundamental characteristics to enable the services of IOT are as follows: connectivity, dynamic changes, enormous scale, heterogeneity, interconnectivity, safety and things related services [11].

A. IOT Architecture

It has different layers of technologies which supports IOT and serves to showcase how various technologies relate to each other and to communicate the configuration, modularity and scalability. The functionality of each layer is described as: 1. Smart sensor layer-lowest layer where smart devices are integrated with sensors and these are having capacities to make measurement such as air quality, speed, humidity, temperature, pressure, flow and movement etc. Most sensors require connectivity to sensor gateways in the form of LAN such as Wi-Fi, Ethernet, personal area network, ZigBee, Bluetooth and ultra-wide band. The sensors which do not require connectivity to backend servers can be provided using WAN such as GSM, GPRS and LTE.2. Gateways and Networks-To transport the massive data, it requires robust and high performance wired or wireless network infrastructure. The various networks are WI-FI, GSM, GPRS and gateways are microcontroller and microprocessor etc.3. Management service layer-Data management is the ability to manage data information flow. 4. Application layer-It covers all smart environments, spaces in the domains such as Agriculture, Supply chain, User interaction, Emergency etc. The figure shows the detailed architecture of Internet of things. [12]

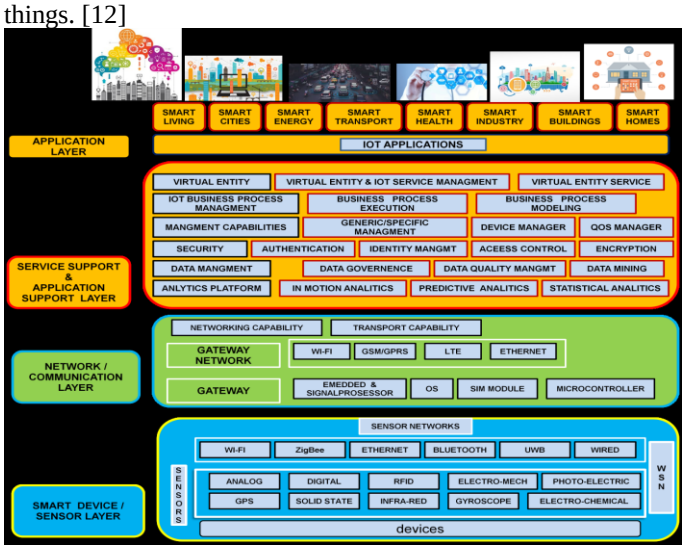

Fig.7. Internet of Things Architectural landscape

IOT has countless benefits for both businesses and consumers are such as automation and control, better human productivity, improved equipment maintenance, operations optimization and automation, comfort and convenience, time saving and money, use of telematics, efficient resource utilization, better tracking and management and access to high quality data[13].The goal of the Internet of Things is to enable things to be connected anyplace, anytime, with anyone and anything ideally using any network and any service[14]. The goals and applications of IOT are shown in the figure[14]15]:

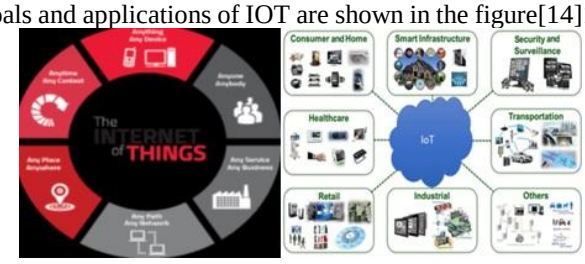

Fig. 8. Goals and Applications of IOT

VI. ROBTOIC TECHNOLGY IN COVID19

The rapid spread of human coronavirus has forced all the countries to apply each and every technology into health care and security surveillance in the society. The use of robots, drones and artificial intelligence technologies are being deployed across the globe to fight against the covid19 pandemic.

As Robotic engineering is still a developing field, many researches, surveys and experiments are being done in the field of health care sector. The robots are standing in the front line in minimizing the risk for medical staff in all applications as they are more immune to contagious spread than human beings. According to the robot structural configuration, there are three major types: stationary (industrial), legged and mobile robots are generally used in many of the manufacturing companies. As per the hospital and service sectors, mobile robots are viable and used widely for coronavirus.

A. Methods and Applications of High-tech Robots in Covid19

UV light Disinfectant Robot: Due to the demand shortage of a thin layer of Personal Protection Equipment (PPE) such as gowns, hand gloves, face masks in the hospitals for medical staff, robots can used to kill coronavirus on their PPEs by sending UV light rays and can be further reused: Virginia Commonwealth University Health system (VCU), America has invented a robot called, called Total Room Ultraviolet Disinfection (TRU-D), stands 5'6" tall which is a mobile robot has sensors and wheels attached to the large frame and fragile uses ultraviolet germicidal irradiation (UV) light vectors to disinfect porous and non-porous surfaces without using of toxic chemicals. The high energy from UV light is absorbed in the cellular RNA and DNA of microorganisms, damaging nucleic acids and preventing them from reproducing therefore they cannot infect humans or PPEs [16].The autonomous UV mobile robots, known as Sunburst UV bots, made by local robotics technology firm PBA Group, built with a lamp module emitting powerful UV-C light helps decontaminate the environment by tearing apart strands of virus DNA. It kills about 99% of bacteria and clinically proven to eliminate coronavirus. The robots move around the places autonomously, guided by light detection, ranging sensors and also self-navigates to its charging station when power is low and can operate for 2.5 hours on a single charge. These can be widely used in commercial places like: hospitals, shopping malls, supermarkets, transport etc. [17] A Denmark based, Danish Technological institute has made Ultraviolet disinfectant (UVD) mobile robot that kills harmful microorganisms and be in a high demand since the corona outbreak. It works autonomously covering all surfaces with UV-C light kills 99.9% of viruses and bacteria within 10minutes [18]. An U.S.based GermFalcon mobile robot, from Dimer UVC innovations is also offering a similar UV disinfection solution for aircraft services that kills bacteria, viruses and superbugs on any exposed area in the aircrafts. It kills 99.99% of viruses within 3minutes on B737/A320 by UV-C light [19]. In Wuhan, Chinese based TMiRob's disinfection autonomous mobile robot, moves around the patients' area and kill the viruses during the ongoing fight against the novel coronavirus[20]



Fig. 9. TruD Sun burst UV, UVD, GermFalcon, TMiRob

2.Delivery Robots: Majority of countries like China, Europe, US, India are using mobile robots to replace and help humans fight coronavirus by delivering PPEs, food, groceries, medicines etc., in hospitals, quarantine centers, public places and nursing homes etc., Postmates, mobile delivery robots deliver food in Los Angles. Beijing-based Zhen Robotics uses yellow robots to deliver groceries. Indian based startup Asimov Robotics, lunched two robots to distribute face masks and hand sanitizer in hospitals, quarantine centers to spread awareness of coronavirus [21]

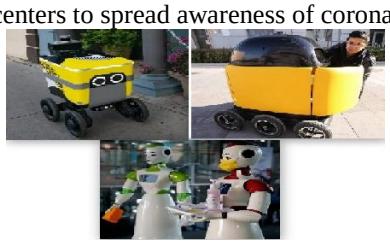

Fig.10. Postmates, Yellow robots, Asimov's

3. Sanitary Robots: There is an urgent need for cleaning and purifying the hospital areas, public areas, shopping malls, airports etc., due to the spread of pandemic coronavirus outbreak all over the world. Scientists and engineers are developing new methods of spraying disinfectant chemicals on the surfaces with the help of mobile robots. Some of the technologies are listed below: Researchers from Nanyang Technological University (NTU), Singapore have developed a wheeled robot named eXtreme Disinfection robot (XDBOT) which can navigate semi-autonomously in any type of environment using LIDAR sensors, hd cameras, a 6-axis articulated arm is controlled by human operator, a large tank with a rotating turret, an electrostatic charged nozzle and can move to 30-50metres with a rotating turret. NTU is still working with Transforma robotics, Hand plus and Maju robotics for news types of sanitary robots [22]. Hangzhou, china using disinfectant robots in large areas. Beijing-based Zhen Robotics, uses yellow robots patrol malls for people not wearing face masks and identifies the temperature reading.[21]



Fig.11. XdBot, Hangzhou, and Zhen robots

4. Surveillance Robots: During the corona outbreak, countries are using patrolling mobile robots in the public areas, common places etc., in order to prevent the risk factor.

These robots alert the people and ask quires related to the lockdown and safeguard human lives. PGuard, the "robocop" [23] initiated by Tunisia's interior ministry, is a remotely operated and equipped with infrared and thermal imaging cameras, sound and light alarm system. It serves like calling out to suspected violators of the lockdown: "What are you doing? Show me you're ID. You don't know there is a lockdown?" A patrol mobile robot "LISOM" in Shenyang, china, hospital checks disinfectant people, temperatures and spaces and sends the alerts to the required personal [21].



Fig.12. PGuard, Lisom robots

5. Delivery and Patrol Drones: A drone is a robot, which is guided remotely or autonomously, often termed unmanned aerial vehicle(UAV) used to deliver food, medicine, goods, transport packages, patrolling and spying etc., in all diversified fields of healthcare, agriculture, film making,military,cargotransport,surveying, demining, target practice and so on. During the corona outbreak, many countries are widely using the services rendered by drones: Shenzhen company MicroMulticopter, deployed more than 100 drones to Chinese cities for patrolling in crowds and traffic areas and identifies who are not wearing masks, spraying disinfectant in public areas, identifying infected coronavirus people having elevated temperature by using thermal sensors.[24]Medtech companies are using robots and drones to provide services and care to quarantined or practicing social distancing. Japanese company Terra Drone ensured medical and other supplies were safely transported without exposing to humans to infection. According to the report by GPS world, using drones speeds up transport by 50% compared to road transport. In the corona outbreak, use of drones and robots would become increasingly essential support for humans in fighting the virus.[24] The figure shows the delivery of medicines by a drone.



Fig. 13. Medical kit delivery drone

VII. IOT TECHNOLGY IN COVID19

At present everyone is aware about the dangerous killer of human species spreading all over the world from the past few months originated from china. Many of the lives were destroyed without mere awareness about their control and diagnostics. As WHO announced it is a pandemic and all governments of the countries are scrambling to keep their citizens safe and secure. Presently, the Internet of things is being used for treatment, curing, diagnosing and detection of coronavirus. The IOT enabled services which are currently being used in detecting and destroying the Covid19 in all the major countries are discussed below.

1. Smart Image processing IOsIP): It is a form of signal processing where the input and output of image processing be a set of characteristics or parameters related to the image [25]. It is a technique to enhance the raw images received from sensors, cameras placed on space robots, satellites, aircrafts, video cameras, cell phones and pictures of day-to-day life of various applications. Image Processing systems are becoming popular due to easy availability of graphics software, powerful personnel computers, large size memory devices, etc. There are two methods available in image processing sequence: analog and digital image processing. The Various techniques used are: image representation, image pre-processing, image enhancement, image restoration, image analysis, image reconstructions and image data compression. The major applications in this field are: document processing, graphic arts, printing industry, remote sensing, non-destructive analysis, forensic studies, material science, film industry, military and medical imaging etc. [26].

2. Smart CCTV (IOsTV): Closed-circuit television, also known as video surveillance, use of video cameras to transmit the signals to the specific place, on limited set of monitors.[27]CCTV systems provide surveillance capabilities used in the protection of assets, systems and people. The systems have many components with a variety of functions, features, and specifications. Key components include cameras, lenses, data distribution, housings and mounts, monitors, switchers, multiplexers and video recorders. The components of CCTV are shown below:

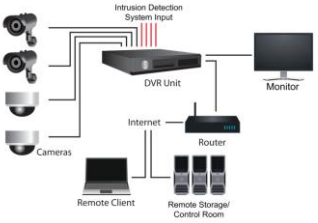

Fig.14. CCTV Component diagram structure

3. Smart Mobile Applications (IOsMA): A mobile application, simply referred as a mobile app is a software application or computer program designed to run on mobile devices like cell phones, tablets and watches. In 2010, American dialect society [28] termed software application as "app" shortly and was listed as a "word of the year". In 2014, government regulatory agencies began trying to regulate and curate applications particularly medical applications. [29] Mobile applications are classified by many methods: Native app, Web-based apps and Hybrid Apps. Most of the devices are sold with many pre-installed apps, such as web browser, email, calendar etc. and the apps which are not pre-installed are available usually through platforms called app stores. The three biggest app stores used in mobile and laptops are Google paly for android, App store for IOS and Microsoft store for windows10 and many more other apps are listed: amazon appstore, blackberry world,ovi for nokia, Samsung apps, electronic app wrapper, f-droid and opera mobile store.

4. Smart Telemedicine (IOsT): Modern information and communication technologies such as computers, cellphones gives how individuals communicate each other, seeking and exchange information and enriching their lives. These technologies have high potential globally to address health problems all over the world. Telemedicine is a term coined in the year 1970, literally means "healing at a distance" [30] signifies the use of IOT & ICTs to improve patient outcomes by increasing access to medical care and information. It is defined as the delivery of health care services, where distance is a

critical factor, by all health care professionals using IOT for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for continuing education of health care providers, all in the interests of advancing the health of individuals and communities. [31] Telemedicine applications are of two types: according to the timing of information transmitted and according to the interaction between the individuals involved. [32] The majority of telemedicine services focus on diagnosis and clinical management in the array of services like tele radiology, tele pathology, tele dermatology, and tele psychiatry. The information transmitted from telemedicine through IOT can be done in wide variety of media like audio, video, text and images.[33]

5. Smart Human Tracking (IOsHT): Smart monitoring systems have evolved to respond for particular needs in healthcare sector. A tracking system is used for observing the objects and people while in motion and supplying a timely ordered sequence of location data for further processing. Recent advancements in mobile technology allow Global positioning System (GPS), Radio frequency identification (RFID), Real-time location systems (RLTS) and Global mobile system (GSM) provides a real-time location based services for vehicles, assets and humans in various applications. Global positioning system is a satellite navigation system used to determine the ground position of any object. A GPS navigation device [34] is carried by a moving animal or person or vehicle that uses GPS to track the device's movements and determine its location. Mobile applications have three types of GPS trackers: data loggers, data pushers and data pullers. RFID uses electromagnetic fields to automatically identify and track tags attached to the objects or humans. A tag consists of tiny radio transponder, a radio receiver and transmitter. It is one method of automatic identification and data capture (AIDC)[35]. RFID can be used in a wide variety of industrial and domestic applications such as[36][37] access management, tracking of goods, animals and humans, tracking and billing processes, machine readable travel documents, airport baggage tracking, retail management, advertising and promotion tracking, transportation and logistics , human implantation, animal identification, institutions like hospitals, healthcare, libraries, schools and universities, museums and sports.

6. Smart AI Thermal Scanners (IOsTS): These are body temperature detection devices used for detecting elevated temperatures in human body located at different places. These thermographic cameras use infrared radiation from the image created just like normal camera which use visible light. Thermal scanners are integrated with Artificial Intelligence analytics connected to automated web and mobile application alerting. These scanners can be equipped with robots and drones which can works on ground and aerial surveys. These can be applied in many fields like: thermal mapping, medical imaging, non-destructive testing, night vison and tracking etc. As the covid19 pandemic goes rampant across the globe many engineers, researchers, startup companies are seriously involving in launching various AI based thermal tracking devices in hospitals, shopping malls, schools, universities, offices etc.

A. Methods and Applications of IOTs in Covid19

The various real-time applications using IOT technologies across the globe are listed below:

1. A government of India initiative, "Arogya Sethu" app is designed to assist citizens from contact with any infected covid19 person. The app uses GPS and Bluetooth on a smartphone to get the live updates. MapMyIndia, has created "covid19 dashboard" app, it provides state-wise data, treatment centres, isolation centres, hunger relief centres, relief camps on the map [38].

2. A.P launches 'YSR Telemedicine', facility which helps health department to track the symptoms of covid19 people.Dial14410, is the helpline where a doctor will respond through audio or video conference and prescribes the medicines and tests through sms [39].

3. Cambridge and Manchester University [40] launches Firetinas, the first A.I. Thermal scanner against covid19.It uses distance radiation algorithm, so that far way temperature can be read easily. Gurgaon based start-up Staqu has launched new thermal camera by its video analytics platform, JARVIS. It alerts when body temperature raises 37°C and can range up to 100meters to identify people [41]. A company "care.ai", working on A.I. overhead scanners screens bystanders to scans facial attributes like sweating, discoloration and thermal data[42].IIT Roorkee professor, Dr.Kamal Jain created a new surveillance system and an app to alert government if anyone violates quarantine and also can do geofencing around him[43].

4. Germany based start-up Thryve, launched smartwatch app to monitor corona spread. Here, the corona data donation app gathers vital information from smartwatches or fitness trackers to analyze the symptoms [44]. University of Illinois, Professor Brian Cunningham developed a smartphone app for coronavirus testing within 30minutes without the need for a diagnostic lab which can reduce time and saves money.It can used in airports, meetings, functions etc[45].IITMadras, incubated start-up Antariksh Watse Ventures developed an IoT-enabled Smart Bin system(AirBin) to prevent the spread of covid19 through waste generated from hospitals, clinics, public bins, quarantine zones etc.It alerts when the clinical waste overflows to the concerned personal[46].

5.Hyderabad based,T-Hub startups, like Terisoft, blocksapps.ai, blue semi, maruth drones, started many IoT enabled smart devices, apps, thermal screeners, surveillance camera drones etc. to fight against coronavirus pandemic [47].

VIII. CHALLENGES TO ROBOT AND IOT SERVICES DURING COVID19

Due to the severe pandemic covid19 attack we have to encounter two major challenges: The first one, challenges faced by the front line citizens, hospital staff, sanitary workers, and police personal. The second one, challenges faced by the technology to improve better in the future. Some of the issues raised are: market adoption towards using of robots and IoT devices worldwide, level of using the technology, awareness of using the smart services by common citizen, reliability and durability of startup based IoT devices, long standing applicability of robots, maintenance and serviceability, adaptability in day-to-day life, inviting the new changes at living and working places, change of living lifestyles, acquiring more science and technical information, and combatting the future epidemic in prior.

IX. RESULTS AND DISCUSSIONS

The results of these IOT and Robotic applications have proven that there is a huge need and demand in emergency epidemics than human labor, which can assist along with the integration of technical personal. Due to the smart technologies like sensors, transducers, actuators, and microprocessors used in robots, drones, scanners etc., they proved in various medical, societal, shopping malls, public places, schools and colleges working effectively as they are highly immune to bacteria, coronaviruses and super bugs. Finally, we have proven the robots and IoT technologies stood in the front line after the medical doctors, paramedical staff, sanitary workers and police staff which can work, assist and help in unhygienic, high security and remote areas. In the future with the impact of pandemic disasters the robots and Iots with the use of Artificial intelligence plays a major role in medical and societal sectors.

X. CONCLUSION

Because of severe attack of pandemic coronavirus across the globe, everyone has to get secured and to get awareness about the using of high end robotic technology and IoT enabled services at hospitals, shopping malls, public areas, quarantine centres, schools, colleges and many more once the lockdown or quarantine period lifts up. One has to get prepared or get sound awareness of using Science and Engineering services in the society.

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Resultant surface roughness of 5% and 10% Al7075SiC MMC by using Friction Stir Processing

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Abstract. The study of friction stir processing has been presently used in industry and academic research. Friction stir processing(FSP) is used as surface modification technique, 5% and 10% Al7075SiC metal matrix composites were tested for surface finish using Talysurf at varying speeds of minimum, medium and maximum. This document provides the outcomes of 5% surface roughness (Ra), 5% skewness (Rsk), 5% kurtosis (Rku) and 10% metal matrix composites Al7075SiC. Experiments were conducted according to Taguchi's method $L_8(3)^3$ at various speeds.

Keywords. FSP; Surface Roughness (R_a,); Skewness (R_{sk}); Kurtosis (R_{ku}).

1. Introduction

The potential utilization of friction stir processing (FSP) has been growing due to the demands of different manufacturing sectors and academic research quickly in these years. Friction Stir Processing is widely found in making various parts of aerospace, automobile, medical equipment and agriculture. Using experimental techniques and statistical models, parameters for the growth of output characterization are systematically considered. Therefore, correct configurations of friction stir handling parameters are essential before the method occurs in order to achieve better surface roughness. The objective of the paper organization is therefore to optimize process parameters for minimum surface roughness composites of different percentages in FSP for Al7075SiC metal matrix composites.

2. Literature survey

Consequently the Taguchi method which a powerful tool for improving productivity during research and development so that high quality products can be produced quickly and at low cost [1,2][5]. The surface finishing is therefore one of the most important variables in the manufacturing system ; several scientists have carried out numerous studies to improve the surface finish of the FSP system. [3,4][6]. The surface finishing in friction stir processing has been finding to be influenced in varying amounts by a number of factors, such as speed, feed,

work, material, etc. and the dielectric fluid, etc. the orthogonal array of grey relational analysis [7,8] used to investigate the multiple performance characteristics in Friction stir processing. Manufacturing materials such as silicon carbide, zirconium oxide, aluminum oxide, magnesium oxide, etc. have excellent uses in the design and manufacture of high-tech machine parts in aerospace, automotive, biomedical and space cars. [7]. As a result, The ability to process those sophisticated FSP ceramics in the macro-domain is much required. As in the just around the corner scenario, Especially in the field of sophisticated macro-machining procedures, such materials dealing with work pieces made of ceramics and composites are rejected ; consequently, the FSP procedures are unique and promising in macro-machining procedures.. Therefore, the FSP technique involves a number of process parameters such as tool rotational speed, dip depth, tilt angle, feed rate and strength [8]. It is therefore feasible to pick the highest possible parametric combination of the remarkable procedure parameter to achieve the required objective of processing a specific material with enhanced processed surface quality and high precision in dimensions. A great amount of FSP procedures such as surface modification, grain refinement and finishing were performed in the region of one- and two-dimensional processes. [11]. This research includes a fundamental and preliminary survey of the method of FSP to examine growth capacity and select the significant process parameters. The optimal parametric combination of minimal surface roughness and minimum divergence of depth was therefore acquired on the basis of the second-order regression response model.. It is additional ; studies have been conducted in the most advantageous parametric combination based on Response Surface Methodology (RSM) by considering additional parameters, i.e. defocusing position and scanning passes.

3. Material work piece

Aluminium 7075SiC was preferred as the work material of 5% and 10%. This is a nice amount of thermal versatility – treatable alloys are accepted for medium to high strength demands and have excellent quality rigidity features. The dissimilar alloying essentials in attendance in the alloy Al7075 are shown in Table 1 and 2.

Table 1 Work piece 5% Al7075SiC composition

Components	**% by Weights**
Aluminium	93.9 to 95.3
Magnesium	0.8 to 1.2
Silicon	0.5 to 1.0
Iron	0.0 to 0.7
Copper	0.15 to 0.4
Chromium	0.04 to 0.35
Zinc	0.0 to 0.25
Manganese	0.0 to 0.15
Residuals	0.0 to 0.15
Titanium	0.0 to 0.15

Table 2 Work piece 10% Al7075SiC composition

Components	**% by Weights**
Aluminium	85.9 to 90.8

Magnesium	0.8 to 1.5
Silicon	1 to 8.0
Iron	0.0 to 1.0
Copper	0.50 to 1.0
Chromium	0.1 to 1.5
Zinc	0.0 to 0.5
Manganese	0.0 to 0.45
Residuals	0.0 to 0.45
Titanium	1.0 to 0.45

4. Experimental plan

Therefore the experiments be considered according toward Taguchi's L_8 (3^3). Experiments were carried out using the instrument material H13 using the vertical friction machine generated by the U2000 Hochun model.. Different machine requirements are provided in Table 3 and experimental configuration is shown in Figure 1

Table 3 Machine specifications

Title	Description	Specification	Units
Spindle	Spindle drive Spindle speed Spindle taper	Variable 120-1500 NT50	RPM
Capacity	Spindle motor Feed motor Coolant pump	15 5 0.18 3-4	HP HP Kw W
	Lubrication pump		
Machine size	L X W X H Net weight	3000 x 3060 x 2700 8100	mm Kg
Table size	L X W	600 x 2600	Mm
Column	Length	710	mm
Feed		8-450	Mm/ min
Longitudinal travel		2000	mm
Cross travel		710	mm

A 20 mm diameter shoulder with a conical nib of 6 mm diameter and 5 mm long H13 tool material is selected. 5% and 10% Al7075SiC material of 100X25X5 mm thickness are in use as work material and processed FSP samples were shown in figure 2. The 0.8 mm cutoff Talysurf tool worth a well-planned surface roughness. Table 4 illustrates the preferred friction stir processing parameter and their values at three levels.



Figure 1. Friction stir processing machine setup

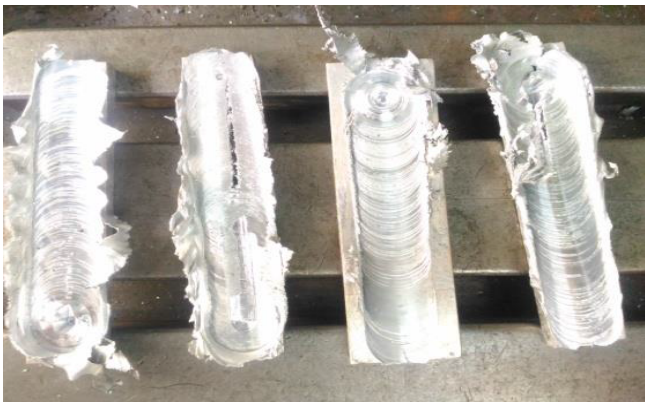

Figure 2. Friction stir processed Al7075SiC specimens

Table 4 Process parameters of FSP

Parameters	Level-1	Level-2	Level-3
Travel speed	500	800	1100
Traverse feed (mm/min)	20	25	30
Plunge depth (mm)	2.5	2.5	2.5

For this reason, surface roughness (R_a), skewness (R_{sk}), kurtosis (R_{ku}) are achieved using Talysurf devices and surface roughness charts are used, the best results can be achieved in this 5% study document and 10% Al7075SiC in Tables 5 and 6..

Table 5 Surface Roughness for 5% Al7075SiC at various levels of Speed (rpm)

Sl.no	Speed (rpm)	Feed (mm min^{-1})	Plunge depth (mm)	R_a µm	R_{sk}	R_{ku}
1	500	20	2.5	6.6671	2.2184	4.82
2	500	25	2.5	6.34520	2.2667	4.8561
3	500	30	2.5	6.1201	2.2705	5.0185
4	500	20	2.5	6.5698	2.4616	4.9118
5	500	25	2.5	5.8735	2.1854	4.7831
6	500	30	2.5	6.6382	2.2234	4.8718
7	800	20	2.5	6.5892	2.2432	4.8168
8	800	25	2.5	6.5167	2.2336	4.8042
9	800	30	2.5	6.2678	2.2133	4.8718
10	800	20	2.5	6.2976	2.2436	4.8691
11	800	25	2.5	6.2764	2.2314	4.8115
12	800	30	2.5	6.2981	2.2174	4.8016
13	1100	20	2.5	6.1064	2.2186	4.7341
14	1100	25	2.5	6.1578	2.2256	4.6542
15	1100	30	2.5	6.2679	2.2387	4.5616
16	1100	20	2.5	7.2198	2.2468	4.5781
17	1100	25	2.5	7.0118	2.2369	4.5014
1	1100	30	2.5	7.1268	2.2104	4.6718

8					1	

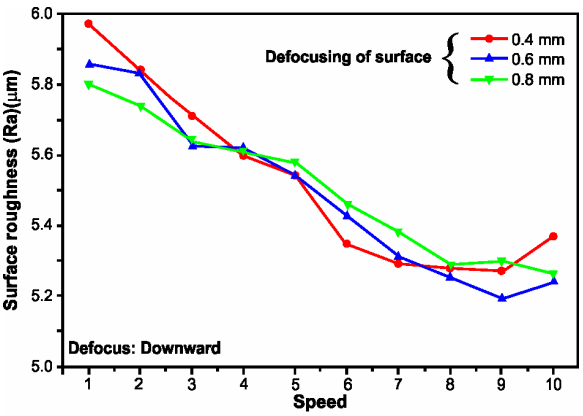

Figure 3

Figure 3. Disparity of Surface Roughness (Ra, $\mathbf{R_{sk}}$ $\mathbf{R_{ku}}$) with numeral of Milling pass at 500 Speed for 5% Al7075SiC

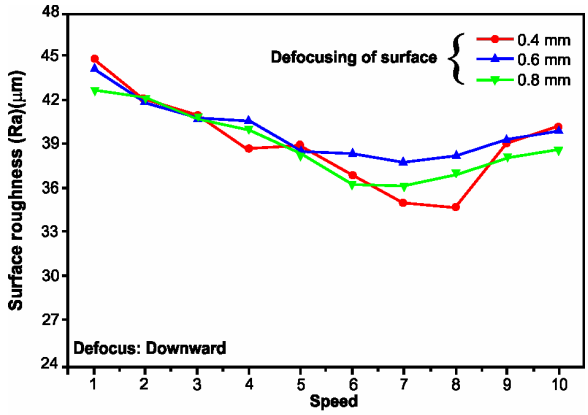

Figure 4

Figure 4. Disparity of surface roughness (Ra, $\mathbf{R_{sk}}$ $\mathbf{R_{ku}}$) with numeral of Milling pass at 1000 Speed for 5% Al7075SiC

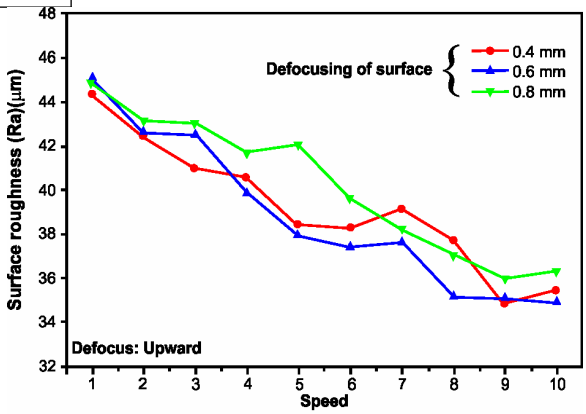

Figure 5

Figure 5. Disparity of surface roughness (Ra, $\mathbf{R_{sk}}$ $\mathbf{R_{ku}}$) with numeral of Milling pass at 1500 Speed for 5% Al7075SiC

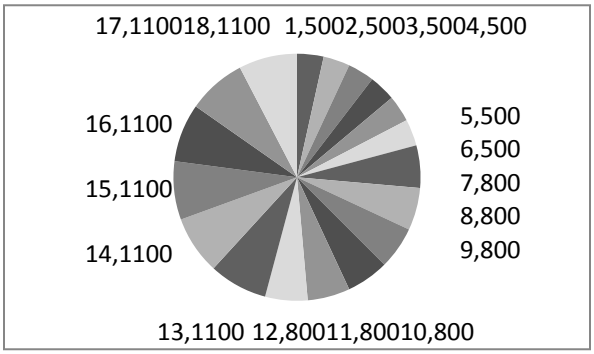

Figure 6. Pie chart representation for 5% Al7075SiC at Various levels of Speeds (rpm)

Table 6 Surface Roughness for 10% Al7075SiC at various levels of Speed (rpm)

Sl. no	Speed (rpm)	Feed (mm min^{-1})	Plunge depth (mm)	R_a μ m	R_{sk}	R_{ku}
1	500	20	2.5	6.984	2.945	3.016
2	500	25	2.5	6.816	2.956	3.236

3	500	30	2.5	6.901	3.006	3.517
4	500	20	2.5	5.976	3.078	3.454
5	500	25	2.5	5.916	2.978	3.156
6	500	30	2.5	5.878	2.947	3.175
7	800	20	2.5	5.890	2.961	3.469
8	800	25	2.5	5.945	2.991	3.514
9	800	30	2.5	5.925	2.9417	3.405
10	800	20	2.5	6.917	2.9517	3.526
11	800	25	2.5	6.987	2.9567	3.559
12	800	30	2.5	6.981	2.9674	3.578
13	1100	20	2.5	6.918	2.9561	3.563
14	1100	25	2.5	6.926	2.9489	3.573
15	1100	30	2.5	6.937	2.9603	3.548
16	1100	20	2.5	7.089	2.9899	3.601
17	1100	25	2.5	7.001	2.9738	3.599
18	1100	30	2.5	7.063	2.9627	3.536

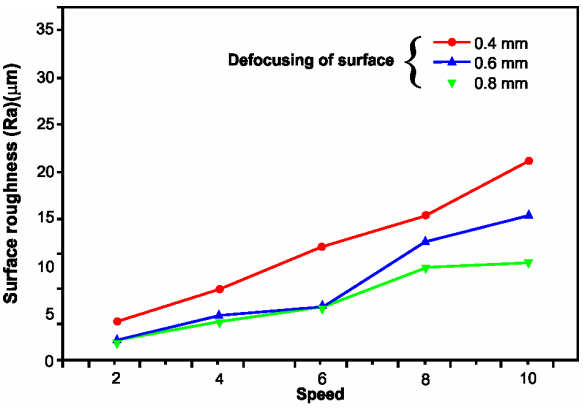

Figure 7

Figure 7. Disparity of Surface Roughness (Ra, $\mathbf{R_{sk}}$ $\mathbf{R_{ku}}$) with numeral of Milling pass at 500 Speed for 10% Al7075SiC

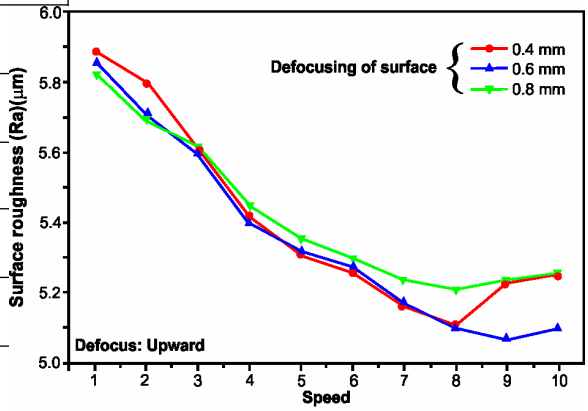

Figure 8

Figure 8. Disparity of surface roughness (Ra, $\mathbf{R_{sk}}$ $\mathbf{R_{ku}}$) with numeral of Milling pass at 1000 Speed for 10% Al7075SiC

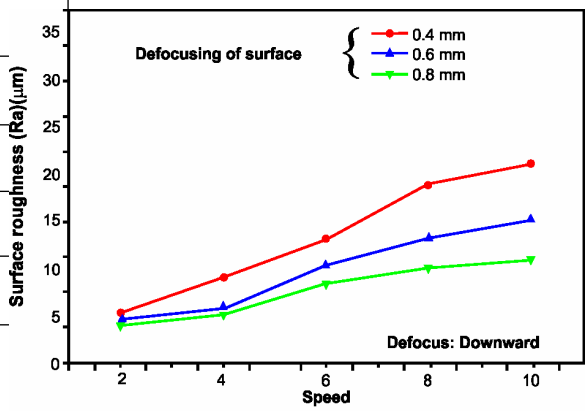

Figure 9

Figure 9. Disparity of surface roughness (Ra, $\mathbf{R_{sk}}$ $\mathbf{R_{ku}}$) with numeral of Milling pass at 1500 Speed for 10% Al7075SiC

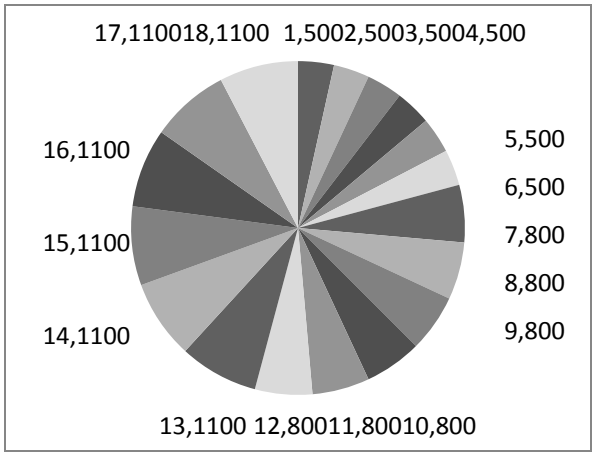

Figure 10. Pie chart representation for 10% Al7075SiC at Various levels of Speeds (rpm)

5. Effect of an amount of FSP passes on surface roughness

Response outcomes, i.e. depth variation in surface roughness (R_a, R_{sk} and R_{ku}), as shown in Tables 5 and 6, a variety of plot comprise be tired and shown in Fig. 3,4,5 and Fig 7,8,9. As shown in Fig 3 and 7, the result of the amount of FSP moves to surface roughness (R_a) in distinct positions defocusing upwards. The figure demonstrates that the roughness of unsmoothed surface of the milling decreases with the amount of FSP passes in each scenario of defocusing positions. At some point in FSP, the height of different micro-sized peaks on the machining surface is increased by increasing the passage of FSP in defocusing conditions. The figure also shows that distinct surface roughness values are attained for any specific amount of FSPs at distinct defocus positions. The increase in defocus position, the FSP surface roughness decreases due to suitability, removing the rough and irregular peaks from the workpiece surface and even creating the surface. The defocus position is higher than 0.4 and 0.8 mm when observed at a higher defocus value, i.e. at 0.8 mm. The FSP's get-up-and-go thickness on the outside of the workpiece is very low when positioning 0.8 mm and this amount of get-up-and-go can not remove the micro-peak from the outside of the FSP. This phenomenon results in the machined surface having a greater quantity of surface roughness. And the surface roughness for various levels of speed at 5% of Al7075-SiC were represented as pie chart in Fig 6.

This impact of FSP number variation passes on the criterion of surface roughness (Ra) is shown in Figure 4 and 8 at different defocusing locations downwards. It is understandable from this plot that the amount of FSP passes has a significant impact on the unique surface roughness (Ra). The surface roughness rate reduces at each of the defocus positions by increasing the amount of FSP passes. It is due to processing on the surface of the workpiece of sharp micro-sized peaks. However, for all defocusing conditions, the surface roughness increases to a small degree after some number of FSP passes. This is because the processing of material from the workpiece surface after confident quantities of passes is not uniform and the processed surface is irregular and uneven due to high intense workpiece stress. At a greater environment of the defocusing situation at 0.8 mm, the volume of the FSP place is very large and the power on the workpiece surface is very little. This low-energy is quite unable to extract from the rough workpiece surface the micro-sized peaks. Hence, the machined surface's roughness value is less than machining at a higher defocusing position under other conditions of defocusing. R_{sk},R_{ku} was seen as a response to another surface roughness parameter to study the FSP surface feature in more detail. Figure 8 demonstrates the impact of upward variation of the amount of FSP passes on surface roughness (R_{sk} R_{ku}) in a variety of defocusing positions. From this plot it is

noted that surface roughness (Rsk Rku) decreases for all defocusing location setting with an rise in FSP passes. It is caused by the irradiated processing of micro-level peaks from the unsmooth FSP zone. From this figure, that the same setting of FSP passes is also pragmatic, the reduced setting of defocusing position outcomes in greater surface roughness value (R_{sk} R_{ku}) compared to greater defocus position environment. This is due primarily to varying densities of energy at distinct focal locations and the quantity of FSP energy required to decrease micro-peak height. However, the roughness of FSP surface (R_{sk} R_{ku}) is comparably high to the defocus circumstances of 0.6 and 0.4 mm at 0.8 mm. This is because of the very low FSP energy that can not remove or decrease micro level peaks from the surface of the workpiece.

The result of different amount of FSP moves on unsmooth surface (R_{sk} R_{ku}) value is demonstrated in Figure 4,5,8 and 9 machining next to different downward defocusing position This demonstrates a plot to improve the amount of FSP pass results at this juncture reduction of surface roughness (R_{sk} R_{ku}) value up to a certain amount of passes. It is the total height of the jagged peak decreasing with the amount of passes on the ground. On the other hand, after a certain number of moves, the roughness of the FSP surface does not differ significantly. The roughness of the surface improves after seventh amount of passes under defocusing circumstances of 0.4 and 0.8 mm. It is again owing to the generation on the FSP surface of small-sized irregular peaks. Hence plot also demonstrates that the end product of defocusing stance is very unplanned on surface roughness condition. The minimum amount of surface roughness is obtained at a defocus location of 0.4 mm and at the eighth digit of FSP, the energy is very little and this energy is not sufficiently expert to take away remaining micro-crests of the unsmooth and uneven workpiece surface. And the surface roughness for various levels of speed at 10% of Al7075-SiC were represented as pie chart in Fig 10.

6. Results and discussion

Consequently, wearing down rates and roughness R_a are mentioned in table-5 and 6, and roughness profiles of 5% and 10% Al7075SiC are mentioned in figures 11(a),(b) and (c), 12(a),(b) and (c) for different speeds (rpm) 500,800 and 1100 respectively.. The results are as expected, but demonstrate the considerably low wearing rates and the roughness of the surface as shown in Figure 11 compared to Figure 12.. Therefore results are attributed to inhomogeneous friction own in the direction of contact of work-tool. In the previous section explain the reason of the theory. The friction surfaces in 5% Al7075SiC be exceptionally rough with under privileged manifestation compare in the direction of 10% Al7075SiC which is extremely smooth with extensive burrs. Figure 11 (a), (b), (c) and Figure 12 (a) (b), (c) The surfaces draw to a close and statistical accuracy of the friction stir processing surface.

Therefore, The erosion mechanism bears the significant resemblance of FSW. It is the gradual declining of erosion rate in FSP is so high that satisfied for work-tool and speed alone may not be the reason but also the feed and plunge depth. The normal speed may amount of friction between work-tool and erosion rate is retained.

The feed and plunge depth give much lesser friction and the poorer metal removal rate. Further exploration of FSP requirements in the wearing-out scheme.

Another interesting and eye-catching observation is the reduced wear rate in 10% Al7075SiC compared to 5% Al7075SiC in FSP. Among the possible reasons, the major one is the least feed and plunge depth on 5% Al7075SiC resulting in low erosion rates. The other options can be the slow speed, the low erosion rates with higher speeds have the apparent reason for elevated feed.

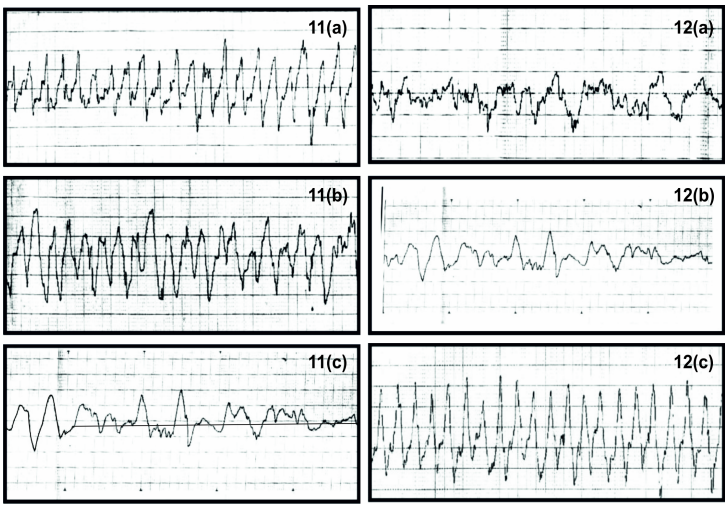

Figure 11 and 12. Surface Roughness Profiles of 5% and 10% Al7075SiC at 500,800 and 1100 rpm

7. Conclusions

1. Friction stir processing (FSP) is highly suitable used for metal matrix composites.
2. In 10% Al7075SiC with higher feed and plunge depth shows inferior erosion rates compared to 5% Al7075SiC
3. Low wearing away rates with decreasing speed in conformity to the theory of friction stir processing.
4. Surface roughness too has a similar tendency as wearing away a rate in the two metal matrix composites of 5% Al7075SiC and 10% Al7075SiC.
5. For the job piece under account, the most favourable combination method parameters for a minimum surface finish of maximum surface finish are acquired at 800 rpm, 0.25 mm dip depth and 25 mm / min feed rate.

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Synthesize and wet condition based characterizations of GRP / Lye treated sisal fiber hybrid composite

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ABSTRACT

One of the indispensable thing in the world is but the supply is limited. In particularly, the supply of material is limited for specific applications. Light weight low strength applications are very wide. This investigation focuses the natural fiber hybrid with artificial fiber to synthesize hybrid composite. The sisal fiber is used to prepare the composite with GRP. The sisal fiber is here treated with specific concentration of Lye in the distilled water. The composites synthesized with treated and untreated sisal fibers. The alternate fashion of horizontal and vertical is followed for fibers' orientation. The bio epoxy is employed as matrix material with mix of hardener. The prepared composite are characterized by water absorbability, tensile properties, flexural properties and shock absorption capacities in wet condition.
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1. Introduction

Composite plays an important role in the applications of Materials [1]. The conventional materials sometimes fails to meet the specific requirements of the final product [2]. Conventional materials is limited in supply but demand is growing steeply [3]. Invention of new materials may substitute of the conventional materials [4]. [5] suggested to include the almond shell powder with resin to prepare the particulate composite panels [67–70]. [6] prepared such composite synthesized with use of powder of tamarind seeds for making the panels for construction [71–74]. [7] found that Sisal fibers to be treated to improve the desired properties and fabricated with treated fibers [8] and tested for compatibility [75,76]. The sisal fiber treated by mallic acid and hybrid with glass fiber for composite material fabrication [9]. [10] proposed a methodology for reinforcement that prevent of de-lamination by stitching before compression [11]. The Lye treated Sisal fiber hybrid with glass fiber with predefined layers and orientation of fibers to obtain the composite material for applications which under the wet conditions [12].

2. Materials and methods

2.1. Composite matrix

The matrix materials are mainly consists of selectively obtained and specially prepared high quality sisal fiber, the commercially available high quality glass fiber for reinforcement [13]. The low cost, best match for sisal fiber based composite's bonding agents, the cashew nut cell oil is employed as resin and also bought the suitable hardener for the same [14]. The Fiber, its Tensile Strength (MPa), its Density (kg/m^3), [63–66] its Young's Modulus (MPa) and Flexural Modulus (MPa) are in the order of as follows Glass Fiber 2500–3500, 2.5, 70000, 70000–73000, Sisal Fiber, 68, 1450, 3774, 125000–17500 respectively. The poly vinyl acetate is employed as releasing agent [15]. The high quality sisal fiber was prepared from the naturally harvested sisal leaves by decortications, followed by drying further the fiber qualities were enhanced by chemical treatment [16].

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2.2. Improving quality of sisal fiber

The low cost and appreciable enhancement was achieved through Lye treatment [17]. Here it was preferred that 1% of Lye volume fraction with distilled water [18]. The high quality sisal fibers soaked in the solution for 240 min followed by drying on open space with normal sunrays (do not being at hot sunrays) for 120 min that is dried in the morning 8 AM to 10 AM. After that the fibers cut to 5 cm long [19].

2.3. Hybrid composite fabrication

The preferred selective sequence of layers and orientation of fibers on each layer are alternate fashion of horizontal and vertical [20]. A chromium- plated MS, Square shaped molds (of side 30 cm) are placed in the molding table [21]. The parting (Wax) agent applied on the mould which will facilitate release the finished [22,23]. Beadings at the corners of models are maintained the preplanned gap [24]. The preplanned length of 50 mm followed for both sisal fiber and GRPs [25]. The glass fibers used for extreme layers that top and bottom [26]. In between layers sisal but their fashions are alternate orientation of fibers in horizontal and vertical directions [27]. The layers are bonded with just prepared paste of mix of 10 part of resin and one part of hardener [28]. Finally entire composite panel was compressed in CTM and kept in the compressed position for 3 to 4 h, by which the voids filled up, air bubbles removed and excess resin content also removed [29]. Then panels allow drying in sun light with weight for avoiding bending due to shrinkage while drying [30]. Hence the composite samples are prepared by the combination of compression mounding and manual layup technique [31].

Table 1
Characterization of dry and wet (G-S-S-S-G) hybrid composite under flexural load.

Characterization Criteria	Treated	Untreated
Flexural strength in MPa	13.3	9.84
Flexural Modulus in MPa	1530	1060

3. Characterization

3.1. Flexural strength based characterization

In the Transverse or Orthogonal loading is used for characterizing by Flexural strength on is for the material in terms of properties by three point bending method [33–40]. The specimen prepared to the standard of ASTM D790 that is 3 mm thick rectangular of size 157x 13sq. millimetres [41–46]. The same FIE universal testing machine UTE-40 type 400 KN capacity was employed for this investigation [47]. The loading speed is 1 mm per minute was set [60–62]. As per standard the 150 mm of gauge length was set [48–51]. The environment conditions are an average relative

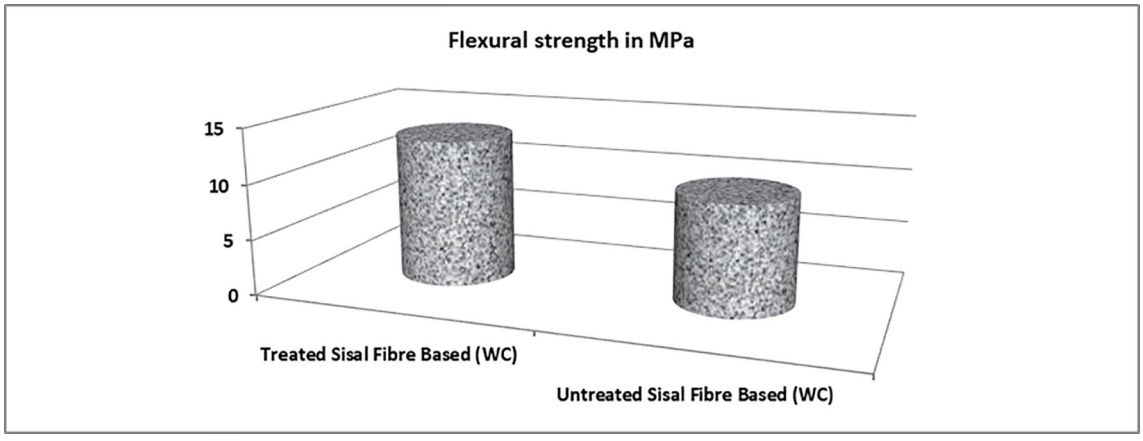

Fig. 1. Flexural strength of treated and untreated sisal fiber based hybrid composite.

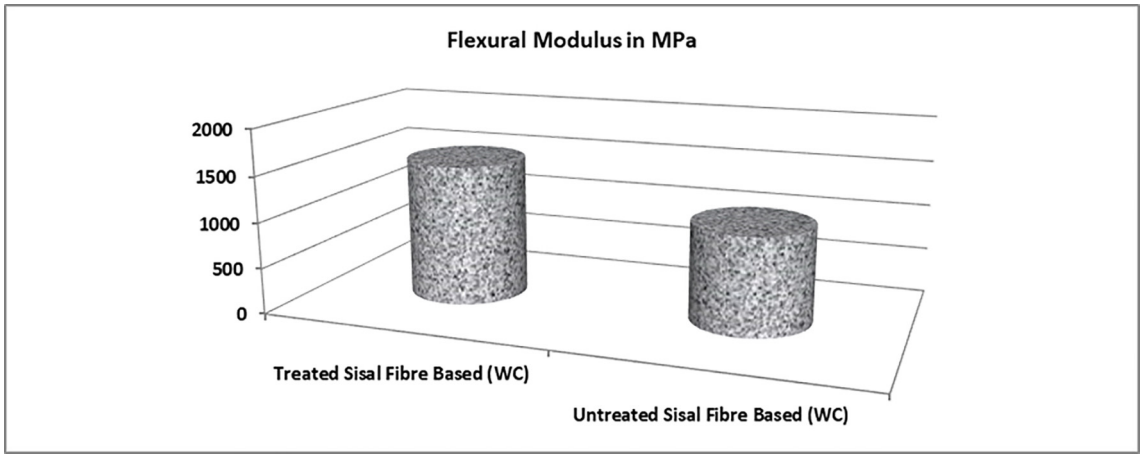

Fig. 2. Flexural modulus of treated and untreated sisal fiber based hybrid composite.

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humidity of 50% and the temperature about 35 °C [52–55]. The observations obtained for both dry and wet composite and presented them in the Table 1 [56–59].

4. Results and discussions

4.1. Flexural properties

The Flexural Properties like flexural strength and flexural modulus of the treated Sisal fiber based hybrid composites got improved. The treated fiber based composite is stronger in bending than untreated fiber based Sisal/GRPhybrid composite (Refer Figs. 1 and 2).

5. Conclusion

The paper demonstrated the concepts of synthesize GRP / lye treated sisal fiber hybrid composite and tested for wet condition based characterizations. The flexural properties is focused in this study and explained well. The proposed composites tested and found that the composites performance fund good under normal ambient condition and also tested for wet condition. The wet condition based investigation resulted that the composite synthesized best performed than its dry condition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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An Experimental Investigation of Mechanical Properties of Teak Wood Rust and Tamarind Kernel Powder Reinforced Polymer Composite

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ABSTRACT: The intention of the present experimental research aims at investigating the mechanical behavior of natural fiber composites. In the recent past, Natural fibers attracting the attention of engineers, researchers, professionals and scientists all over the world to use them as an alternative to conventional reinforcing materials, because of their superior properties such as high specific-strength, less weight, economical, availability, equitably decent mechanical properties, non-abrasive, eco-friendly and bio-degradable characteristics. In this experimental work an attempt is made to find the effect of teak wood and tamarind kernel as reinforced particulates on mechanical properties of composites with polyester resin. The analysis is carried out on the mechanical behavior of different combinations of composite material, with different tests such as tensile test, hardness test and flexural bend test. Finally, it is reported that more value in the combination of tamarind dust on flexural bend test. Coming to hardness test it reported more value in teak wood dust and at last in tensile test it varies at different combinations.

KEYWORDS: Natural Fiber, Polymer Composite, Mechanical Behaviour, Flexural Test, Tension Test, Hardness Test.

I. INTRODUCTION

Composites are made from a matrix that is reinforced with an engineered, man-made or natural fiber or other reinforcing material. The reinforcing material and the matrix material can be metal, ceramic, or polymer. Composites typically have a fiber or particle phase that is stiffer and stronger than the continuous matrix phase and serve as the principal load carrying members. The matrix acts as a load transfer medium between fibers, and in less ideal cases where the loads are complex, the matrix may even have to bear loads transverse to the fiber axis. Composites are used not only for their structural properties, but also for electrical, thermal, tribological, and environmental applications.
The following are some of the reasons why composites are selected for certain applications:

- High strength to weight ratio (low density high tensile strength)
- High creep resistance
- High tensile strength at elevated temperatures
- High toughness

A. Polymer Composites

Most commonly used matrix materials are polymeric. In general, the mechanical properties of polymers are inadequate for many structural purposes. In particular their strength and stiffness are low compared to metals and ceramics. These difficulties are overcome by reinforcing other materials with polymers. Secondly the processing of polymer matrix composites need not involve high pressure and doesn't require high temperature. Also, equipment's required for manufacturing polymer matrix composites are simpler. For this reason, polymer matrix composites developed rapidly and soon became popular for structural applications.

B. Natural fiber reinforced composites

The interest in natural fiber-reinforced polymer composite materials is rapidly growing both in terms of their industrial applications and fundamental research. They are renewable, cheap, completely or partially recyclable, and biodegradable. Plants, such as flax, cotton, hemp, jute, sisal, kenaf, pineapple, ramie, bamboo, rice husk, wood rust,

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banana, etc., as well as wood, used from time immemorial as a source of lignocellulose fibers, are more and more often applied as the reinforcement of composites. Their availability, renewability, low density, and price as well as satisfactory mechanical properties make them an attractive ecological alternative to glass, carbon and man-made fibers used for the manufacturing of composites. The natural fiber containing composites are more environmentally friendly, and are used in transportation (automobiles, railway coaches, aerospace), military applications, building and construction industries (ceiling paneling, partition boards), packaging, consumer products, etc.

C. Application of Natural fiber composites

The natural fiber composites can be very cost-effective material for following applications:
Building and construction industry: panels for partition and false ceiling, partition boards, wall, floor, window and door frames, roof tiles, mobile or pre-fabricated buildings which can be used in times of natural calamities such as floods, cyclones, earthquakes, etc.
Storage devices: post-boxes, grain storage silos, bio-gas containers, etc.
Furniture: chair, table, shower, bath units, etc.
Electric devices: electrical appliances, pipes, etc.
Everyday applications: lampshades, suitcases, helmets, etc.
Transportation: automobile and railway coach interior, boat, etc.

II. LITERATURE REVIEW

Natural fiber reinforced polymer composites have raised great attentions and interests among materials scientists and engineers in recent years due to the considerations of developing an environmental friendly material and partly replacing currently used glass or carbon fibers in fiber reinforced composites. They are high specific strength and modulus materials, low prices, recyclable, easy available in some countries, etc.

Pickering et al. [1] conducted a research to study the mechanical properties, especially interfacial performances of the composites based on natural fibers due to the poor interfacial bonding between the hydrophilic natural fibers and the hydrophobic polymer matrices. Two types of fiber surface treatment methods, namely chemical bonding and oxidization were used to improve the interfacial bonding properties of natural fiber reinforced polymeric composites. Interfacial properties were evaluated and analyzed by single fiber pull-out test and the theoretical model. The interfacial shear strength (IFSS) was obtained by the statistical parameters. The results were compared with those obtained by traditional ways. Based on this study, an improved method which could more accurately evaluate the interfacial properties between natural fiber and polymeric matrices was proposed.

Joshi et al. [2] compared life cycle environmental performance of natural fiber composites with glass fiber reinforced composites and found that natural fiber composites are environmentally superior in the specific applications studied. Natural fiber composites are likely to be environmentally superior to glass fiber composites in most cases for the following reasons: (1) natural fiber production has lower environmental impacts compared to glass fiber production; (2) natural fiber composites have higher fiber content for equivalent performance, 16

reducing more polluting base polymer content; (3) the light-weight natural fiber composites improve fuel efficiency and reduce emissions in the use phase of the component, especially in auto applications; and (4) end of life incineration of natural fibers results in recovered energy and carbon credits.

Rana et al. [3] in their work showed that the use of compatibilizer in jute fibers increases its mechanical properties. At 60% by weight of fiber loading, the use of the compatibilizer improved the flexural strength as high as 100%, tensile strength to 120%, and impact strength by 175%. The following conclusions may be drawn from this paper:

1. The sharp increase in mechanical properties and decrease in water absorption values after addition of the compatibilizer.

2. All these results justify that the role of jute fiber was not as a filler fiber but as a reinforcing fiber in a properly compatibilized system.

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3. This system produced a new range of low-energy, low-cost composites having interesting properties and should be given priority over costly and high-energy synthesis reinforcing fiber wherever possible.

Shah and Lakkad [4] tries to compare the mechanical properties of jute-reinforces and glass-reinforced and the results shows that the jute fibers, when introduced into the resin matrix as reinforcement, considerably improve the mechanical properties, but the improvement is much lower than that obtained by introduction of glass and other high performance fibers. Hence, the jute fibers can be used as a reinforcement where modest strength and modulus are required. Another potential use for the jute fibers is that, it can be used as a filler fiber, replacing the glass as well as the resin in a filament wound component. The main problem of the present work has been that it is difficult to introduce a large quantity of jute fibers into the JRP laminates because the jute fibers, unlike glass fibers, soak up large amount of resin. This problem is partly overcome when hybridsing with glass fibers is carried out. Ray et al. [5] in their work, Jute fibres were subjected to alkali treatment with 5% NaOH solution for 0, 2, 4, 6 and 8 h at 300C. It was found that improvement in properties both for fibers and reinforced composites. The fibres after treatment were finer, having less hemicellulose content, increased crystallinity, reduced amount of defects resulting in superior bonding with the vinylester resin. As fibers, the improvements in properties were predominant around 6–8 h treatment whereas as composites, it was maximum when reinforced with 4 h-treated fibers at 35% fiber loadings. The modulus of the jute fibers is improved by 12, 68 and 79% after 4, 6 and 8 h of treatment, respectively. The tenacity of the fibers improved by 46% after 6 and 8 h treatment and the% breaking strain was reduced by 23% after 8 h treatment. For 35% composites with 4 h-treated fibers, the flexural strength improved from 199.1 to 238.9 MPa by 20%, modulus improved from 11.89 to 14.69 GPa by 23% and laminar shear strength increased from 0.238 to 0.283 MPa by 19%. The mechanical properties of natural fiber-reinforced composite depend extremely on the degree of adhesion between the natural fiber and the matrix [6]. There by, poor fiber/matrix interface leads to a weaker material with low strength and life span. In the last two decades, many researchers have focused on improving the interfacial adhesion by modifying the fiber surfaces via physical and chemical treatments to make them more compatible with matrix [7]. These surface treatments also enhance environmental durability (moisture and temperature) and wear resistance of the composite.

III. MATERIALS AND METHODOLOGY

A. Materials

This unit explains the details of processing of experimental process and the composite Followed by their mechanical characteristic features. The materials used in this work are

- Teak wood dust
- Tamarind kernel powder
- K-type polyester resin
- Hardener
- Catalysts

B. Method of Specimen preparation

Tamarind kernel powder and teak wood dust are reinforced with polyester k-type resin, this resin is belonging to the polyester family is utilized as the matrix material. Tamarind kernel powder made by us, first we took tamarind seeds and remove the shell/husk after roasting the seeds and at last grind the seeds according to required size particles. We got teak wood dust from a local supplier. Remove the moisture of teak wood and tamarind kernel powder. Also, the polyester k-type resin and hardener are provided by a local supplier. This manufacturing process is carried out by hand layup technique. Hardener and curing polyester resin is taken in the form of the ratio. Three types of composites have been produced with three different combinations.

- In the first combination out of 250gms wt the ratios of weight of materials taken as 15%Wt of tamarind kernel powder and 85%Wt of k-type polyester resin.
- In the second combination out of 250gms wt the ratios of weight of materials taken as 15%Wt of teak wood dust and 85%Wt of k-type polyester resin.
- Coming to the last combination out of 250gms wt the ratios o weight of materials taken as 10%Wt of tamarind kernel powder, 10%Wt of teak wood dust, and 80%Wt of k-type polyester resin.

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While doing stir well without any lumps, and pour in mold. Here we took plastic box as a mold box and pour it after 24 hrs at room temperature it cured. Remove from the mold after process completed. And then cut the specimens according to required dimensions for mechanical testing. The composition of the composite material used for testing is presented in table 1. The reinforcing material is shown in fig 1 and fig 2.

Table 1: Designations of Composite Materials

Composites	Compositions
A1	Tamarind kernel powder (15wt %) + K-type polyester resin (85wt %)
A2	Teak wood dust (15wt %) + K-type polyester resin (85wt %)
A3	Tamarind kernel powder (10wt %) + Teak wood dust (10wt %) +K-type polyester resin (20wt %)



Fig.1. Tamarind Kernel Powder



Fig.2. Teak Wood Dust

C. Mechanical Testing

Types of tests done on specimens

- Hardness test (before heating)

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- Hardness test (after heating at 150ºc)
- Flexural bend test
- Tensile test

Hardness Test (Before Heating)

The hardness test was done on the specimen by using shore hardness tester. A diamond indents in form of conical steel rod and having an angle 30ºc.

Hardness Test (After Heating)

This test is same as that of before heating but the difference is before testing the specimen it is heated up to 150ºc temperature. Then the process should be done.
The fig 3 and fig 4 presents the hardness test specimen and hardness test.

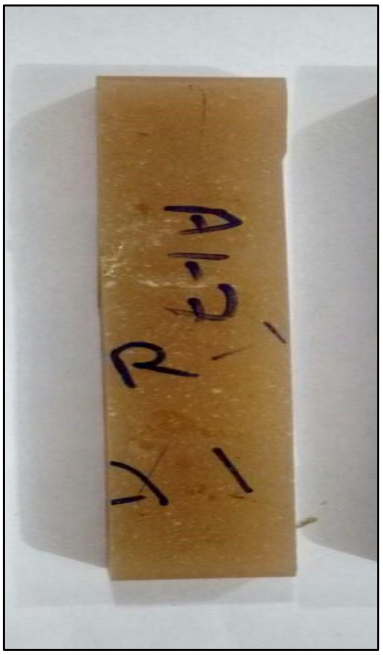

Fig.3. Hardness Test Specimen



Fig.4. Hardness Test

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Flexural Bend Tests

There are two types of flexural tests.

i. In the first scheme, the beam is centrally loaded & basically supported at two ends is called three points bending test.
ii. In the second method, there are two loading points and two end supports are called four points bending test.

In this experiment, we used three-point bending tests it gives result by recording the load applied and it outcomes the strain.The condition of stress depends on the distribution of bending moment and shear force, the specimen subjected to three points are four points bending tests.

Flexural Strengths

In the case of three points bending test, the stress is on the surface of the specimen at failure. The flexural modulus for three points bending tests is

$E_f = S^3m/4bh^3$

Where E_f = flexural modulus

S= support spam

m= slope of load deflection

b= width

h= thickness



Fig.5. Flexural Test Specimen

Tensile Testing

In tensile testing, the load is applied uniaxially and displacement is recorded. The strain and stress derive using stress-strain formula. The information thus collected is utilized to generate the stress-strain curve. In engineering applications, the magnitude of tensile stress is defined as load over the initial cross- section area.

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Fig.6. Tensile Test Specimen

IV. RESULTS AND DISCUSSION

This chapter represents the mechanical properties of the teak wood dust, tamarind kernel powder. The test was done on here combinations the processing of test details has been explained in the previous chapter. The results of 3 combinations reported in this chapter. This test's results included flexural bend test, tensile test and, hardness tests before heating and after heating are discussed.

Effect of different types of combinations on hardness test before heating:

The three composites of measured hardness values are shown in the figure. The hardness value of teak wood dust filled K-type polyester resin is more as compared to tamarind kernel powder and the combination of tamarind + teak. Among three different types of combination, the tamarind kernel combination showed less hardness value.

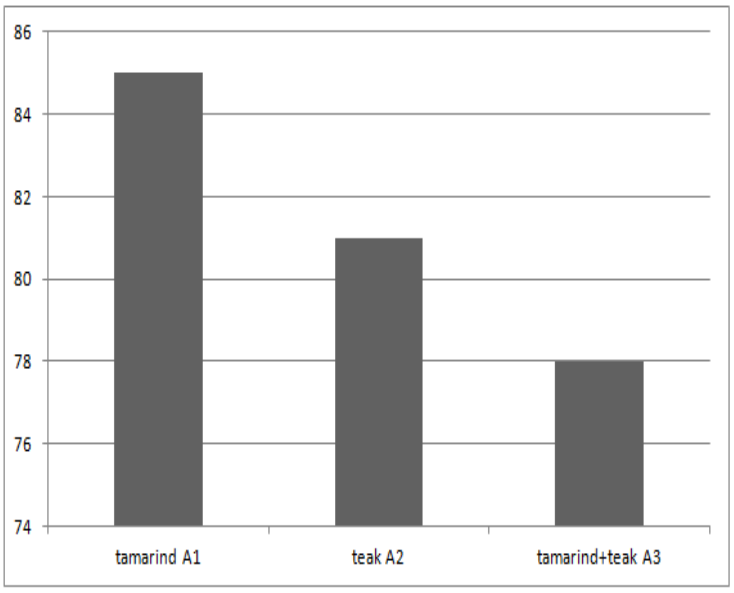

Fig.7. Comparison of Hardness of 3 specimens before heating.

Effect of different types of combinations on hardness test after heating:

Coming to the hardness values of the specimen after heating also is shown in the figure. In this, the combination of teak wood dust filled K-type polyester resin is more as compared to remaining two combinations.

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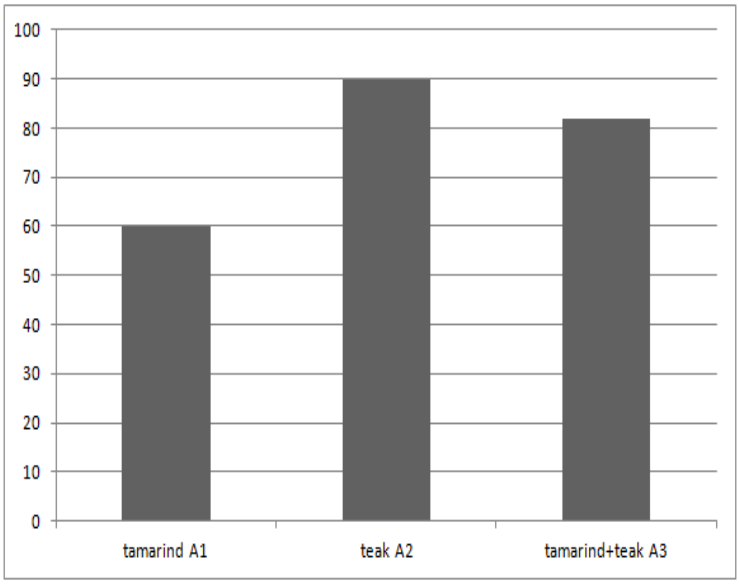

Fig.8. Comparison of Hardness of 3 specimens after heating

Effect of different types of combinations on flexural bend tests:

In this, flexural tests tamarind kernel powder with polyester resin reported more value than the teak wood dust and combinations of teak wood dust + tamarind kernel powder. The less value reported by the combination of tamarind and teak wood dust.

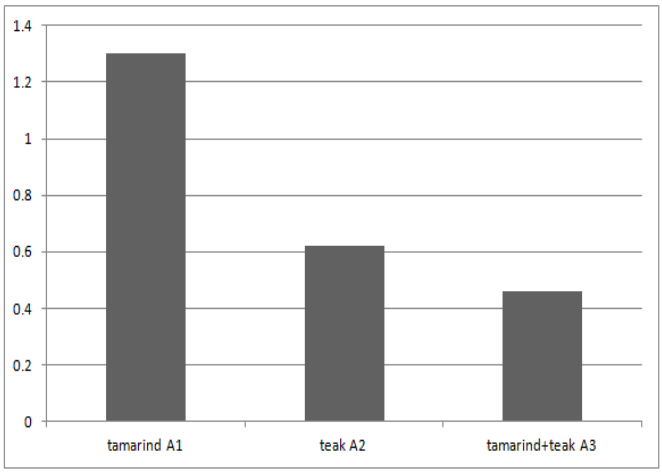

Fig.8. Comparison of Flexural Strength of 3 specimens

Effect of different types of combinations on tensile test:

In this experiment, the input data taken as

Combination of tamarind:

Specimen width mm: 13.72
Specimen thickness mm: 12.7
Cross-section area mm2: 174.244
Original gauge length mm: 50
Final gauge length mm: 50.9

In this, the result showed that ultimate load at 3.320KN, ultimate tensile strength at 19.054n/mm^2,elongation % = 1.800, yield load at 2.400KN and yield stress at 13.774 N/mm^2.

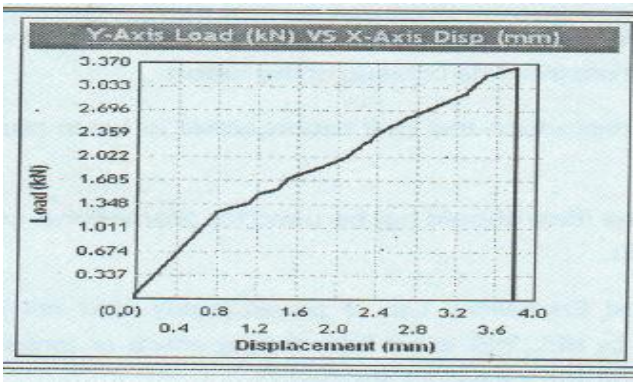

Fig.9. Results of Tensile test on Specimen A1.

Combination of teak:

Specimen width mm: 13.43
Specimen thickness mm: 13.4
Cross-section area mm2: 179.962
Original gauge length mm: 50
Final gauge length mm: 50.86
In this, the result showed that ultimate load at 3.360, ultimate tensile strength at 18.671N/mm^2, elongation % = 1.720, yield load at 3.200KN, yield stress at 17.782N/mm^2.

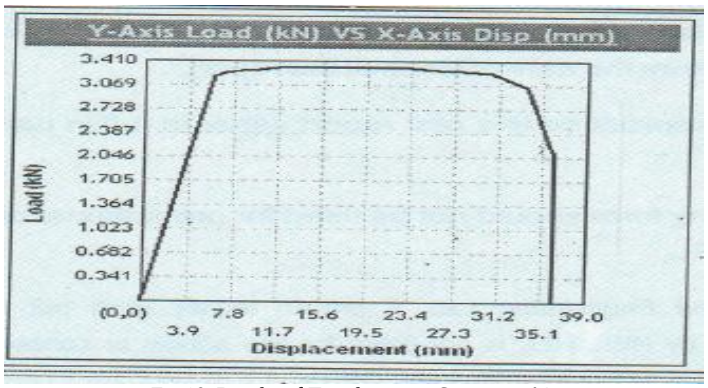

Fig.10. Results of Tensile test on Specimen A2.

Combination of teak + tamarind:

Specimen width mm: 14.9
Specimen thickness mm: 14.7
C/S area mm2: 219.03
Original gauge length mm: 50
Final gauge length mm: 51.4
In this, the result showed that ultimate load at 3.240KN, ultimate tensile strength at 14.792N/mm^2, elongation %= 2.080, yield load at 3.040KN, yield strength at 13.879N/mm^2.

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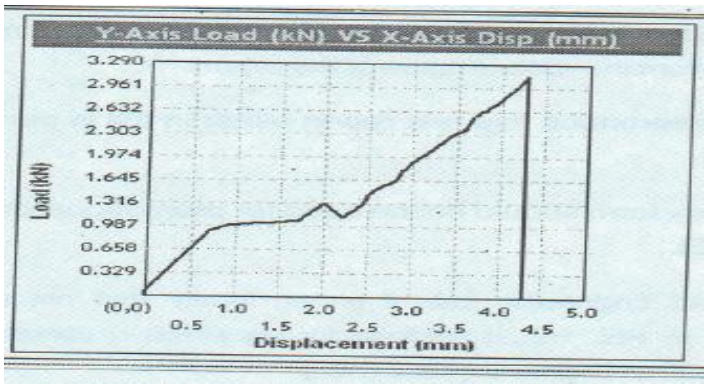

Fig.11. Results of Tensile test on Specimen A2.

V. CONCLUSIONS

The feasibility of use of teak wood rust and tamarind Kernel powder reinforcement in polymers composites is studied from the experiment. Both the reinforcements exhibited good bonding with the matrix. The polymer when reinforced with Teak rust and tamarind Kernel powder resulting in a composite with good tensile and bending strength to use in structural applications.

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Investigation of the Deep Drawability of Aluminium Sheets by Finite Element Numerical Simulation

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ABSTRACT: All sheet metal forming processes occur after permanent plastic deformation resulting in the material properties changing and therefore it is necessary to determine the extent to which a material can further be deformed for subsequent forming operations. The aim of the present work is to evaluate the formability of TWBs made of two dissimilar Al alloys sheets through deep drawing process. The different aluminium alloy sheets AA 6061 and AA 5052 are considered. The modelling of these two sheets is modelled in different length ratios to know the effect of sheets length. The sheet length ratios like 30-70, 40-60, 50-50, 60-40 and 70-30 are considered. The numerical simulations are performed for deep drawing of square cups on sheet width of 75x150, 100x200 and 200x200 mm strain paths at three different punch forces (10, 15 and 20kN) and blank holding forces (60, 70, 80kN). For numerical simulation a commercial FEM dynamic explicit code in which Holloman's power law and Hills 1948 yield's criterion is used. Failure initiation, major limit strains and dome heights are evaluated for all conditions. From the overall results, it has been noted that by increasing the punch force major stain is improved. Failure initiation is happened in AA6061 alloy irrespective of the punch force and blank holding force in strain path.

KEYWORDS: Deep Drawing, TWBs, Forming limit diagram, speed of welding.

I. INTRODUCTION

In the modern development of manufacturing processes, sheet metal forming is one of the major processes. Among conventional sheet metal forming processes, deep drawing processes give distinct results by various materials. A part is said to be deep drawn when its depth is one and half times the diameter of the part. Deep drawing process is an efficient automated process for large productions having the advantage of lowering wastage of the material. Thus reducing cost besides yielding stronger finished products than that are manufactured by casting or machining. It also reduces the cost of assembling by providing combined assembly parts in a single deep drawing process.

Deep drawing is used extensively in the forming of sheet metal into cup or box like structures under tensile and compressive conditions, without altering the sheet thickness. Products of various shapes and sizes such as pots and pans for cooking, containers, sinks, automobile parts like panels and gas tanks are among a few of the applications manufactured by sheet metal deep drawing.

The formability of sheet material during the deep drawing depends on the parameters like blank holder force, lubrication, punch radius, die radius, die–punch clearance, in addition to mechanical properties and thickness of the sheet metal and part's geometry. The proper selection of these variables helps to reduce the defects in the deep drawing process like fracture, wrinkling etc and helps to implement optimum results out of the forming behaviour of the materials used in the process.

II. RELATED WORK

Rodrigues et al [1](2007) compared the formability behavior of friction stir welded aluminum blanks with wide weld beads and Laser steel welded blanks with narrow weld beads. A tailor-welded blank of 1mm thick is made by considering similar and dissimilar combinations of the two steel alloys (DC06 and DP600) and two aluminum alloys (AA 5182-H111 and AA 6016-T4). The formability tests of the AA 5182-H111 and AA 6016-T4 base materials and its similar welds show that they suffer strong wrinkling associated with severe changes in microstructure of the material, thickness of the weld relative to the base material, which induces non-homogenous behavior of the blank and surface finishing. Reza et al.[10] (2012) studied the effects of punch and die temperature on the formability of a cup shaped AA3003 aluminum alloy sheet. The formability improves as the temperature difference between the punch and the die increases. Also the forming speed does not affect localized necking for the given punch velocities in their study

Recently Mostafapur et al[11](2013) conducted investigation to examine the effect on the formability and drawing depth of Al 1050 alloy using the new pulsating blank holder system. When compared with static holder, there was an increase in the depth, strength, formability and accuracy of the final product by using pulsating blank holder.

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III. METHODOLOGY

III .a. Mechanical properties of base materials

The sheet material was considered as aluminum and the properties of AA 6061 and AA 5052 alloy were applied to the blanks. The properties of AA 6061 and AA 5052 aluminum sheet are shown in the Table 3.1 and Table 3.2 and also Table 3.3 shows Blank holding force, blank ratios, and Punch force and sheet metal blanks in three levels.

Table 3.1 Mechanical Properties of AA 6061 sheet

Base	*E(GPa)*	*v*	*σ (MPa)*	*K(MPa)*	*n*	R_0	R_{45}	R_{90}	*t (mm)*
AA 6061	69	0.33	277	392	0.08	0.81	0.9	0.71	2

Table 3.2 Mechanical Properties of AA 5052 sheet

Base	*E(GPa)*	*v*	*σ (MPa)*	*K(MPa)*	*n*	R_0	R_{45}	R_{90}	*t (mm)*
AA 5052	69	0.33	174	350	0.14	0.92	0.93	0.85	2

Table 3.3 Blank holding force, blank ratios, and Punch force and sheet metal blanks in three levels

Blank Holding Force (kN)	60, 70, 80
Blank length ratios	30-70, 40-60, 50-50, 60-40 and 70-30
Punch force (KN)	10, 15, 20
Sheet metal blank (mm)	75x150, 100x200 and 200x200

III .b. Forming Limit Diagram (FLD)

The forming limit diagram (FLD) is a crucial tool for characterizing the formability of sheet metal. For a given material the FLD depends on the shape of the yield function. But from the experimental and numerical results the FLD was strongly strain path dependent. The experimental method for determining the FLD was introduced by Keeler (1965,1968). The maximum strains that the sheet materials can sustain prior to the onset of localized necking are referred as the forming limit strains. A FLD is the plot of the major and minor limit strains in the principal strain space. But in all the sheet metal forming processes, experimental determination of the FLD has been tedious and expensive as the strain paths of different materials were non-linear and vary from each other. The simulation results when compared with FLD, focuses the problematic areas such as wrinkling, tearing etc of the component. They were then subjected to redesign of the component or the tool. A typical forming limit diagram is as shown in Figure 1.

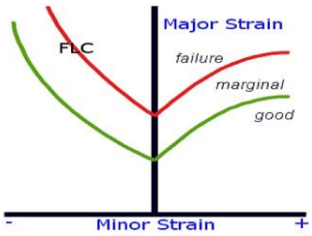

Fig 1. Forming limit diagram (FLD)

III .c. Simulations Using PAMSTAMP 2G

III .c. i. Finite Element Method and PAM STAMP 2G

Finite element method was mainly used for numerical analysis of sheet metal forming operations. Nowadays there were numerous commercial finite element codes. The simulations of two or three dimensional deep drawing operations mostly use the explicit finite element codes though there were weaknesses in the calculation of various stresses. The explicit finite element code PAM STAMP 2G was chosen for the simulations in this study. PAM STAMP 2G was an integrated solution for carrying out various stamping processes. It works as a unique graphical user interface that imports a CAD file, rework the geometry, mesh different parts, generation of the tools, launch the calculations by specifying the stamping process and finally post-process the results.

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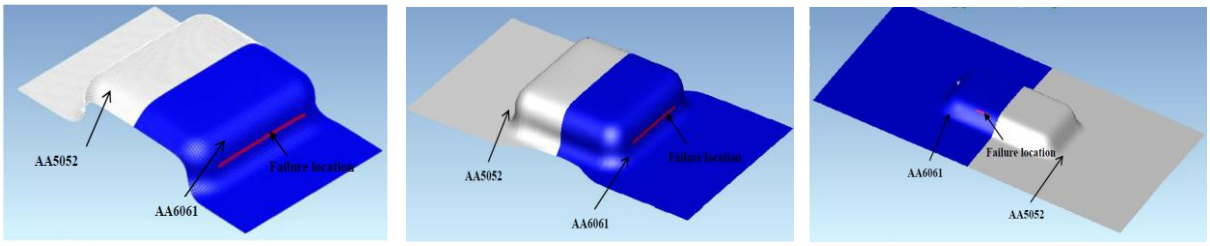
In CAD modelling, the tools required for the test, blank, punch, blank holder and die were generated. Simulations of deep drawing process were simulated using a finite element code, PAM STAMP 2G.The sheet comprised of quadrilateral shell elements with five through thickness integration points of Belytschko-Tsay formulation. The strain hardening law and the plasticity model considered were the Holloman's power law and the Hill's 1948 isotropic hardening yield criterion respectively. Two base material sheets each of size 150x150mm and 200x200mm were taken for all the conditions. The punch radius considered was 8mm and 6mm. A uniform meshing of size 1mm was used throughout the simulations. The yield strength was kept constant and the friction coefficients taken were 0.1, 0.15 and 0.2. The blank holder forces considered were 10kN, 15kN and 20kN. Downward stroke to the punch is given with a velocity of 10mm/min and a total of 18 simulations were performed by varying the friction coefficient and blank holder force. From the simulation results the thickness distribution, punch force, and dome height were evaluated.

IV. EXPERIMENTAL RESULTS

The present study observed the variation of the blank holding force and the blank ratio at three different varying levels while simulating the whole process. The blank holding force and the lubrication condition are effectively evaluated by comparing the punch force and the thickness distribution from the results obtained from the deep drawing process simulations of the AA 6061 and AA5052 sheet by calculating the major strain and minor strain values at each condition of different strain paths.

IV.I. FAILURE INITIATION

Figure 2 (a),(b) and (c) shows deformed strain paths of width 75x150mm, 100x200mm and 200x200mm at punch force of 10kN. In all Figures failure is happened in the AA 6061 sheet whereas failure location is same in all the strain paths. In 75x150mm and 100x200mm the stain paths failure is in the width direction. Initial failure is seen in the AA 6061, it is due to variation in the mechanical properties as compared to AA 5052 alloy. Strain hardening coefficient (n) which is one the effectible formability parameters during the deformation and also play a vital role during the strain localization. If the n value is more the strain localization will be uniform and vice versa. From the Table 1and 2, n value of AA 6061alloy is less compared to AA5052 alloy which lead the faster failure in AA 6061 alloy than AA 5052 alloy. Similar failure phenomenon has seen at punch forces of 15kN and 20kN.



(a) (b) (c)

Fig. 2 (a)Failure location at 10kN punch force in 75x150 mm sheet (b) Failure location at 10kN punch force in 100x200 mm sheet (c) Failure location at 10kN punch force in 200x200 mm sheet

IV.II. Failure Locations

Below is the table showing the failure point, also considered as the punch force for the applied blank holding force along with the different blank ratios. The different strain paths are also mentioned.

Blank holding force (kN)	Blank ratio	Punch Force (kN)	Failure Initiation
60, 70, 80	30-70, 40-60, 50-50, 60-40, 70-30	10, 15, 20	AA 6061

Table 4. 1 Failure locations at different parameters

It is observed from the above Table 4.1 that all the time base material AA 6061 is undergoing into failure which shows that base material AA 5052 has got high forming when compare to base material AA6061 to undergo forming into any considered strain paths for the given blank holder force and punch force in considered blank ratios.

Finally it is concluded that among five different blank ratios as 30-70, 40-60, 50-50, 60-40, 70-30 for the blank holding force (60, 70, 80), punch force (10, 20, 30), strain paths (75x150, 100x200, 200x200) shows the best

forming in 70-30 blank ratio which indicates that at blank ratio 70-30, AA 6061 base material has got the highest forming limit.

V. CONCLUSION

The results obtained by varying all the above parameters are evaluated for the punch force and also for the thickness distribution. And it is concluded that:

- As the blank holding force increases from 10kN to 20kN, the punch force decreases with slight variation for the strain path 200x200mm. The punch force is noticed to increase with increase in the blank holding force for the strain path 150x150mm.
- The thickness distribution is evaluated from the graphs drawn by comparing the thickness with the distance, both calculated in mm. The observations show variation in the thickness distribution for the strain path 150x150mm for variations in the process parameters. But there is no change in the thickness distribution for the strain path 200x200mm.
- The dome height decreased as the coefficient of friction increased from 0.1 to 0.2. The maximum dome height is noted as 23mm for the strain path 150x150mm and as 13mm for 200x200mm strain path. But the variation in the dome height in each of the simulations is very minimum

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Mechanical Behavior & Analysis of Epoxy, Al_2O_3 Composites

K. Bharadwaja, S. S. Rao, T. Babu Rao

Abstract: ***In this paper, an intelligent report has been planned for to assess epoxy composite network Epoxy composite execution of Al_2O_3 particles remembered for epoxy composite resin. A ultrasonic blending method applied to accomplish homogenous dissemination of particles addicted to epoxy pitch. Various mechanical and Tribological tests, for example, bending (three(3) point) test, Charpy Impact test & hardness are perform to check mechanical properties & wear execution of Al_2O_{3+} Epoxy composites. These composites showed expanded bowing quality and effect quality because of the absorption of Al_2O_3 particles. In collection, presentation of Al_2O_3 particles into Epoxy gum grid at low qualities brought about noteworthy decrease of wear rate Such type of impacts would be ascribed to the scattering of Al_2O_3 particles into epoxy framework &stacking. The impact of the Al_2O_3 molecule ejection with epoxy lattice tar is additionally portrayed regarding strengthening strategies.***

Keywords: Epoxy composite; Al_2O_3particles; Epoxy; Mechanical properties; Tribological execution.

I. INTRODUCTION

The Epoxy pitch is mainly fundamental thermosetting polymers that have been generally utilized while the framework in Epoxy + Al_2O_3 composites along with other basic materials because of its high quality, huge compound obstruction, and straightforwardness in preparing and in light of the fact that it is accessible since multi year. Separated of this, epoxy tars are one of a kind among every thermosetting gum as a result of numerous elements including shrinkage, no volumeatiles emitted during fix, similarity with an extraordinary number of materials, quality and toughness, security, disintegration and substance obstruction, and electrical protection [1]. practically identical to different thermo sets, epoxy saps likewise structure a system on restoring with various relieving operators, for example, amines, anhydrides, thiols, and so forth [2]. These substance and handling adaptabilities make epoxies valuable in numerous applications, for example, defensive covering, paints, breaking rubbers, and liners cements, hardware, mechanical deck and Epoxy composites. Since numerous years, Epoxy composites have become other materials that improve Epoxy composite material execution by recognizing innovative qualities and permitting interesting association among materials [3-11]. There are various observations that illustrate Epoxy composites demonstrate elevated mechanical & warm properties contrasted with conventional Epoxy+ Al_2O_3 composites [16,]. Basically, fillers have high thickness contrasted with the low thickness of polymer network, accordingly require a lot of fillers superfluous to the framework so as to get better mechanical execution. Additionally, this expansion in filler content prompts an expansion in the heaviness of the Epoxy composite. Then again, polymer Epoxy composites have the one of a kind capacity to improve mechanical properties at low filler content, enabling the material to be lightweight [19]. The primary points of interest of Epoxy composite polymers are its favorable circumstances in physical properties contrasted with ordinary composites. As of late, there is extraordinary mindfulness in improving properties of epoxy grid Epoxy composite with expansion of particles, for example, TiO2 and others [22, 23]. Schadler and Siegel [24] created an epoxy framework Epoxy composite loaded up with TiO2 and revealed a helpful impact on mechanical properties. It was discovered that the expansion of articles can be an increasingly supportive method for enlightening the mechanical and warm attributes. Epoxy/dirt Epoxy composites are the most broadly worked thermo set cross breeds. Researchers change various kinds of tar, natural modifiers, relieving specialists and handling conditions in manage to increase basic tolerating of materials and to streamline the preparing systems. Epoxy composites are these days no longer just private to the research center, they are found in the genuine world [25]. One of the lion's share regular application techniques to accomplish homogenous scattering is ultrasonic blending, which have been, all things considered, utilized in present day years. One of the uses of epoxy, as referenced some time ago, is flooring. This present examination endeavors to research mechanical properties of Epoxy composites by bringing Al_2O_3 particles into epoxy tar, with center around kind of circulation and stacking. The last properties of Epoxy composites may control the path toward new utilization of elite of polymers

II. MATERIALS USED

The hybrid Epoxy composite material used in the current research includes a matrix material Lapox C-51, a low viscosity liquid epoxy resin (equivalent weight = 182-192 g/eq, viscosity at 25°C= 450 - 650 m Pas) along with Lapox K-6 , a room temperature curing amine hardener (density at 25°C = 1.04 Kg/l) supplied by Atul Ltd, Gujarat. The reinforcing material Al_2O_3 particle (190 µm) procured from Fisher Scientific, Mumbai.

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III. SPECIMEN PREPARATION

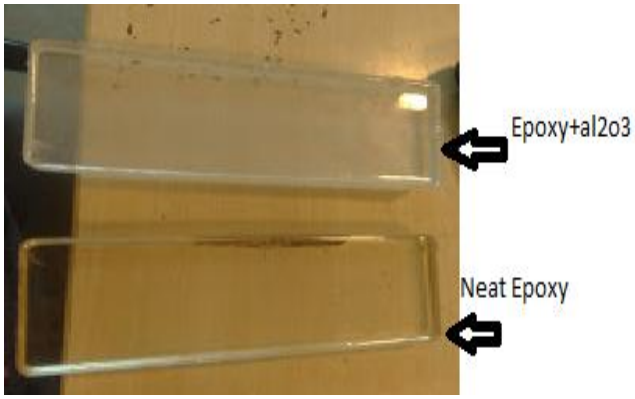


Fig 1

The calculated weight amount of Epoxy+ Al_2O_3 particles was mixed resin through a mechanical stirrer for 10 min to decrease viscosity of resin after that This compound was then mixed Homogenizer (Miccra D-9, speed range of 11 000–39 000 rpm) used for 14 min in order to attain a homogenous dispersion .shown in Fig 1. A curing agent was added to the mixes at surrounding temperature & combined for 5 minutes by means of the mechanical stirrer. So as to acquire ordinary Epoxy composite examples for mechanical testing, the last mix was filled the shut shape, trailed by the relieving procedure around 24 hours with proper releaser applied before filling mould.

Epoxy composite Characterization

Flexural Test

Three-point bending test of the Epoxy+ Al_2O_3 composite samples prepared ASTM D790 using a Deepak Samarth universal testing machine at a deformation rate of 5 m/min at near to room temperature in regulate to calculate flexural properties.

Charpy Impact Test

Notched Impact test conducted using Impact Tester machine, model FIT 300 (EN) according to ASTM D256 standard.The entire composite sample dimensions are 10x10x55 mm

Hardness

The samples for hardness testing were machined from the fabricated Epoxy composites with the dimensions of 15x25x10mm and polished them to 1µm. by using Barcol method.

Scanning electron microscopy(SEM)

In categorize to observe the morphology of fracture surfaces in Flexural Bending test , Charpy impact test,& SEM utilized with the function of obtaining in sequence concerning the consequence of particles on the resultant reinforcing.

IV. TEST RESULTS

Flexural Test

Flexural Bending test utilized for assessing flexural properties of epoxy composites loaded up with Al_2O_3 particles. after number of studies which agree with the positive impact of in adaptable particles on the size of macrometer during stress conduct of framework Epoxy composite. In including, it is celebrated that flexural quality of Epoxy+ Al_2O_3 composites is strengthened with fall of micrometer molecule size because of expanded filler content [28]. This gives far over the ground flexural quality. Fig. 1 shows flexural quality of Epoxy composites loaded up with Al2O3 particles as far as Al2O3 particles content. As per Table 1& Fig. 1, the including of 5% volume Al2O3 into epoxy gum brought about a 10% overhauling in flexural quality contrasted and slick epoxy. Expanding the measure of Al2O3 to 7% volume development improved flexural quality upto 30%. This expanded flexural quality can be licensed to the nature of dissemination and stacking of particles.

Flexural strength results of Al2O3. .. Wt % (Table1)

Sample No.	% of Al_2O_3	Flexural strength (MPa)	Impact strength (KJ/m2)	Hardness strength (B)
1	1	45	1	55
2	2	49	1.8	62
3	3	54	2.1	70
4	4	55	2.3	76
5	5	59	2.9	82
6	6	61	2.6	85

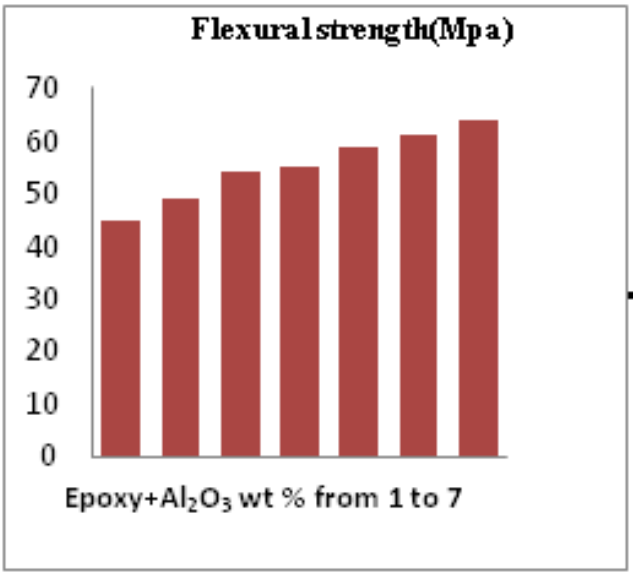


Fig 1

Impact test

The Charpy impact test is one of the most appropriate impact tests that assess the performance of a material issue to shock loading with bending, tension and torsion. Charpy tests are extensively applied in industries due to the simplicity of sample preparation and the opportunity to generate comparative data very rapidly [32]. Notched samples are prepared. The specimen contains a notch, then the calculated impact strength is pretentious by only fracture propagation.

In other words, notches act as stress concentrators. As well, if the original addition procedure not efficient, a comparable trend could be induced by constituent part agglomerates, which continue as stress concentrators within the matrix. If the introduced particles act as burly stress concentrators, the impact force of the composite (epoxy+ Al2O3) is predictable to decline significantly as more particles are introduced. It be supposed to be noted at this point that the utilize of notched specimens in this study emphasizes the measurement of the power required to promulgate a crack through the material. shows Fig.2. impact strength of (epoxy + Al2O3) composites as a role of Al2O3 particle content.

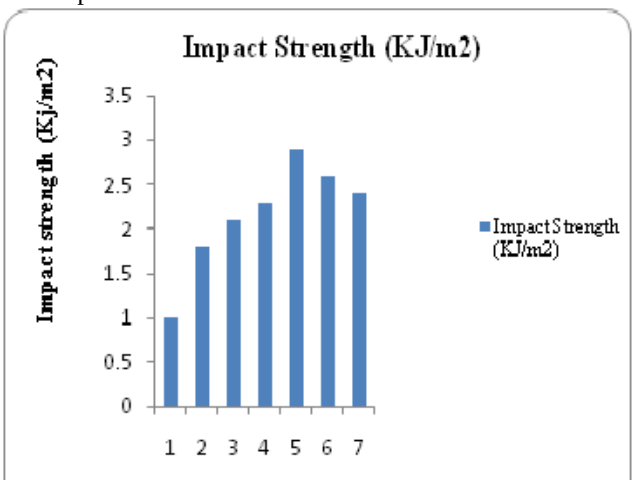


Fig 2

Hardness test

Fig. 3 shows the variations in the hardness of Epoxy with Al_2O_3(composite) filler content. As practical, accumulation of the Al_2O_3 particles improved the hardness, which corresponds to the high hardness & additional identical diffusion of Al_2O_3 filler. Elevated hardness is exhibited by the 6% of Al_2O_3 particles overflowing (Epoxy+ Al_2O_3) composites, while 7 % Al_2O_3 particles Epoxy composite shows decrease in hardness. For the majority cases, increasing filler content increases the rigidity of the Epoxy + Al_2O_3 composite. In this case of high filler ratio, a small drop in hardness value is seen. These observable fact can be delineate by the weak point in the bond the epoxy + Al_2O_3 fillers. Lam et al. found that ornamental the stuffing ratio resulted in attractive collect in the Al_2O_3 particles crammed Epoxy composite & a decrease in the hardness value of the Epoxy + Al_2O_3 composite

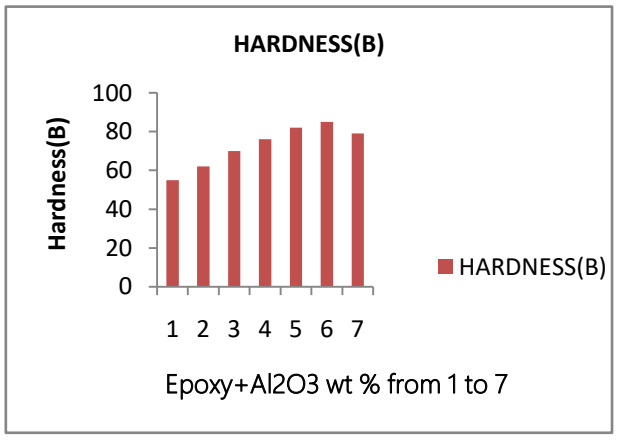
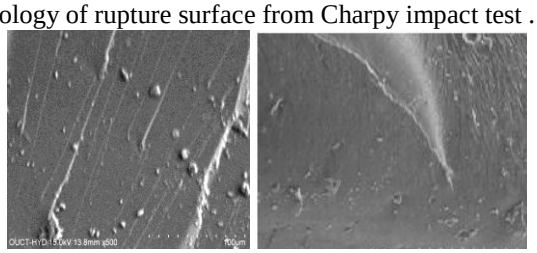


Fig 3

Scanning electron microscopy

Crack capture outline are seen in this manner of transmission. in conclusion, constant ductile mode dissemination takes place in high temperature testing conditions. in addition, plain stress is the prevailing state of tension in (Epoxy+ Al_2O_3) composite, which causes an increase in the stress essential for to yield shearing.. Morphology of rupture surface from Charpy impact test .



a) b)

Fig .4

(a) epoxy composite with 1% Al_2O_3 particles (b) epoxy composite with 7% Al_2O_3 particles

V. CONCLUSION

In this paper evaluated Mechanical & Tribological performance of composite(Epoxy+Al_2O_3).so as to attain high superiority dispersion of Epoxy+ Al_2O_3 composite, ultrasonic mixing utilized to get the Results, Matrix properties have been pretentious by beginning of particles. Flexural Bending strength, of composite augmented due to mixture of 1% volume Al_2O_3 particles with epoxy matrix. These improvements continued up to 7% volume added into epoxy matrix Impact strength, of composite improved due to blend of 1% volume Al_2O_3 particles with epoxy matrix. These improvements continued up to 5% volume, and decreased in 6 & 7 % volume. added into epoxy matrix Hardness of composite improved due to blend of 1% volume Al_2O_3 particles with epoxy matrix. These improvements continued up to 6% volume, and decreased in 7 % volume. added into Epoxy$_+$ Al_2O_3 matrix. [40].since possibility of agglomeration particles increases in these circumstances. in conclusion, high mechanical properties of Al_2O_{3+}epoxy composite, with superior wear properties, permit the substance to moderately or entirely substitute fibers in predictable fiber-reinforced composites.

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DRY SLIDING WEAR BEHAVIOUR OF ALUMINIUM 7075/SiC/MoS_2 COMPOSITES AT ROOM TEMPERATURE

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Abstract: *Al7075 aluminium alloy is the most favored material used in aero space, defense, automobile and various engineering purposes due to its exceptional properties. Due to poor resistance to wear property, it is restricted to use at various engineering applications. The wear resistances of aluminium alloys are improved by adding of ceramic reinforcement particulates. In the present work Al7075 aluminium alloy is selected as a matrix material and silicon carbide (SiC) selected as primary renforcement which has good compatibility with aluminium alloy and posse's excellent mechanical properties, high electrical resistivity, and good thermal conductivity. On other hand molybdenum disulfide (MoS_2) also used as secondary reinforcement (solid lubricant) to enhance the wear properties of composite materials in dry sliding wear condition at room temperature. The Al7075-3%SiC – 3%MoS_2 composites are fabricated via stir-casting process with increasing of molybdenum disulfide (MoS_2) by 4% and 5% respectively. The dry sliding wear test was carried out for the fabricated composites on Pin-on-Disk apparatus to estimate the wear rate of composites by considering progression parameters as normal load, sliding distance and sliding velocity during experimentation. Further, the wear surface analysis was carried out by optical microscopy analysis. This experimental result reveals that, the effect of molybdenum disulfide (MoS_2) in dry sliding wear condition of fabricated composites.*

Keywords: **Hybrid Composites, Stir Casting Techniques, Micro Structures, Wear rate, Dry Sliding Wear**

1. INTRODUCTION

A innovative set of advanced materials entitled metal matrix composites(MMC) substitute traditional materials because of unusual wear resistance characteristics, strength to weight ratio and in several applications for instance as pistons, cylinder liners and other materials etc. MMCs have been an interesting and competitive field of scientific analysis and research more than the past two decades, with MMCs being practical engineering materials mainly in recent times[1]. Aluminum-based composites contribute to the overall share of commercially produced MMC[2]. Aluminum material is very light metal which is frequently used in various types of industrial appliances and having a density of approximately 2.7g / cc after that to magnesium. This type of metals is frequently applied as the stand material in various manufacturing due to high strength to weight ratio and fast storage. Products based on aluminum are typically combined with durable terracotta constituent parts to create compounds that enhance more suitability of these lightweight materials for use in quite a lot of applications wherever the biggest factor is wear [3]. Aluminum is armored with various kind of durable terracotta constituent parts similar to SiC [4,5,6,7,8], B_4C[9-10], Al_2O_3[11–13] and TiC [14] for the manufacture of composite materials for various applications. In addition to these normal ceramic particles, a

small number of supplementary materials just like mineral admixtures i.e. rock dust, fly ash, marble dust and bagasse ash have been examined by some researchers [15]. Mainly of the work spotlight on enhancing the wear resistance of the aluminum alloy and SiC is used with several materials among the specific ceramic particles, resulting in increased the main property which is resistance of wear. SiC improved AMCs are glowing acknowledged for their heavy strength and resistance to wear put side by side to conventional alloys [16]. Increasing SiC of volume and width diminishes Al6061/SiC composites ' common wear rate [17]. Al alloy's mechanical strength and wear resistance improve as SiC particulates increase. Other than the secondary augment in hardness build it hard to machine the material [18]. In addition to strong ceramic particles, the accumulation of solid lubricant constituent parts such as Gr or MoS_2 improves the wear characteristics of compounds [19–23]. It happens due to the mechanical characteristics are enhanced of bulk due to durable constituent parts and diminished abrasion coefficient due to the configuration of lubrication layer [24–26]. Additional amplify in the graphite (Gr) increases composite rupture strength which reduces wear resistance [27]. Furthermore, as the percentage of Gr reinforcement enhanced, the material's hardness decreases as a consequence of the compound's increased porosity [28]. Therefore, the quantity of unyielding lubricant added be supposed to contained by the maximum value and preserve be worn in combination in the midst of supplementary terracotta reinforcements like SiC and TiB_2. Furthermore, graphite is additional in a large amount revises as reinforcement owing to its enhanced self-lubricating characteristics to trim down friction and rate of wear. Nevertheless, very few attempts were made on MoS_2 alone as a reinforcing part of aluminum matrix compounds, which furthermore contain a self lubricating feature. The most crucial improvement of the MoS_2 in excess of Gr is that to show its strong lubricant nature, i.e., it does not necessitate any peripheral sustainable things i.e oxygen. Even in the vacuum environment, MoS_2 can show its solid lubricant property. However, MMC manufacturing faces many difficulties including similarities among medium and reinforced constituent parts, identical divisions of reinforcement constituent parts on more matrix material; it is very successfully resolved via an assortment of changes during manufacturing systems. Methods of in situ, liquid, solid state are widely utilized to incorporate ceramic particles into the techniques of matrix production. The MMCs were manufacture in liquid stir casting, among other things, incredibly inexpensive and effortless. The reinforced terracotta particles are unvaryingly disseminated and are accomplished of achieving a near net component and the production speed of the element [29, 30, 31].

2. EXPERIMENTAL PROCEDURE

2.1 Raw Materials

For this work, the base matrix selected was Al7075 alloy and procured in the form of ingots from Vision Castings, Hyderabad. Table 1 illustrates the chemical composition of the Al7075 alloy. For this work, The chosen reinforcement material was Silicon Carbide (SiC) and MoS_2 (molybdenum disulfide) from M/s Vision Castings & Pvt. Ltd., Telangana, Hyderabad.

Table 1. Al7075 Chemical Composition (Weight percentage)

Chemical composition	Si	Fe	Cu	Mn	Mg	Cr	Zn	T
Al7075	0.4	0.5	1.6	0.3	2.5	0.15	5.5	0

2.2 Fabrication of Composites

Composites are prepared using stir casting technique through the liquid metallurgy route. Upon successful degassing with solid degassing hexachloroethane tablet, preheated SiC fine particles and MoS_2 of lab-grade spotlessness were additional into the eddy of the molten alloy. A ceramic-coated steel impeller was used for a period of 10 minutes, to achieve molten alloy by mechanical stirring. It achieved a frequency of 400 rpm. A 710^0C pouring temperature was continued and the fused metal used in preheated cast iron molds.

Table 2. Composition and code of prepared materials

S.No	Composition	Code
1	Al alloy	Al
2	Al 7075 + 3% by wt Sic + 3% by wt MoS_2	
3	Al 7075 + 3% by wt Sic + 4% by wt MoS_2	
4	Al 7075 + 3% by wt Sic + 5% by wt MoS_2	

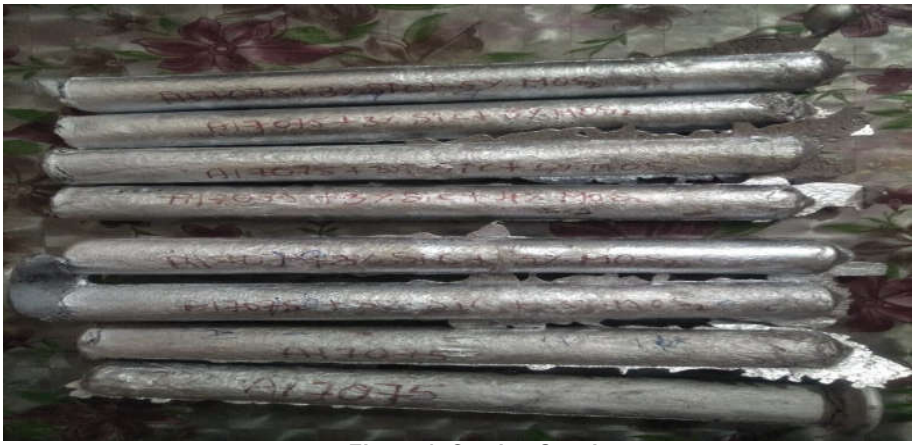

Figure 1. Casting Specimens

3. PHYSICAL AND MECHNICAL PROPERTIES

3.1 Hardness Test

Bulk hardness measurements are performed using standard Rockwell hardness testing machine scheduled to the base metal & composite specimens. The sections were machined at room temperature and load using 500 kg as per ASTM E10-07a. The test showed that the composite specimen's hardness had progressively amplified through an enhancement of up to 5% wt of MoS_2 fine particles in the metal matrix.

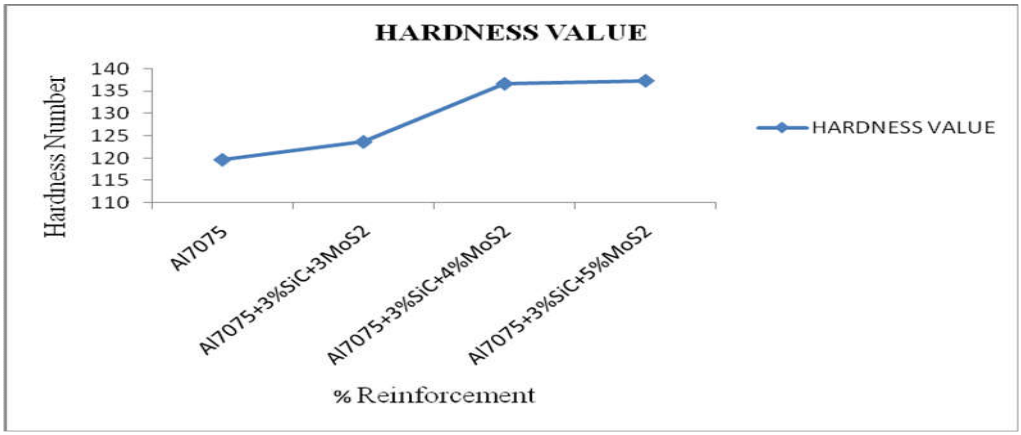

Figure 2. Change in Hardness of the material with percentage reinforcement in hardness

3.2 Tensile Strength Test

The specimens were a machine for obtaining dog boned structure as per ASTM–UTM carried out the standard E8 experiment. All the samples of the tensile test are publicized in Figure 4. The test showed that the ultimate tensile strength improved slowly by rising the percentage of reinforcement applied to the steel matrix by wt. The peak tensile strength of 5% MoS_2 was observed. The ultimate tensile strength pattern is shown in the Figure 3.

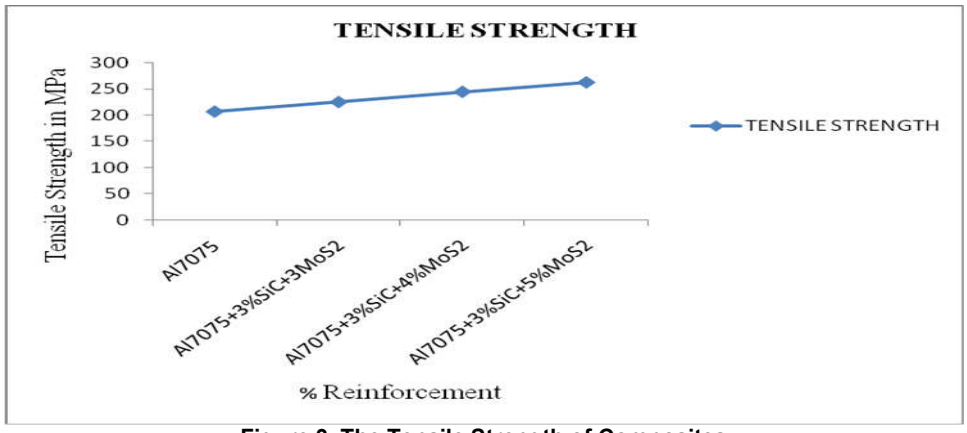

Figure 3. The Tensile Strength of Composites

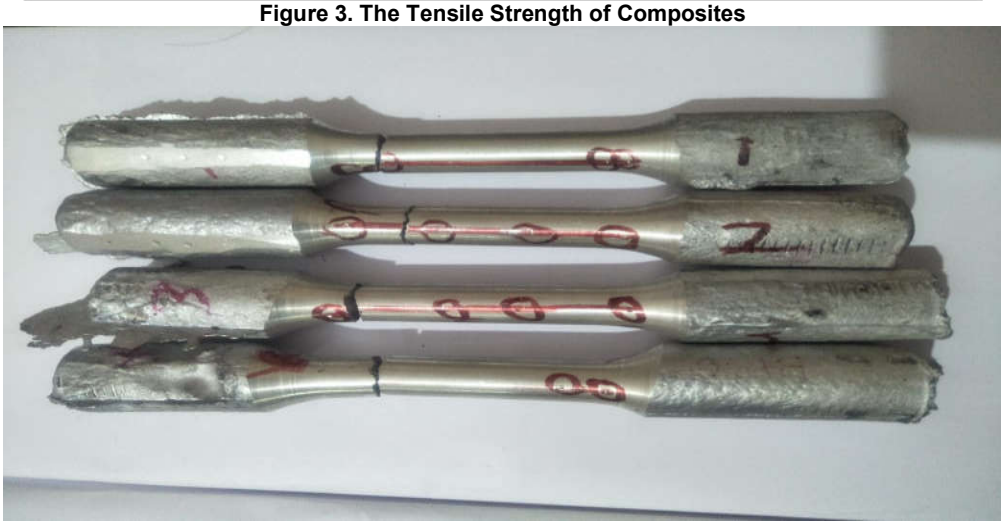

Figure 4. Tensile Test Specimens

3.3 Elongation

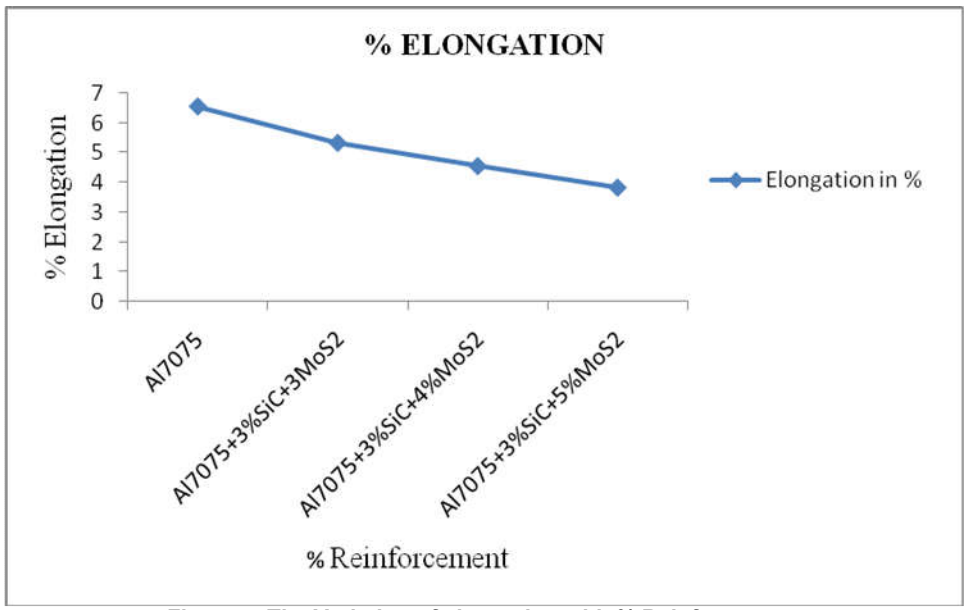

Figure 5. The Variation of elongation with % Reinforcement

Figure 5. Shows the difference of elongation among SiC & MoS_2, the measurement of Ductility of composites by using % elongation. The Ductility of Al alloy is high as evaluate to prepared composites. The elongation of the composites drastically condensed due to raise in weight percentage of reinforcement. The decrease in the ductility due to development voids nucleation by increasing % of MoS_2. At the tip of cracked particles stress concentration is very high, this forms lower ductility as compared to un reinforced composites (Al alloy).

3.4 Density

A rule of mixture is used to determine the potential density values of base alloy and composites. We used Electronic specific gravity balancer to measure the density of alloy and composites. Figure. 6 shows electronic specific gravity balancer.



Figure 6. Electronic specific gravity balancer

The typical theoretical and measured density values of the AA-7075 alloy and its relevant composites were shown in Table 6. Adding Sic and MoS_2 into the base material in such a

case density of the composites was increased evaluate to the base material AA 7075 alloy. This is the reason of high density of AA 7075 alloy.

Table 3. Theoretical and measured densities of AA-7075 and Composites

Samples	Measured Density (g/cm^3)	Theoretical Density (g/cm^3)
AA-7075	2.81	2.82
AA-7075+3%SiC +3%MoS_2	2.86	2.88
AA-7075+3%SiC+ 4%MoS_2	2.89	2.91
AA-7075+3%SiC+ 5%MoS_2	2.9	2.93

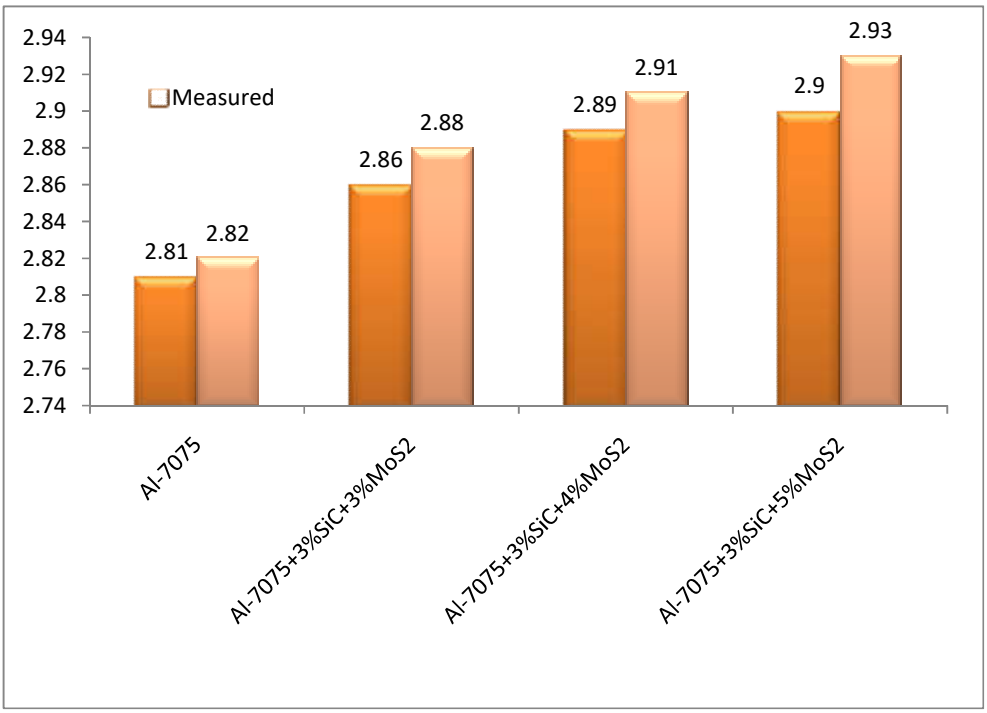

Figure 7. Variation of Density Vs % of Reinforcement

4. WEAR PROPERTIES

In this work we used specimens as per the ASTM G99 and experiments conducted using a computerized wear test machine (pin on disc) as illustrated in the figure 9. Disc of the material is steel. The disc surface was cleaned with high garde emery paper before testing. Figure 8 reveals the dimensions of the wear test samples were 8mm ϕ and 30mm length and Figure 10 shows wear test samples. In this wear test we used different types of paremeters such as load is varied 10N, 15N and 20N, sliding distance is 950 m and sliding velocity is 2.5 m/s. In this test pin was kept stationary perpendicular to the disc and disc was roated.

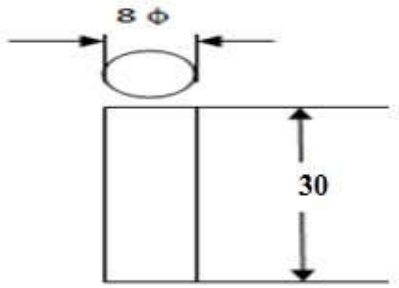

Figure 8. Dimensions of Wear test sample



Figure 9. Pin on Disc Setup

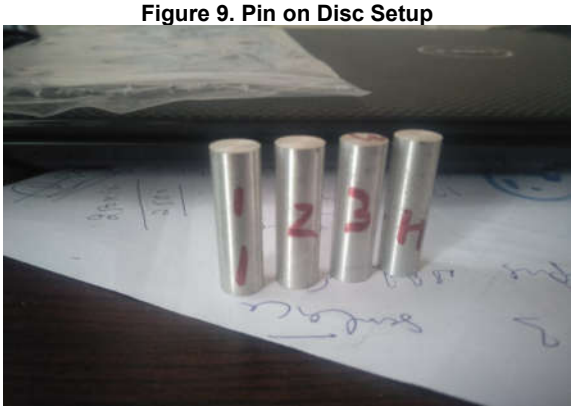

Figure 10. Wear test specimens



Figure 11. Wear test specimens

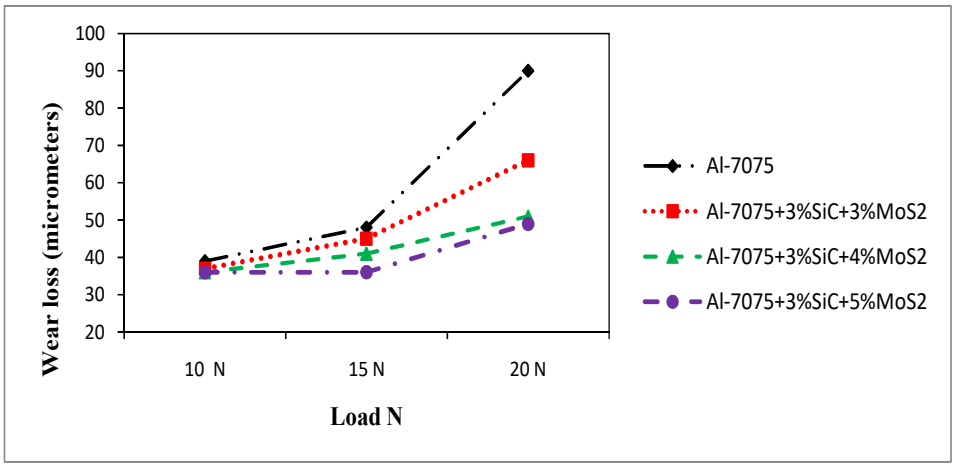

Figure 12. Variation of Wear rate with load at sliding velocity 2.5 m/sec and constant sliding distance 950m

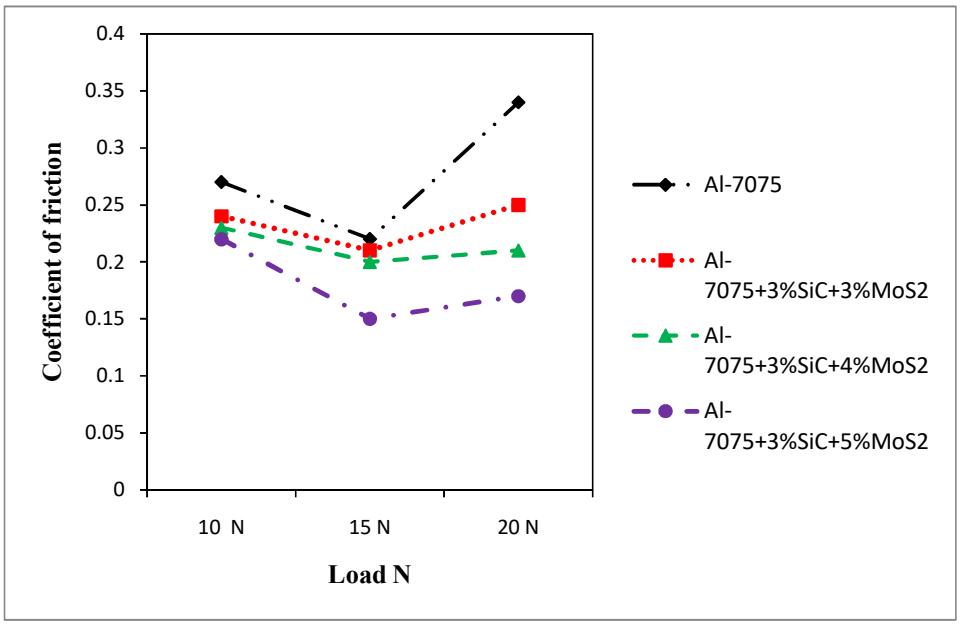

Figure 13. Variation of Coefficient of friction with load

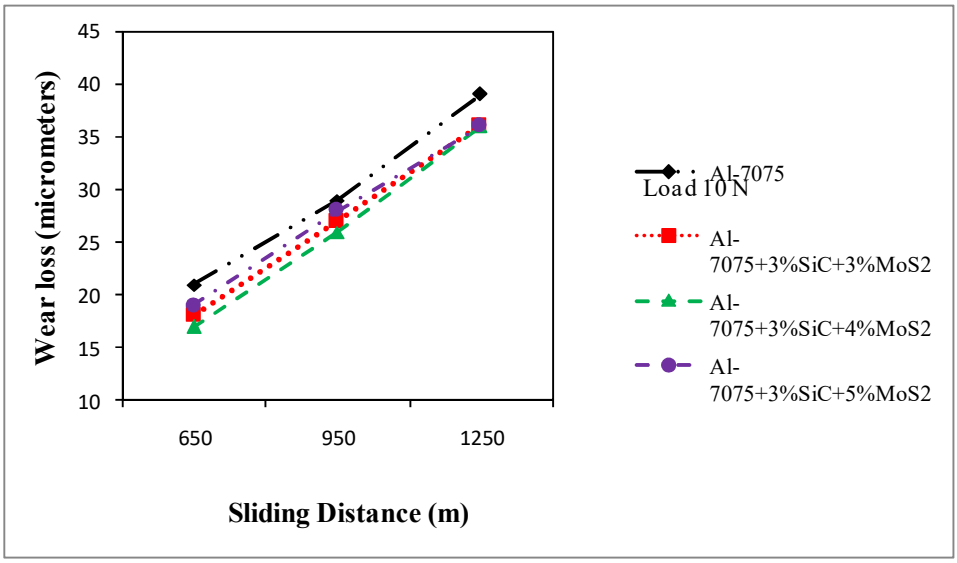

Figure 14. Variation of Wear rate with Sliding distance at sliding velocity 2.5m/sec and at constant load 10N in room temperature condition

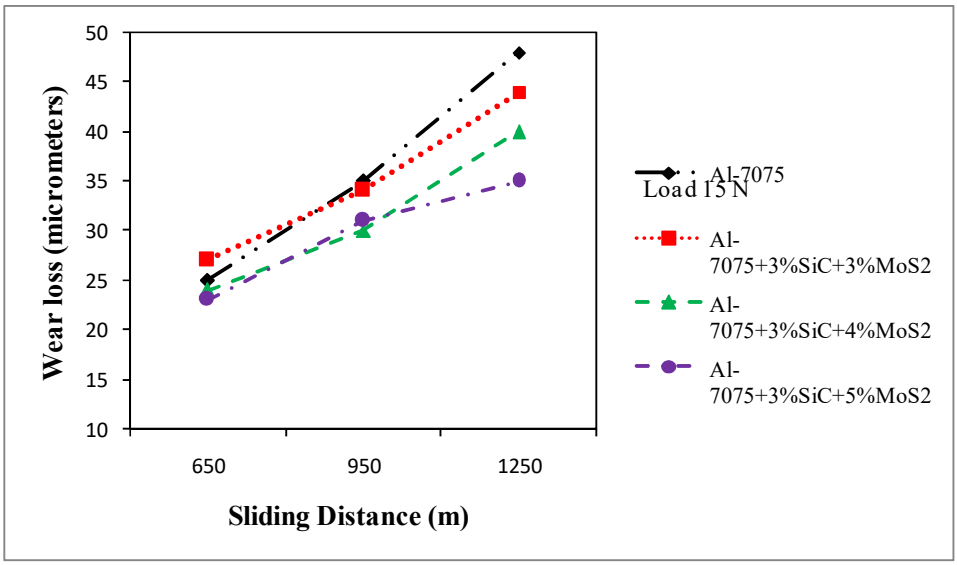

Figure 15. Variation of Wear rate with Sliding distance at sliding velocity 2.5m/sec and at constant load 15N in room temperature condition

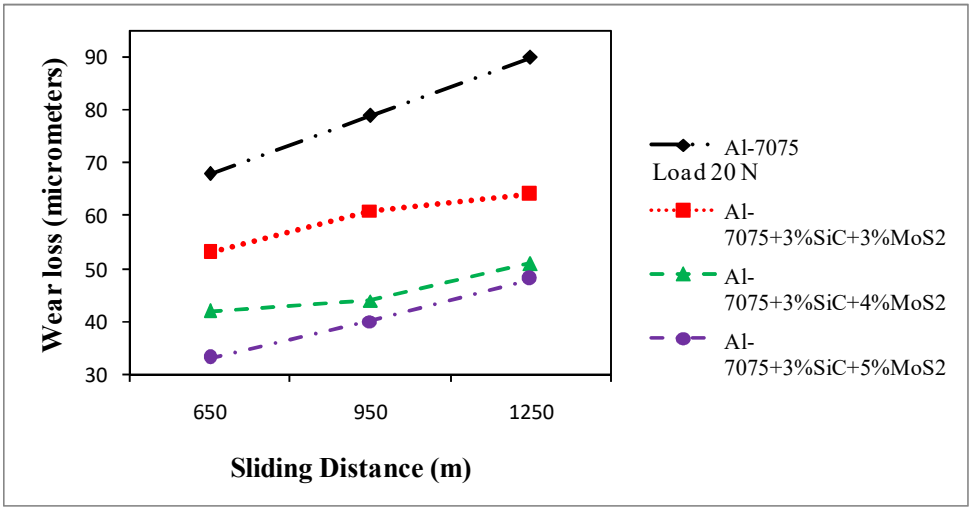

Figure 16. Variation of Wear rate with Sliding distance at sliding velocity 2.5m/sec and at constant load 20N in room temperature condition

The above figures clearly show the difference in wear rate for different loads viz 10N, 15N, 20N with accumulation of wt percent reinforcement to Aluminium alloy. From the statistics above, we can clearly identify that the wear rate decreased in every part of different loads by adding wt percent of reinforcement, as the load rises the wear level often enhanced in all situations. The stress also amplified proportionately at the pin-disk boundary when the load is raised, whereas Al7075 as a lighter material endure very high wear and SiC elements & MoS_2 soild lubricant withdraws the weight functioned after that the boundary connection among Al, SiC and MoS_2 decreases the rate of wear in the abrasive wear system.

5. MICROSTRUCTURE

Morphology, thickness, size and distribution of reinforcing particles have a foremost impact on the properties of particulate composites. The samples were prepared by rigorous buffing and engraving for microstructure analysis, and the specimens were then examined beneath an optical microscope to examine the microstructure. Figures 17-19 display the optical micrograph, which illustrate the even scattering of the matrix reinforcement.

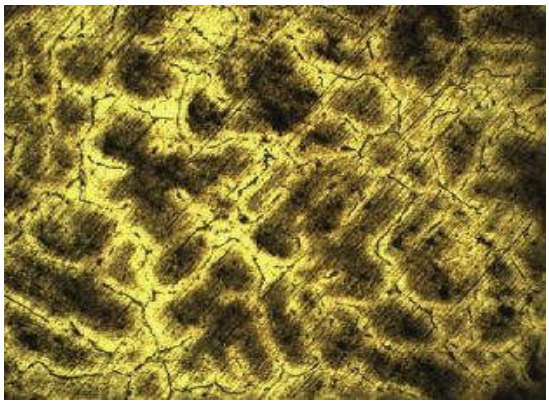

Figure 17. Al7075+ 3% SiC+3%MoS_2

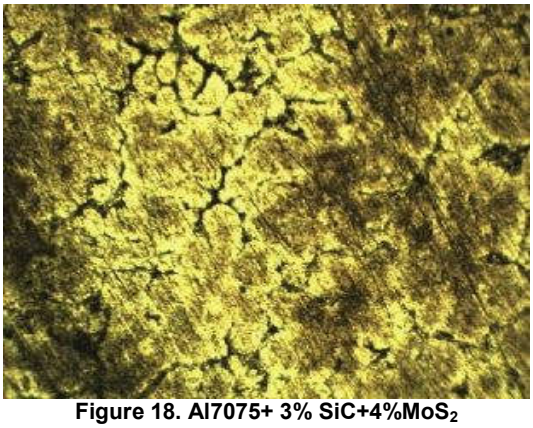

Figure 18. Al7075+ 3% SiC+4%MoS_2

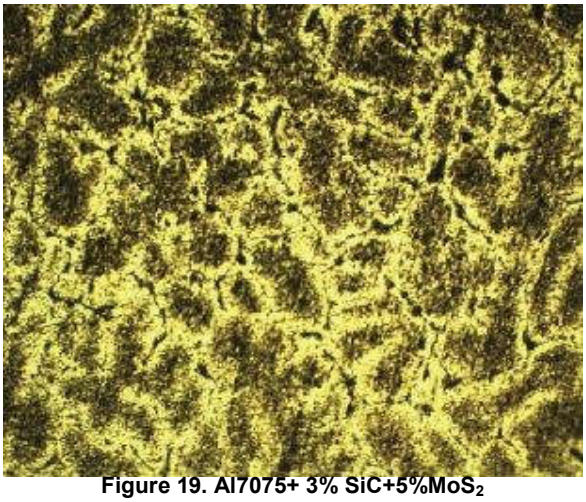

Figure 19. Al7075+ 3% SiC+5%MoS_2

6. CONCLUSIONS

1. Through increasing the percentage of SiC & MoS_2 reinforcement content, density increases. There are not much more variations among the experimental and the theoretical density values and this designate the aptness of the stir casting system for composite preparation..

2. The composites are arranged using the technique of liquid metallurgy (stir casting). in the midst of an amplify in the percentage of reinforcement, the micro hardness increases; this is due to the SiC particle and secondary MoS_2 reinforcement distributed in the soft matrix material. As the reinforcement percentage increases the hardness value when compared to the alloy.

3. By increasing the secondary MoS_2 reinforcement, the tensile strength increases. Due to the addition of 3%, 4% and 5% by mass MoS_2, the tensile strength increases significantly. The composite elongation rate dropped drastically thanks to weight percentage increase in reinforcement.

4. At first, the rate of wear was greater in the nonappearance of SiC & MoS_2 particle asperities. The SiC & MoS_2 elements outlined a protective stratum among the pin and offset face exterior as the sliding distance and load increases, thereby increasing the wear speed. When the pin-disk interface raises the load. As a softer material, Al 7075 endure higher wear, but the Sic particle & stronger lubricant MoS_2 resists the load functional and the bonding crossing point among Al. SiC & MoS_2 in the abrasive wear system decreases wear rates.

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Influence of Variable Speed on Performance and Emission Characteristics of Diesel Engine using Fish Oil Biodiesel Blends

M. Vijay Kumar, U. Gopala Rao

Abstract: ***Alternative fuel sources are needed to be developed to meet the escalating demand for fossil fuels. Also from an environmental point of view, these most modern resources of fuels must be environment-friendly. The rapidly increasing consumption of fossil fuel and petroleum products has been a matter of concern for many countries which imports more crude oil. So, there is necessary for the development of new energy sources. The biomass, edible oil, inedible oils from plants and fish fat oil are imperatives and seen to be a potential substitute for diesel fuel. Acid and Base catalyzed transesterification is the most acceptable process for biodiesel production.***

In this project, an attempt towards finding the effect of alternate fuels as a substitute over diesel and reduce its consumption to lessen the environmental effects. Biodiesel has been extensively used in diesel engines as a partial substitute in the past few decades. The present investigation is carried out with blending up fish oil biodiesel with diesel in varying proportions to test out the emission and performance characteristics of direct injection single cylinder, four strokes, and air-cooled diesel engine. The fish oil biodiesel was produced by the transesterification process and obtained fish oil biodiesel blended with diesel fuel with various propagations of B20, B50, B75 & B100. These blended fuels were further investigated in a diesel engine with variable speeds such as 1000rpm, 1250rpm, 1500rpm, 1720rpm, 2000rpm 2250rpm & 2500rpm. In this comparative study, the effects of fish oil biodiesel fuel blends are compared and evaluated with pure diesel.

Keywords: Fish oil biodiesel, Direct injection single cylinder four-stroke air cooled diesel engine, Performance and Emissions.

I. INTRODUCTION

Fossil fuels are the major source of energy, since the economic revolt in the 18th century. Coal is still one of the easily accessible sources, and there was almost unlimited availability when it was discovered. During the 19th century, technology allowed for the processing of crude and it rapidly regained as a substitution fossil energy supply [1-2].

The fuel that was used for heating, was the crudest product spent however, because of the process knowledge advanced, a lot of crudest products entered the market. These crude products, with their high energy content and portability. Electricity can be provided to houses. The demand for Energy is closely joined to economics. With a lot of evolving countries from developing to an industrial country, the worldwide demand for energy has quickly risen. With the development of the economy, comes a standard higher in living and demand. Henceforth the need for economical fuels with fewer environmental effects has risen, resulting in various investigations to provide fuels with cost-effectiveness and comparatively less pollution [3-5].

A. Biofuels

The history of biofuels has its origins from kerosene lamps as a supply of light associated with a historic oil lamp in 1950 created in a place that is believed to be populated. The primary form of a created vehicle, the Ford motorcar, has engines running with Otto cycle designed to operate on plant-based fuels and Dr. Rudolph Diesel in 1894 stated that the compression-ignition engine has to be designed in a way it might be hopped-up by edible fat [6]. His dream was one day farmers may build their fuel to use in agricultural areas, wherever fossil fuel product was inaccessible. Fuel and its high-energy content have become a fuel of desire and also the style of the CI engine was modified to match these properties of the newly created fuel. Because of this provision and also due to the price of diesel (edible fat wasn't given any consideration except at some crossroads throughout the 1930s) the lack of oil pushed the costs up. Miserably, the newly created engine style won't operate on edible fat anymore because of high viscosity [7].

B. Transesterification

Transesterification could be a natural action to manufacture biodiesel from fatty oils. This method consists of reacting to the fixed oil with the alcohol and a catalyst. The foremost ordinarily alcohols utilized for this method is fermentation alcohol and wood alcohol. As a catalyst, a protein, an acid or a base is considered in this process but the analysis recommends employing a base catalyst like sodium hydroxide (NaOH) or potassium hydroxide (KOH) [8]. By fermentation of alcohol, one winds up with carboxylic acid ethyl group organic compound and by fermentation of wood alcohol the product is a carboxylic acid, methyl radical organic compound. Each of those product square measures characterized as biodiesel though their properties are slightly different. Wood alcohol is the commonest alcohol used. The trans-esterification process is caused by the chemical process. Bio-diesel fuel has better properties than that of Petro-diesel fuel as the varying values can be observed in table 1. given below.

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Table 1. Properties Of Fuels

	Density (kg/m^3) at 15°C	Viscosity (mm^2/sn) at 40°C	Calorific Value (KJ/kg)	Cetane Number	Flash Point (°C)	Pour Point (°C)
Diesel Fuel	845	3.54	44350	51	60	-15
B100	875	4.35	42500	52.5	155	-14
B75	868	4.14	42962	-	130	-14.2
B50	860	3.94	43425	-	106	-14.4
B25	853	3.74	43887	-	82	-14.7

II. METHODOLOGY

A. Experimental Procedure

Before beginning the study on the utilization of any different fuels during the process of CI engine, it is very essential in the choice of engine and arrangement of the setup. The information and also the methodology to be approved in every technique and calculations for deciding completely various parameters also are needed. Required investigation needed for Preparatory work. The following procedure steps were followed before beginning the investigation:

- The required specified fish oil for the study was collected and later transesterification processes were followed to obtained biodiesel.
- Most of the important properties were found and were within the limits.
- A single cylinder, four stroke, air-cooled, DI engine and gas analyzer was selected for investigation.
- Further investigation was carried out with variable speed with different propagation of fuel blends, pure fish oil and pure diesel.
- The speed, fuel consumption, gas temperature and emissions reading were noted for variable speeds.

B. Measurement of Exhaust Gas

An AVI DeGas444 exhaust gas instrument was used to record or measure the pollutants; NOx, CO and HC emissions. The HC, CO, were measured with the assistance of sensors functioning on non-dispersive infrared (NDIR) principle and NOx was measured with a chemical science detector.

The gas instruments were initially observed in standard/ideal conditions to confirm the accuracy value of the analyzer. This activity procedure is concerned with the injection of gases of higher concentration and the responses are validated. The composition ranges of CO and HC gases were; 3.6% volume of CO, 2000 ppm gas volume of HC, where as for the NO_x gas it is 2300 to 3000 ppm volume.

C. Blends of Fish oil with Diesel fuel

Blending is a simple technique of employing a mostly highly viscous fuel as an alternative fuel in an exceedingly CI engine by combining it within a fuel produces a low viscous fuel. For the study, the fish oil was blending with diesel in numerous proportions on a volume from 25 percent to in steady steps until 100 percent. The mix was represented because of the fish oil, trailed by the numerical worth that represents the share of the fish oil within the mix. For instance, the numerical worth within the mix B-25 indicates 25 percent of fish oil biodiesel. Likewise, alternative blends were denoted as B25, B50, B75, B100 of fish oil biodiesel. The mixture was stirred well with the assistance of a magnetic stirrer, to urge a mixture is stable which is homogeneous.

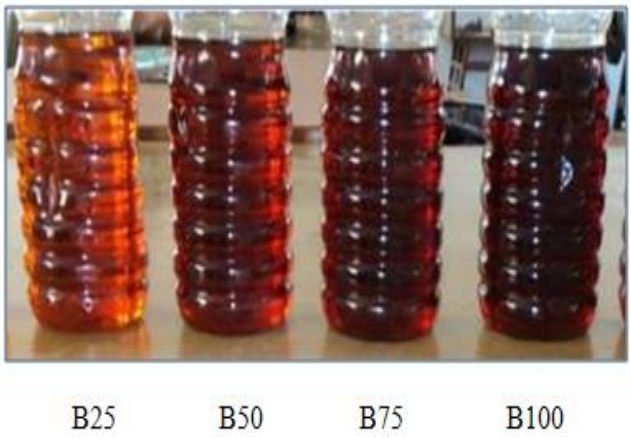


Fig 1. Various samples of the fish oil biodiesel-fuels

D. Experimental Setup



Fig 2. Engine setup

The investigation was done on a Kirloskar TAF-1 single-cylinder, air-cooled, four-stroke, and, direct-injection internal combustion engine with the variable speed device employed in it and experimentation runs on this engine.

A control panel was close-fitting in the generator to produce the assigned load to the engine. The engine output will be varied by dominant the sphere current. The measuring device was marked statically by the produced current. The post load will be measured by the measuring device with the assistance of a strain gauge system of load cell straddling between the stator coil base and also the frame. A measuring device and a fuel indicator enclosed within the circuit of fuel to live record or measure the consumption of fuel and it provides the power consumption as engine input.

The burette was close-fitting with a 2-method valve. The fuel released from 1 in the fuel tank was directed to the engine and in place "2" the contained with fuel within the measuring device was also directed to engine. For the activity of fuel rate of flow of the engine, the valve was set at the place "2". The fuel rate of flow was measured on a degree basis. The fuel detector detected the time for a certain flow in the system.

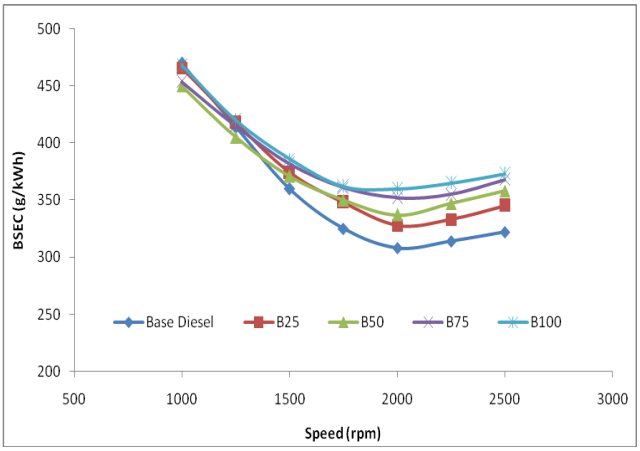
III. RESULTS AND DISCUSSION

This article gives about the information about the results obtained from the performance of the engine and its emissions from the single-cylinder, four strokes, air-cooled, DI diesel with variable speed rpm is considered for producing power by burning the blended fuels. Fuel modification techniques are used for mixing the fish oil biodiesel at percentages with diesel fuel.

A. Performance Parameters

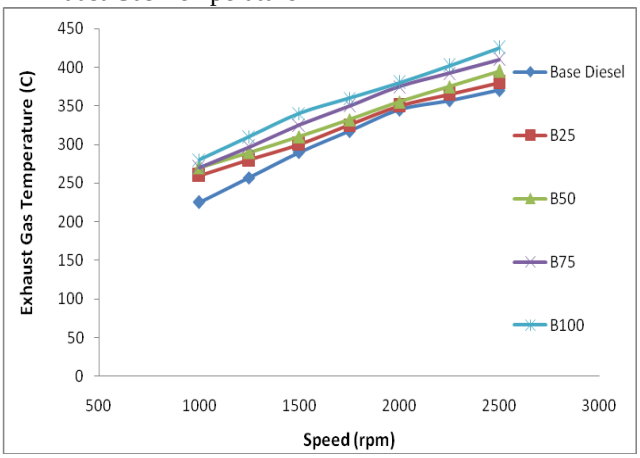
- **Brake Specific Energy Consumption(BSEC)**

The Break specific fuel consumption (BSEC) values obtained for the fuels namely Diesel, B25, B50, B75, B100 at the above-mentioned speeds have increased by about 2.65%, 3.23%, 5.65% and 8.32%. These values indicate that at B100 i.e. pure fish oil biodiesel the value of BSEC is higher when compared to any other fuel in the experiment and this is obtained due to the density of the B100 fuel due to which when sprayed in the combustion chamber the volume turns out to be more. But the values for BSEC of fish oil biodiesel have decreased in the low engine speeds are lower when compared to that of base diesel. But the slightly overall fuel consumption has lowered in the use of fish oil biodiesel blends due to presence of oxygen in the biodiesel, and also due to the efficient combustion timing that is available by the fish oil biodiesel.



Graph 1. BSEC vs Speed

- Exhaust Gas Temperature

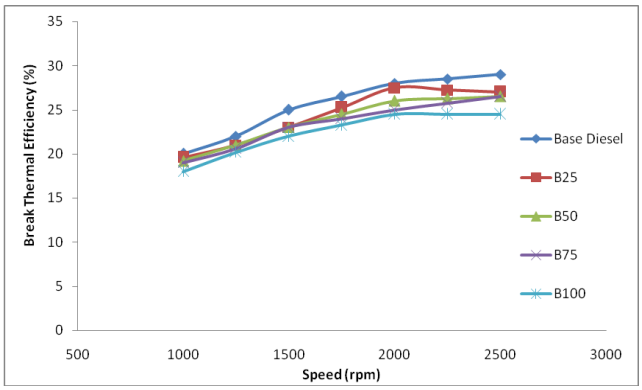


Graph 2. Exhaust Gas Teperature vs Speed

The values of the temperature of the gas at the exhaust can provide insights about the heat of the fuels in the combustion chamber during combustion can be of help in analyzing the values of the emission. The aforementioned graph provides the values of the exhaust gas temperatures with the lower values being from base diesel fuel and highest values coming from the B100 fish oil biodiesel at corresponding engine speed. The more the temperature the more is efficiency and the values of the B100 are higher due to the presence of the oxygen in the fish oil biodiesel blend from the origin which now helps in the higher combustion or full combustion producing the higher efficiency and also the values of the EGT decrease with decrease of the percentage of the blend in the diesel.

- **Brake Thermal Efficiency**

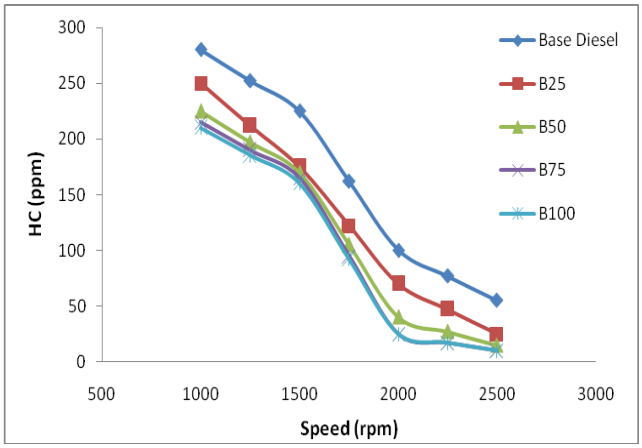
Thermal efficiency is one of the factors to be considered while evaluating the efficiency of the engine on various fuels. As we look into the values obtained, the thermal efficiency of B100 has decreased by 7.3% than that of its counterpart base diesel fuel. This is majorly due to the high density of the biodiesel and lowers effective power, higher consumption of fuel, lower values of heat regarding the Biodiesel. The B25 was shown good results as compared to B50, B75, and B100.



Graph 3. Brake Thermal Efficency vs Speed

B. Emissions Parameters

- Hydrocarbons Emission

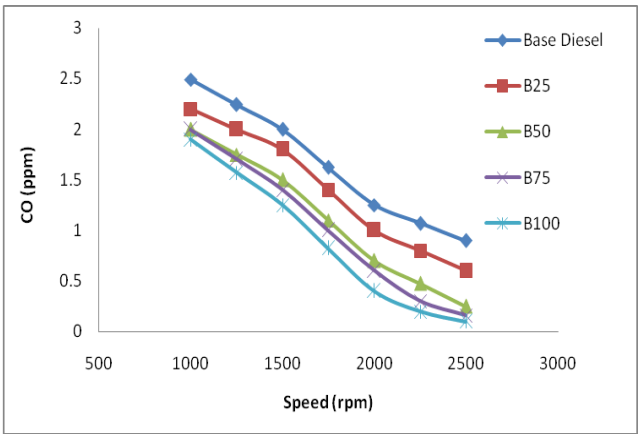


Graph 4. Hydrocarbons Emission vs Speed

HC presence in the emission is due to the incapability to utilize the chemical energy in the combustion chamber. And also due to the incapability of the fuel to burn due to lack of temperature which in turn is a result of insufficient combustion time and unavailability of oxygen but this problem is solved in the usage of Fish oil biodiesel as the presence of oxygen help in complete burning of the fuels thus reducing the emission of HC into the atmosphere. The graph proves the same with the values provide showing that diesel is the highest contributor of HC and the B100 is said to the fuel-producing lowest HC.

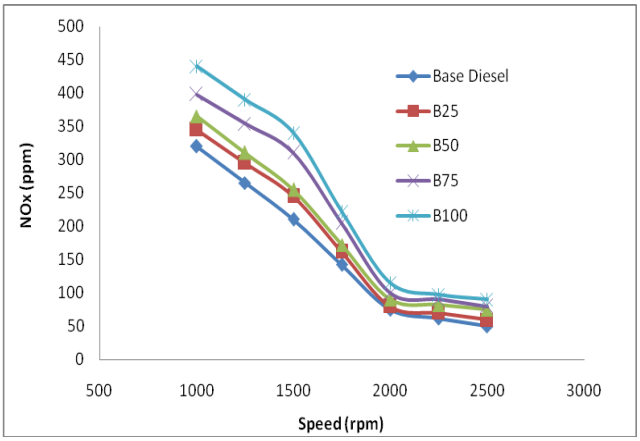
- **Carbonmonoxides Emission**

CO emission is one of the important parameters in the consideration of a better fuel. The more the amount of CO, the more is the loss of chemical energy which not only affects the environment but also reduces the efficiency of the engine. When looked into the numbers provided by the graph, diesel is the biggest contributor of CO and with an increase in the percentage of the biodiesel in the pure diesel, the emission values have come down. This is due to the increase of the air-fuel reaction when biodiesel/ fuel is present.



Graph 5. Carbonmonoxides Emission vs Speed

- **Oxides of Nitrogens Emission**



Graph 6. Oxides of Nitrogens Emission vs Speed

The main pollutants formed from the diesel engines are NOx, CO and HC. In this section, the graph provides the values of the NOx pollutants formed. The values seem to prove the existing arguments about the percentage of NOx produced in the performance of the blends and the base diesel fuel. The NOx value for the B100 is highest when compared to any other fuel in the experiment and that of diesel is lowest. The reason for such performance is peak temperature which ought to be the sole reason this is supported by the values of the exhaust gas temperature, which is due to the presence of oxygen in biodiesel.

IV. CONCLUSIONS

The engine performance and emission characteristics of single-cylinder, four strokes, cooled by air, a direct injection diesel engine have a different influence on output at various speeds. The conclusions of every method are given below.

- The usability of waste fish oil was converted into fish oil biodiesel by the transesterification process and later it was performed in a conventional diesel engine to find its performance and emissions.
- Performance parameters of the fish oil biodiesel blends have differed slightly when compared with the base diesel fuel outputs.
- The performance parameters of the B25 blend were very near to the base diesel fuel trends and seem to be favorable blends as compared to all other blends.
- BSFC values have higher in the case of B100, due to the higher density of the fuel blend. While the lowest is recorded for diesel.
- Exhaust gas temperature has also been recorded high in the case of B100 which indicates the high combustion due to the presence of oxygen in fish oil biodiesel.
- Emissions have a great effect on the fish oil biodiesel & diesel blends than base diesel fuel.
- These emission results prove the existing argument about the higher values of NOx for B100 and subsequently lowered with the decrease in blend percentage. NOx values of base diesel fuel are lower than B100.
- The values of Hydrocarbons have decreased in the use of B100 when compared to base diesel fuel.
- The use of blends has proven worth by releasing lower content of Carbon monoxide, Hydrocarbons into the atmosphere in comparison with the pure diesel fuel.

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OPTIMISATION OF SCRAM JET STRUT INJECTION

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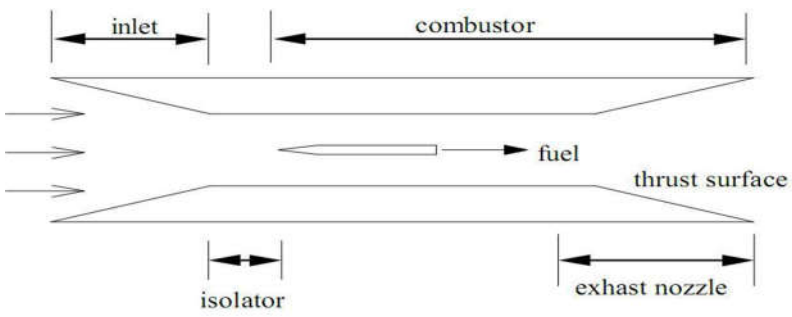
Abstract - The Scramjet engine design is an extension of the Ramjet. However a Scramjet allows the flow through the engine to remain supersonic, whereas in a Ramjet the flow is slowed to subsonic levels before it enters the combustor. The main problem of scramjet fuel injection is that the airflow is quite fast, meaning that there is minimal time for the fuel to mix with the air and ignite to produce thrust (essentially milliseconds). In such cases the simulation of a supersonic reactive flow is an important tool for the investigation and development of Scramjet engines. Numerical investigations have become less expensive than experiments. In this project, mixing and combustion for different shaped strut injector's are being analyzed in Ansys Fluent Software.

Key Words – Scramjet Engine, Ramjet Engine, Struts, Strut Injection, Supersonic Combustion, Ansys.

1. Introduction

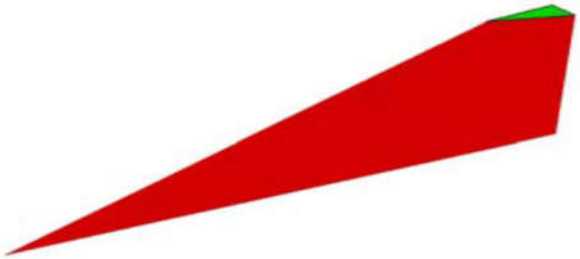
In the History of the supersonic combustion there are two types of systems which is defined and operated in the high velocity regimes Scram jet and ram jet where ram jet sometimes refereed as the Flying Stove an air breathing engine which supports the air intake of forward motion to compress incoming air and support the sub sonic flight systems however the advantage with this type of system is more but when we are using the Ramjet in the system it can only operate at high velocities of system movement it cannot start an engine with the zero velocity condition or stand still therefore ramjet systems need an assisted takeoff that means it need an assisted pushing system like a rocket to pus to the high velocities. However it can work at high velocity speeds at Mach 3 and Mach 6

The Scramjet engines can be viewed as a type of ramjet engine whereas when it comes to ramjet the incoming air decelerates before combustion in ramjet systems where in the scramjet the velocity if the air is same throughout the systems. The incoming air which is supersonic is same throughout the engine. The Scramjet consists of 4 major parts: the inlet, isolator, combustor and exhaust nozzle

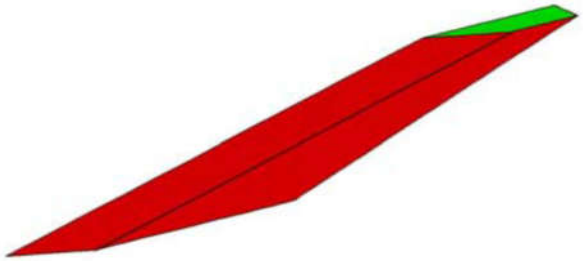


2. LITERATURE REVIEW

[1] **Dr. Krishna Murari Pandey & Thangavel Sivashakthivel** chipped away at a theme named "Ongoing Advances in Scramjet Fuel Injection - A Review", in which they found out that– Fuel injection process in to scramjet motors is an area of prominent growth. A scramjet engines uses either gas or fluid. The air fuel mixture should be thoroughly mixed to around stoichiometric extents for proficient combustion to occur. The fundamental issue of scramjet fuel infusion is that the airflow is very quick, implying that there is insignificant time for the fuel to blend with the air and touch off to deliver push (basically milliseconds).Hydrogen is the primary fuel utilized for combustion. Hydrocarbons present even more a test contrasted with hydrogen because of the more drawn out start delay and the prerequisite for further developed blending procedures. Upgrading the blending, and in this manner diminishing the combustor length, is a significant angle in planning scramjet motors. There are number of strategies utilized today for fuel infusion into scramjet motors.[2] **K.M.Pandey and T.Sivasakthivel** chipped away at a theme named "CFD Analysis of Mixing and Combustion of a Scramjet Combustor with a Planer Strut Injector". The two-dimensional coupled implicit NS equations, the standard k-ε turbulence model and the finite-rate/eddy-dissipation reaction model have been applied to numerically simulate the flow field of the hydrogen fueled scramjet combustor with a planer strut flame holder under two different working conditions, namely, cold flow and engine ignition.[3] **Yuan shengxue** took a shot at the point "supersonic combustion", in which he found that – The estimation of combustion in supersonic flow demonstrates about entropic increase & all out loss of weight in flame items might diminish alongside the expansion of burning speed. The diagonal explosion ripple edge wouldn't get constrained by wedge point lower frail & driven arrangement circumstances & be resolved distinctly by combustion speed.[4] **Gruineg and F. Mayingar** took a shot about "Supersonic combustion of lamp fuel/h2-blends in a prototype Scramjet combustor", in which they found out that– an important temperature level is somewhat accomplished by the angled shock ripples in the supersonic flow alongside expanding combustion zone proportion. [5] **K.Kumaran and V.Babu** took a shot at the subject of "Examination about certain impact of science representations on the arithmetical expectations of the supersonic combustion of H2", in which they found out that– Multi step science foresees bigger & more extensive layout warmth discharge more of what is anticipated by one step science. The one step science representation is equipped for anticipating general execution boundaries by the help of significantly low computation expense. A superior tradeoff b/w push expansion & combustion effectiveness shall be accomplished with the help of organized combustion.



Conceptual view of Strut (A)



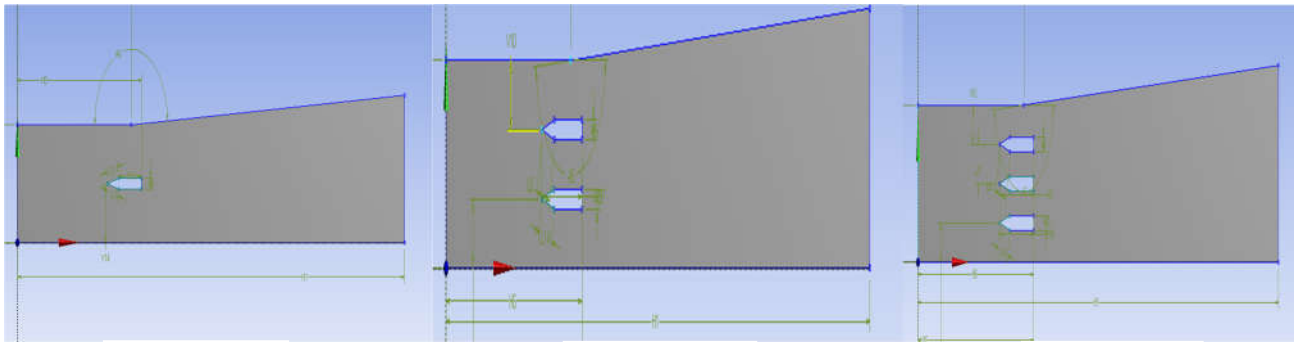
Conceptual view of Strut (E)

PROCEDURE:

In this experiment, the **density of the air fuel mixture** (i.e. air and hydrogen), **Mach number** and **static pressure** inside the scram jet engine's combustion chamber are analyzed with the help of Ansys Fluent Software. The base paper for the project have been taken from one of the K.M Pandey's contribution to the field of scram jet engine technology **"CFD Analysis of a Hydrogen Fueled Mixture in Scramjet Combustor with a Strut Injector by Using Fluent Software"** and few other papers of him. Below is the description of how the experiment is beingcarried out in the environment of Ansys Fluent Software.

i) **Geometry**:

A simplified combustion chamber is created in the geometry section of the software provided with two types of struts, one being the triangular strut {strut A} and the other is the experimental strut named {strut E}. The above mentioned struts are also categorized into three types based on their configuration in the combustion chamber,



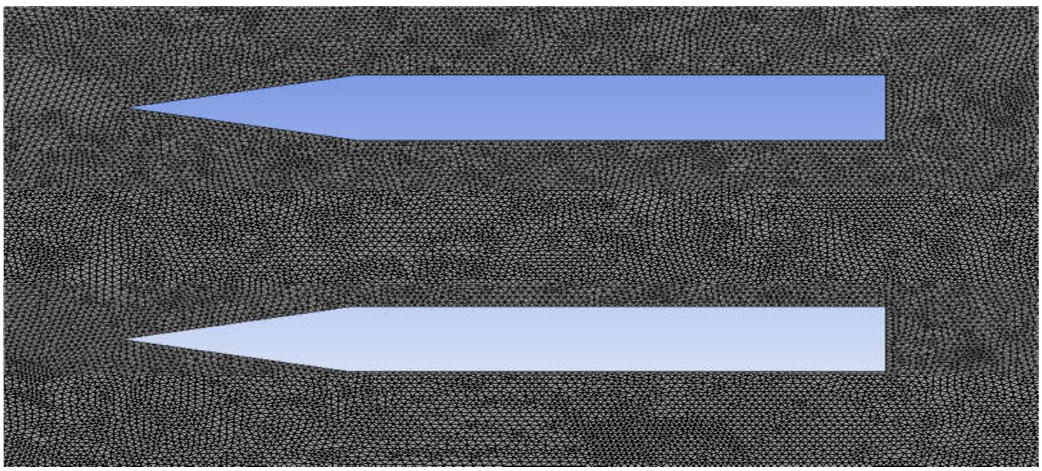
Single strut Double strut Triple strut

Meshing:

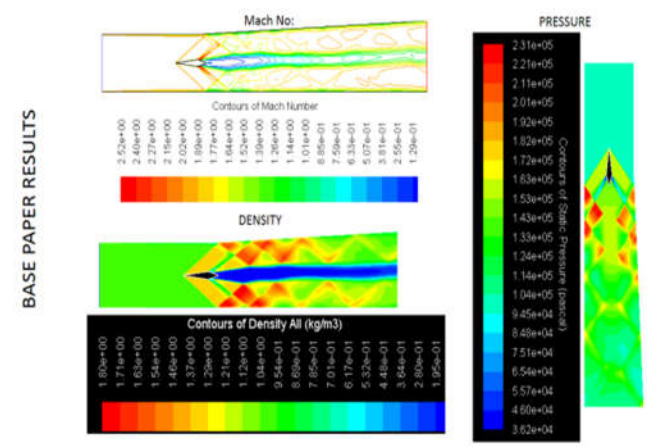
Later, the model is meshed in the meshing section. We have emphasized the strut boundaries to have higher mesh density in the combustion chamber in order to obtain the results more precisely. Such that the changes in the pressure, density and in Mach number around the strut to be more clearly observable.

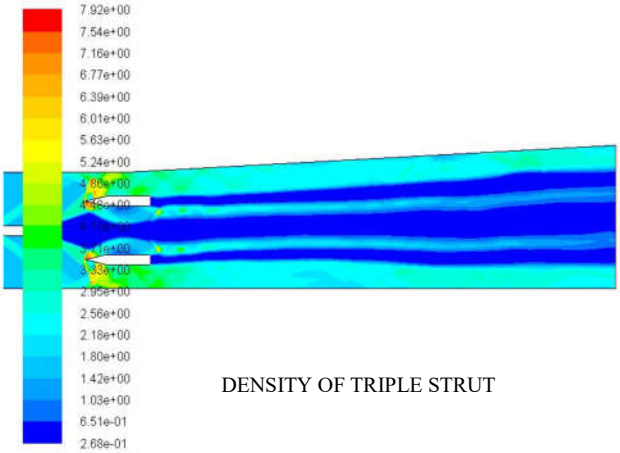
Higher mesh density + less element size = Better results

a) Face size - 0.30mm b) Element size - 0.60mm c) Total elements – 433111

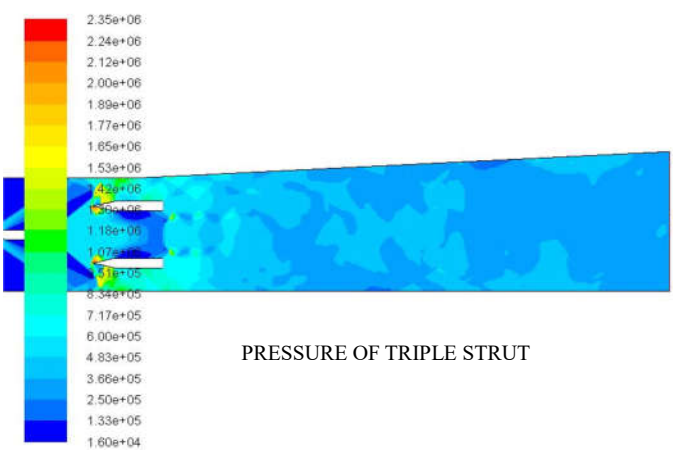


RESULTS:

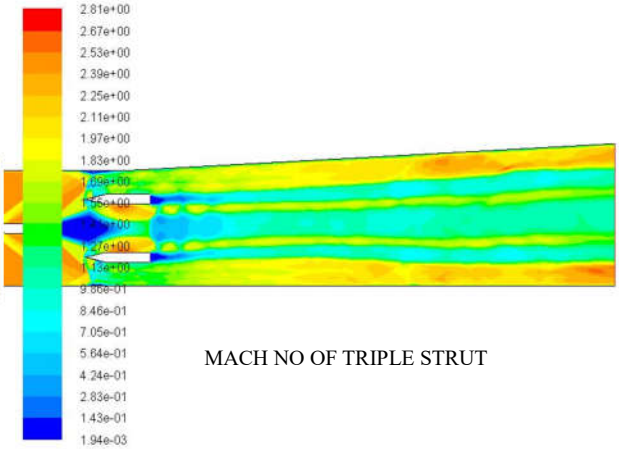




DENSITY OF TRIPLE STRUT



PRESSURE OF TRIPLE STRUT



MACH NO OF TRIPLE STRUT

OVERALL RESULTS IN TABULAR FORM

PAPER	DENSITY of Strut A	Density Of Strut E	Mach No of Strut A	Mach no Of Strut E	Static Pressure of Strut A	S Pressure of Strut E
BASE PAPER 1	1.80	--	2.52	--	2.31	--
BASE PAPER 2	1.89	--	2.17	--	2.61	--
Experimental Single strut	2.55	3.45	2.55	2.98	4.38	7.01
Experimental Double strut	4.87	4.59	2.56	2.56	1.01	1.02
Experimental Triple Strut	7.09	7.92	2.57	2.81	1.98	2.35

The provided images of result are of Density, Pressure and Mach no for the Triple Strut E Configuration compared against the results of the base papers.

5. Conclusion:

In above investigation the k-w model is used to inspect the mixing in a scramjet model under realistic operating conditions. The configuration used is alike the scramjet engine in the lab where its development and experimentation took place at (Deutsches Zentrum für Luft- und Raumfahrt) Germany. The Configurations in this computational work is made for single double and triple strut is made to employ the behavior and improvement of increasing struts in the combustion chamber to see this change the current work is very helpful in visualizing and comparing the existing and newly employed turbulence model for single double and triple strut injection systems in the scram jet combustion chamber after thorough simulation the completed and compared results with each other there is a significant mixing and improvement in shock wave generation is observed in triple strut model therefore there is more room for improvement in this are due to space constraint we can't go more than three struts unless new arrangements are introduced in the current work the highly performed configuration is Triple Strut E model.

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[1] **Dr. Krishna Murari Pandey and T.Sivasakthivel**, "Recent Advances in Scramjet Fuel Injection - A Review," International Journal of Chemical Engineering and Applications vol. 1, no. 4, pp. 294-301, 2010.

[2] **Dr. KM Pandey and T.Sivasakthivel**, "CFD Analysis of Mixing and Combustion of a Scramjet Combustor with a Planer Strut Injector" *Vol. 2, No. 2, April 2011*

[3] **yuan Shengxue,** "supersonic combustion", vol. 42, no. 2, science in china (Series A), February 1999,

[4] **Gruenig and f. Mayinger,** "supersonic combustion of erosene/h2-mixtures in a model scramjet combustor", institute for thermodynamics, technical university Munich, and d-85747.

[5] **K. Kumaran and V. Babu,** "Investigation of the effect of chemistry models on the numerical predictions of the supersonic combustion of hydrogen", Combustion and Flame, vol 156, 2009, pp.826–841.

THERMAL INVESTIGATION OF HYBRID NANO BASED PHASE CHANGE MATERIALS TO CATER COOLING NEEDS FOR ENERGY SYSTEMS

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Abstract - Day by day energy needs are increasing and there is a disparity between energy supply and energy request. Buildings are major consumers of energy of approximately 27% in the world wide. And also increasing anxieties about climate transformation and environmental emissions have directed to conserving energy through the development of numerous energy-effectual systems.

Latent thermal energy storage system is one important method amongst different thermal energy storing methods due to excellent features like high energy storage density, storing thermal energy at constant temperature. In spite of these it has very poor thermal conductivity of phase change materials which would reduce energy storage capacity and reduces time for melting and solidification thereby heat transfer from heat transfer fluid to PCMs (Phase Change Materials) decreases.

The main objective of current investigation is to enhance the thermal properties of PCMs with dispersion of hybrid nanoparticles which suit for development of Latent Thermal Energy Storage (LTES). The work proceeds with selection of PCM which suits for passive cooling applications having freezing and melting temperatures around human comfort conditions. Later, hybrid nanoparticles which can enhance thermal properties are synthesized using sol gel process and the as-prepared particles are characterized for studying the crystalline lattice structure of elements and surface morphology using X-Ray Diffraction, Field Emission Scanning Electron Microscope (EDAX Analysis also). The nanoparticles are dispersed in PCM with different weight percentages (0.2%, 0.4%, 0.6% and 1%) using ultra sonic vibrator. The as prepared hybrid nano based PCM samples were thermal investigated like melting, freezing, heat energy storage density, specific heat etc. using differential scanning calorimeter (DSC), Fourier Transform Infrared Spectrometry (FTIR) Results are validated comparing pure PCMs with NPCMs and predicting the optimized one among different proportions of Nano based PCMs for efficient passive cooling applications.

Key Words – X-Ray Diffraction(XRD), Field Emission Scanning Electron Microscope(FESEM), Differential Scanning Calorimetry(DSC), ultra sonic vibrator.

1. Introduction

The climatic change in the earth outcomes to relentless increment popular latest heat load in structures and in energy. Henceforth the solace cooling in building is increasing and the interest for consolation cooling is also expanding rapidly around the globe. The elevated cooling request brings about high top electric power request amid in the sultriest overdue

spring. This request makes any other trouble or takes a look at to electric utilities and their customers. Consequently, current-building administrations is probably deliberate to configuration provide adequate deliver to load and power use control with a selected give up purpose to get the most prudent operations.

heat energy stockpiling approach, it can be say as "putting away low temperature power for later use so that you can join the time hole between energy accessibility and vitality utilize" is taken into consideration as a helpful apparatus to address the request modern day heap of electrical customers.

Within the beyond, researchers were inquisitive about reducing the fee cutting-edge power and shop the diminishing fossil fuels. However, lately, the incentive has transformed from those areas latest reducing CO2 emission, from the environmental viewpoint. Electricity performance and the use of smooth and inexhaustible power, has received the fundamental care state-of-the-art the advanced and growing nations. Inside the current electricity and environment situation there may be simply no want to justify the need for electricity conservation. Growing efficient and cheaper power storage gadgets is as significant as growing new resources present day energy. Thermal storage minimize the time or price mismatch among thermal deliver and energy call for, and it plays a crucial position in energy conservation thermal storage enhance overall performance modern-day electricity systems with the aid of smoothing deliver and increasing reliability. The better performance might cause thermal conservation and enhance fee effectiveness. Modern day the renewable power sources can only offer electricity intermittently.

2. PROCEDURE:

SYNTHESIS OF NANOPARTICLES

Sol-gel process

The sol-gel process contains the development of inanimate networks through the development of a colloid period (sol) and gelation of the sol to form a network in a non-stop liquefied phase (gel). The precursors for synthesis of this colloid have commonly of a metallic component a rounded with the aid of number responsive ligands. The preliminary materialis process to shape a dissoluble oxide and varieties a sol in interaction with water or diluted acid. Deduction of the liquefied from the sol produces the gel, and the sol/gel change controls the element size and shape. Calcinations of the gel produce the oxide.

Sol-gel process discusses to the hydrolyzes and condensation of alkoxide-based precursors such as Si(OEt) 4 (tetraethyl orthosilicate, or TEOS). The reactions worried in the sol-gel chemistry primarily grounded on the hydrolyzes and condensation of metallic alkoxides M(OR)z can be define as monitors:

$$MOR + H2O \rightarrow MOH + ROH \text{ (hydrolysis)}$$

$$MOH + ROM \rightarrow M\text{-}O\text{-}M + ROH \text{ (condensation)}$$

The sol-gel procedure can be categorized by a sequence of different steps.

1. Forming of dissimilar steady solutions of the alkoxide or solvated metal precursor.
2. Gelation resulting from the creation of an oxide- or alcohol- bridged network (the gel) by a polycondensation reaction that results in a significantly rise in the viscosity of the solution.
3. Aging of the gel (Syneresis), meanwhile which the polycondensation reactions go on as far as the gel transfers

into a solidified mass, coexist by abbreviation of the gel network and exclusion of solvent from gel pores. Ostwald mellow (also make reference to as coarsen, is the phenomena by which small molecules are consumed by bigger molecules in the growing procedure) and phase changes may happen simultaneously with syneresis. The aging procedure of gels can exceed seven days and is dangerous to the stoppage of cracks in gels that have been cast.

4. Drying of the gel, when H2O and other unstable liquids are detached from the gel network. This procedure is complex due to essential changes in the shape of the gel.

The drying procedure has itself been fragmented into 4 different steps:

I. The constant rate period,
II. The critical point,
III. The falling rate period,
IV. The second falling rate period.

If isolated by thermal vaporization, the resulting monolith is termed a xerogel. If the solvent (such as water) is removed below supercritical or nearby super critical circumstances, the product is an aerogel.

5. Dehydration, during which surface-bound M-OH groups are detached, there by stabilizing the gel against rehydration. This is generally achieved by calcining the monolith at temperature up to 8000 C.

6. Densification and decomposition of the gels at high temperatures (T>8000 C).

materials procured

Phase change material (PCM)

- Paraffin C16 PCM

Chemicals for copper nano

- Precursor - copper acetate
- Stabilizing agent - polyvinyl pyrrolidone
- Reducing agent – sodium borohydride
- Distilled water was used for reaction
- Speed 450 rpm
- Temperature – 45 degree centigrade

Chemicals for silver nano synthesis

- Precursor – silver nitrate
- Stabilizing agent - polyvinyl pyrrolidone
- Reducing agent – ascorbic acid
- Distilled water was used for reaction
- Speed - 400 rpm
- Temperature – 45 degree centigrade

Stepwise procedure

1. 5g of cupric nitrate +30ml of distilled water (precursor solution 2) are mixed and dissolve it fully using magnetic stirrer at 50 degree Celsius, 350RPM.

2. Simultaneously, prepare a solution of 0.5g Polyvinylpolypyrrolidone (PVP) + 30mL distilled water at ambient temperature.
3. Slowly add the solution obtained from step 2 to the solution from step 1 while continuing the stirring process.
4. 1g of Sodium Borohydride + 30 mL Distilled water (strong reducing agent)
5. Transfer solution obtained from step 4 into a burette.
6. Add this solution drop-wise into the solution prepared in step 4 while continuing the stirring process.
7. Color changes from light bluish to cream color with pale white.
8. Keep titrating till the color change is observed.
9. Decant, if necessary. Wash with acetone and filter out the hybrid nano-particles using double filter paper. Keep the contents for drying.
10. Keep the contents for drying.

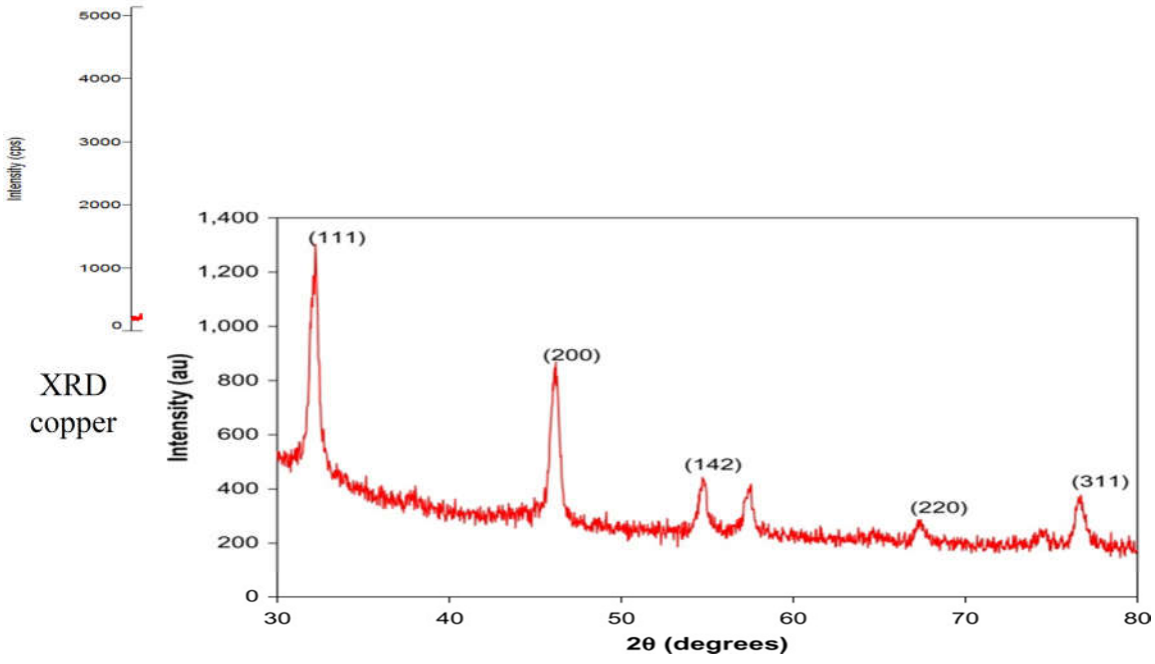
Preparation of Nano based paraffin C16 PCM samples

The synthesized solid nanoparticles copper and silver 50-50% were dispersed in the paraffin C16 PCM by using Ultrasonicator. The weight percentages are 0.2, 0.4, 0.6, 0.8 and 1. The samples were then sent for further testing.

3. RESULTS:

The dried solid nanoparticles were given for XRD testing to determine the size and FESEM testing to determine the surface morphology. The nanoparticles were further dispersed in paraffin C16 PCM in different weight ratios and given for DSC testing to determine the melting, freezing point and latent heat of the Nano based paraffin C16 PCM. The weight ratios of nanoparticles dispersed in paraffin C16 PCM are 0.02%, 0.04%, 0.06%, 0.08% and 0.1% by weight. The pure paraffin C16 PCM was also tested to compare the properties.

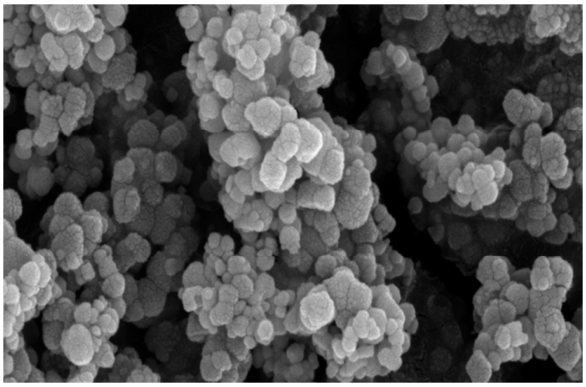
X-ray diffractometer (XRD) RESULTS



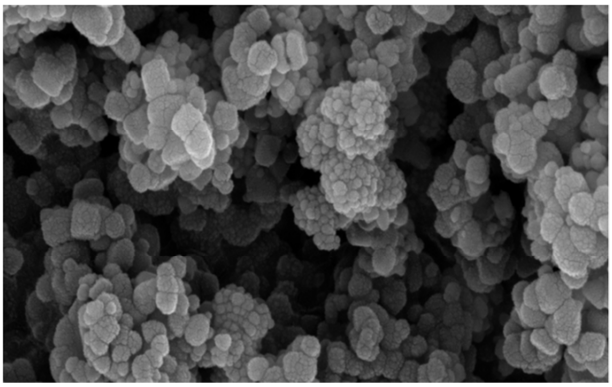
XRD result of copper

XRD results of silver nano

Field Emission Scanning Electron Microscope (FESEM) results



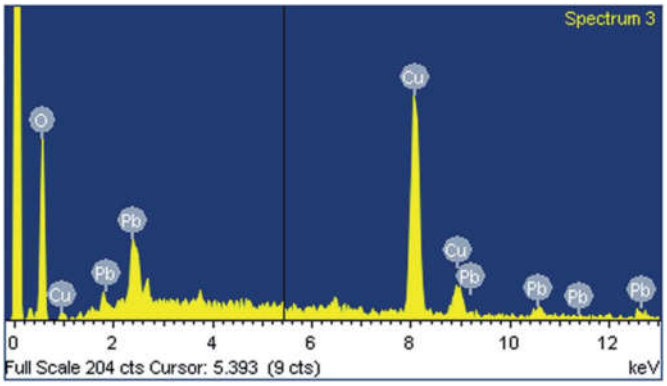
FESEM of Cu nanoparticles



FESEM of Ag nanoparticles

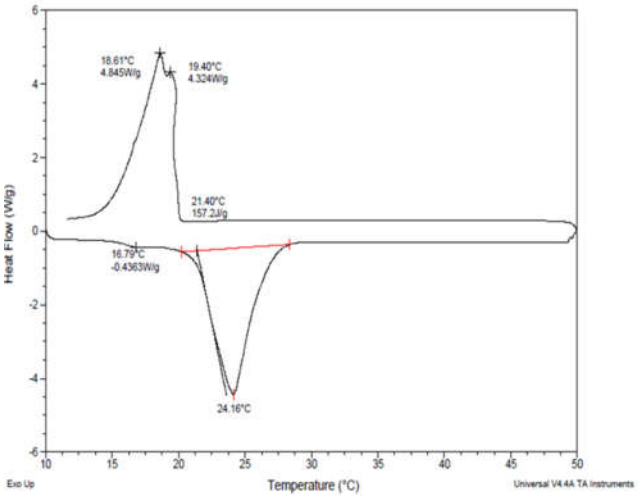
The studies of FESEM reveal that the particles produced were spherical in shape and is of Nano size. The size varies from 30mm to 140 mm with variations for both copper and silver nanoparticles.

EDAX analysis

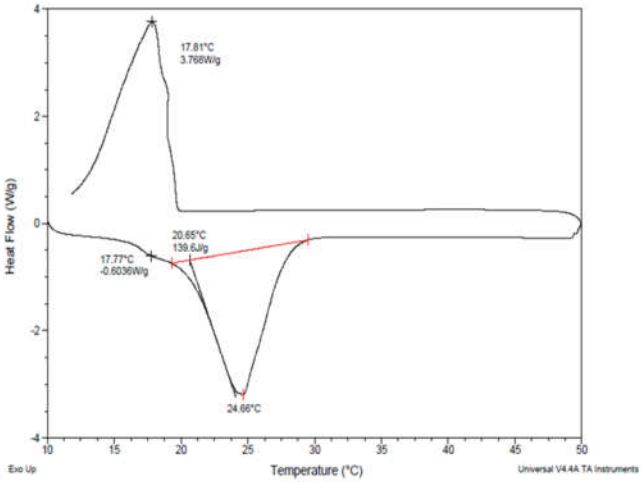


The EDAX analysis gives us the amount of crystallization and the weight percent of composition of the hybrid nanoparticles. From the figure above we can observe the crystallization percent of copper. On the top right corner we have the weight percentage of the elements.

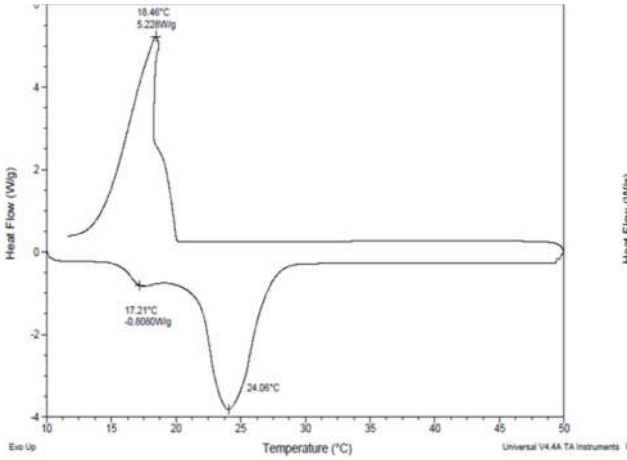
Differential Scanning Calorimetry (DSC) results



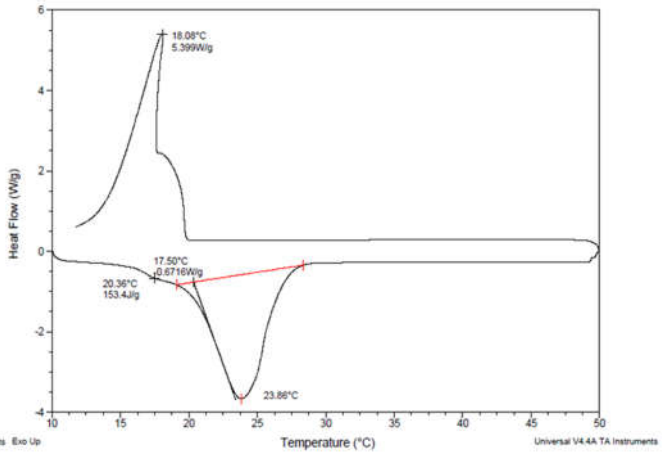
DSC for pure paraffin C16 PCM



DSC for 0.2% by wt. N-PCM



DSC for 0.4% by wt. N-PCM

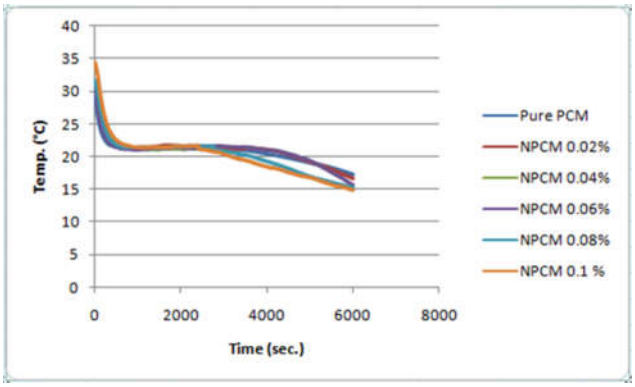


DSC for 0.6% by wt. N-PCM

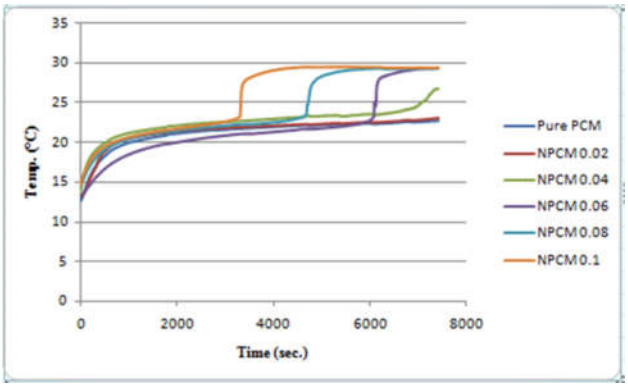
	Freezing (^{O}C)	Melting (^{O}C)	Latent heat (kJ/kg)	
			Freezing	Melting
Pure PCM	21.22	22.42	181.28	194.99
NPCM (0.2%)	22.06	22.78	182.15	187.03
NPCM (0.4 %)	22.50	22.68	191.87	200.14
NPCM (0.6 %)	22.44	22.45	202.36	207.77
NPCM (0.8 %)	22.36	22.99	187.44	195.82

NPCM (1 %)	22.47	22.99	185.25	189.01

Summary of DSC results.



Freezing curves of Pure and NPCM using Experimental setup



Melting curves of Pure and NPCM using Experimental setup

Process	Parameters		Hybrid nano based PCM				
		Pure	0.02%	0.04%	0.06%	0.08%	1%
Freezing	Commencement (min)	9.5	8.33	7.5	6.67	6.5	6.3
	Completion (min)	25	23.33	20.83	16.67	16.67	15.83
	Enhancement %	-	7.15	20.5	49.9	49.9	57.9
	Reduction %	-	12.3	21.05	29.7	31.5	33.6

Freezing characteristics of Pure and Hybrid nano based PCM

Process	Parameters		Hybrid nano based PCM				
		Pure	0.02%	0.04%	0.06%	0.08%	1%
Melting	Commencement (min)	28	27	26.1	25.8	24.9	24
	Completion (min)	39.1	38.2	37.6	35.4	35.2	34.4
	Reduction %	-	3.57	6.78	7.85	11.07	14.28

Melting characteristics of Pure and Hybrid nano based PCM

5. Conclusion:

1. The nanoparticles synthesized for both copper and silver were found to in Nano size with a range from 30nm to 140nm.
2. The SEM results reveal that the copper and silver nanoparticles spherical in shape with high surface to volume ratio, which can enhance heat transfer characteristics.
3. From the DSC results, there is little variation in the melting and freezing points due to addition of nanoparticles but, there is significant increase in the latent heat of the N-PCM until the wt. % of 0.6 beyond which the latent heat decreases. This shows that the optimum value of that amount of nanoparticles that should be dispersed in the paraffin C16 PCM is **0.6%**
4. Based on the above test results, the as-prepared paraffin C16 PCM with nanoparticles can be expected to provide better cooling effect through regulating the temperature within the comfortable range of 23 °C to 25 °C in indoor spaces.

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Mechanical and Material Properties of Areca/ Epoxy Composite

T. Naresh Kumar, S. Sathishkumar, A. Jeevarathinam, R. Sivaprasad, R. Praveen Kumar

Abstract: ***The contemporary test targets learning the perfunctory conduct of half breed regular fiber combinations. Tests of a few Areca-Epoxy were made utilizing layup strategy where the assembling of handles was substitute and the weightiness division of polymer % and fiber& network was kept at 90%- 10% , 80% - 20% and 30%-70%.Specimens were cut from the created cover as indicated by the ASTM models for various analyses. For Ductile test and flexural test were cut fit as a fiddle and level bar shape separately.***

Keywords: Natural Fibers,Polymer,Material Properties, Mechanical Properties..

I. INTRODUCTION

The enthusiasm for common fiber-strengthened polymer composite materials is quickly becoming both as far as their modern applications and principal look into [1]. They are inexhaustible, modest, totally or somewhat recyclable, and biodegradable. Plants, for example, flax, cotton, hemp, jute, sisal, kenaf, pineapple, ramie, bamboo, banana, and so on., just as wood, utilized from time prehistoric as a wellspring of lignocellulosic filaments, are increasingly more regularly applied as the support of composites [2].

Substantial excellent has revolved into a rudimentary bit of configuration for engineers, since of user-friendliness of multifarious assortment of resources that have analogous possessions and encounter the item plan precise [3-5]. Accomplishment of realistic going-over unaccompanied brands it hard to discriminate the flawless edifice of the last amalgamated [6]. A harmonized approach between measurable prototypical and micromechanical model is wanted. In this paper, subsequent normal fiber and polymer link from past scrutiny is exploited to gauge the mechanical possessions, for instance, thickness, Young's modulus and elasticity [7-9]. Four degrees of fiber stacking are employed to scrutinize the ideal regular fiber strengthened polymer compound [10].

II. SPECIMEN AND EXPERIMENTAL

Areca which remain conveyed and gutted with aquatic and dehydrated. By then the aggregates are gently dispersed with hand sedentary serenely. By then its outside projectile is cleared by the cutting edge and it is expurgated into obligatory estimation [11-13]. We take precise proportion of polymer which we have decided previously and 10% of its hardener [14-16]. By then this mix is blended totally till it transmutes into to some degree warm. Bit extra quantity of hardener is taken for the wastage at the same time. Hardener should taken minutely bearing in mind the way that little further quantity of hardener can destroy the compound [17-19].

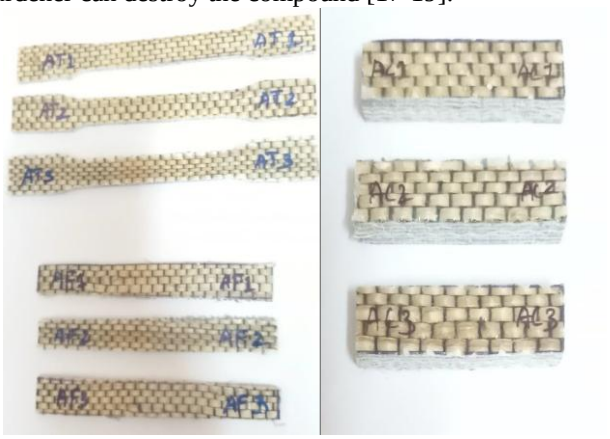

Fig.1 Areca /Epoxy Composite Specimen

Most ordinarily the example lies on a help range and the heap is applied to the middle by the stacking nose creating three point twisting at a predetermined rate. The parameters for this test are the help length, the speed of the stacking, and the greatest redirection for the test. These parameters depend on the test example thickness and are characterized distinctively by ASTM [20].

Table 1. Standard for Characterization

TEST NAME	STANDARD
TENSILE TEST	ASTM D 638
FLEXURAL TEST	ASTM D 790
IMPACT TEST (CHARPY)	ASTM E 23

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SEM Fractrography

The surfaces of the examples are analyzed legitimately by examining electron magnifying lens and the compound examples are astride on counterfoils through silver glue.

III. TEST RESULTS

From the Tensile, Flexural and Impact test results shown in Figure 2 to 6 it can be observed that specimen 2 (80% polymer & 20% fiber composition) possess good mechanical properties and also SEM images shown in figure from 7 to 9 it can be observed that good bonding and less porosity between fiber and polymer composites.

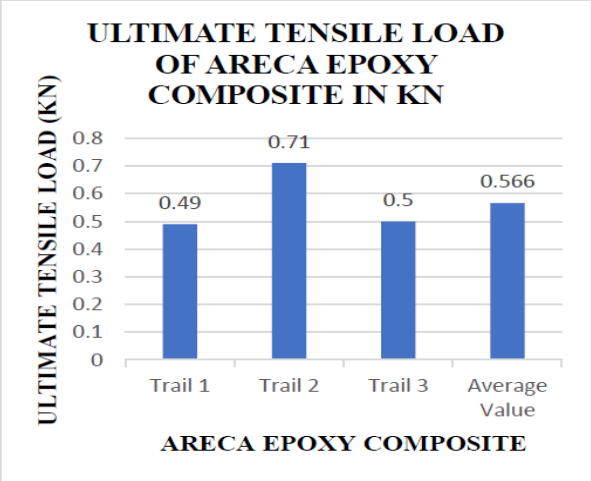

Fig.2 Tensile Load comparison

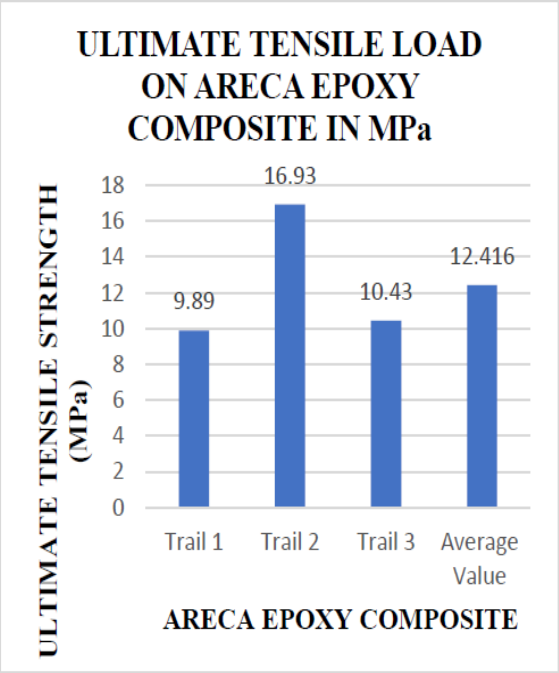

Fig.3 Tensile strength comparison

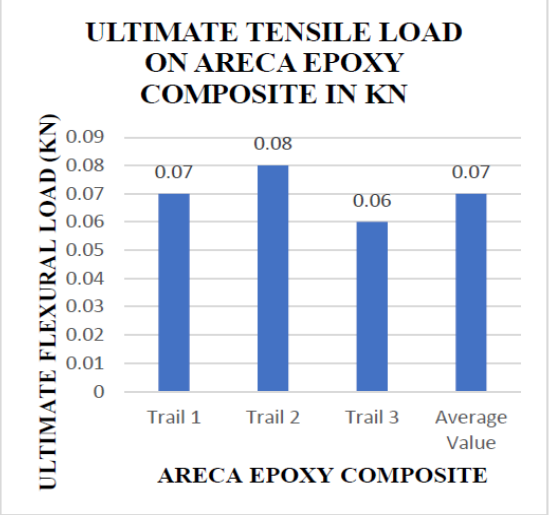

Fig.4 Flexural Load comparison

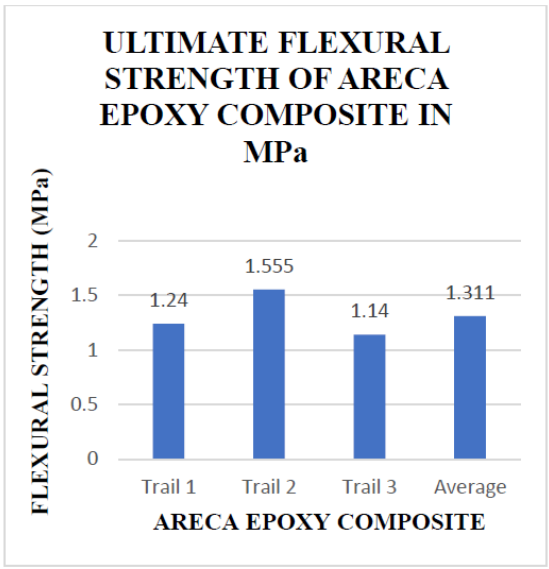

Fig.5 Flexural strength comparison

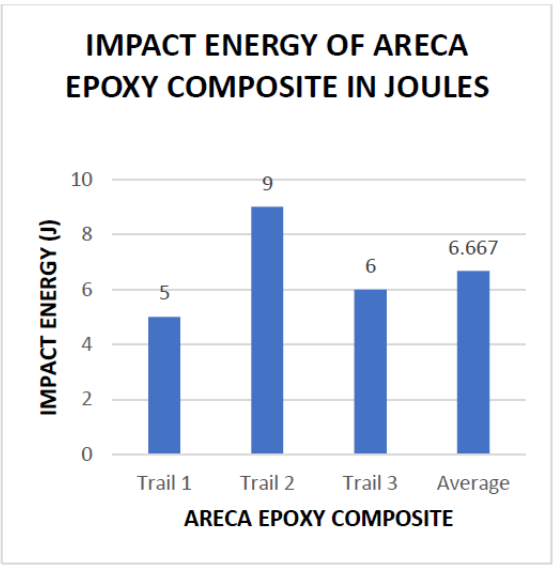

Fig.6 Impact Energy comparison

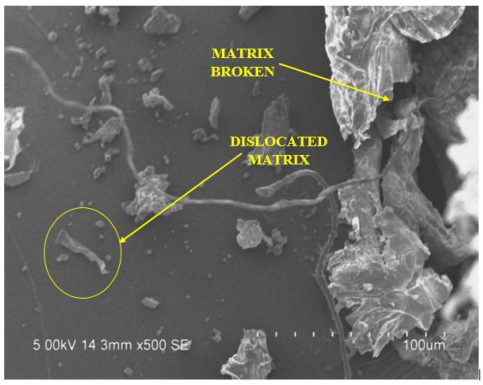

Fig.7 SEM of Tensile specimen

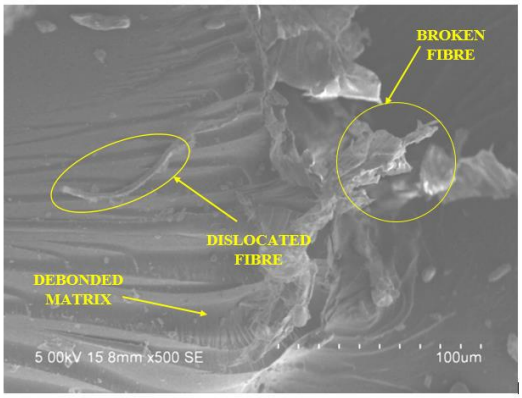

Fig.8 SEM of Flexural specimen

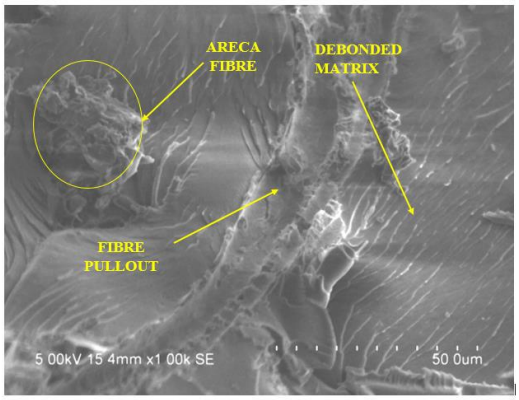

Fig.9 SEM of Impact specimen

IV. CONCLUSION

In this work, the common fiber picked as Areca fiber. Unidirectional mats were created and layered up, course of action with epoxy gum network. The overlay is fabricated utilizing hand lay-up system. The Mechanical properties, for example, rigidity, flexural quality and effect quality are broke down on the created material. Too Miniaturized scale structure of the composite is examined utilizing checking electron magnifying lens (SEM). Specimens were cut from the created cover as indicated by the ASTM models for various analyses. For Tensile test and flexural test tests were cut fit as a fiddle and level bar shape separately. The outcomes showed that one-sided Areca epoxy composite have great tractable, flexural and sway quality. Upgrade of mechanical properties might be achieved by utilizing the treated strands and right technique for creation. The surface morphology demonstrates that the development of voids and holes in every one of the examples composites. Thus in this examination woven fiber mats are utilized in setting up the composites; uniform conveyance of pitch around the filaments and air voids are the significant causes as seen in micrographs.

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EXPERIMENTAL INVESTIGATION FOR PERFORMANCE ENHANCEMENT OF HOUSEHOLD REFRIGERATOR USING PHASE CHANGE MATERIAL

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Abstract- A phase change material is a substance that can store or release significant amounts of heat energy by changing its phase from solid to liquid vice versa. It has already been proven that incorporation of phase change material with refrigeration systems improves the energy efficiency as well as the quality of the frozen food. However, the attachment of phase change material system with the refrigeration system is a challenging task in different aspects such as PCM thickness, quantity of PCM, PCM phase change temperature selection for optimizing energy consumptions of refrigeration systems are the main concerns of today's researches. Implementation of the Cold Thermal Energy Storage system is one of the effective ways to reduce energy consumption. In this study, a household domestic refrigerator with ceiling type evaporator is considered to equip it with cold thermal energy storage system. According to ASHRAE standard, the temperatures are ranges for the household refrigerator is between 274 and 280 K, and hence water is used as phase change material. Owing to the low thermal conductivity of water impact of the extended surface in the container was investigated. The experimental results of charging and discharging process show the good consistency with the numerical results. Furthermore, it is obtained that using finned cold thermal energy storage system, would reduce compressor's energy consumption about 17.4% per day.

Keywords – Cold thermal energy storage, Phase change material, Latent heat storage, Thermal energy storage system, Heat transfer surface, Latent cold thermal energy.

I. INTRODUCTION

Domestic refrigerators the most commonly used household appliances. These appliances are consuming the more residential electricity throughout the year. In china we can see that the residential electricity usage is about 30 to 40%. Hence, enhancing the energy efficiency of domestic refrigerator is the major issue. We can overcome this issue up to some extent by improving the coefficient of performance of a domestic refrigeration system. We can also reduce the power consumption, by using water as a phase change material in refrigeration system.

Introduction to Phase Change Material:

The materials which are having the capability of storing and releasing the energy when phase transformation occurred are called phase change materials. As the material changes its phase from solid to liquid, energy is absorbed from its local while remaining at a constant temperature. The energy which is absorbed by the material performs to increase the energy of the constituent molecules and their vibrational position. At the diffuse temperature the atomic bonds breakup and the materials progression from a solid to liquid. During solidification process the material transfer energy to its local and the molecules lose energy, position.

Types of PCMs:

There are three types PCMs are, they are

(A) Organic PCMs
(B) Inorganic PCMs
(C) Metal and Metal alloy PCMs

II. LITERATURE REVIEW

The invention of the refrigeration system in the modern world is one of the admirable works which helps to increase the comfort levels of mankind. The great invention makes nature to help us according to our requirements, anyhow increases in energy predicament and ecological pollution, which drives to acceleration of atmospheric temperature. R&AC sector is the major contributor for this issue because they are the major energy taking devices due to their continuous usage. In today's world, the most energy consuming appliances are household refrigerators and are utilizing a major part of the entire universal energy. According to the Liu et al the energy utilization of refrigerators are nearly 15% to 20% of electricity utilization whereas in Malaysia 26% of electricity was consumed. Usage of the PCM as a LHTES system would be the latest alternative for achievement improving of the domestic refrigerator by improving evaporator heat transfer, decreasing efficiency losses of the compressor. In our project work the performance improvement of the domestic refrigerator has been studied in detail. The performance enhancement of the domestic refrigerator is determined by the phase change material box volume, geometry, assimilation, and position. The design of PCM containing chamber is the main challenge for developing refrigeration system. Different shapes of phase change material compartment were used in the previous papers such as rectangular slab or circular slab at different positions of the refrigeration system.

Performance of refrigeration system in accordance with PCM position:

The installation of PCM with domestic refrigerator is a vigorous work. Phase change material can be installed at anywhere among the condenser or evaporator else in the storage chamber. It is known by the study of previous research papers data, which gives the placing of phase change material at evaporator will gives the improvement of the coefficient of performance, at the same time the ON time of compressor also decreased with longer compressor off time. Which will also give fluctuations in the compartment temperature with varying thermal loads. According to the Azzouz et al. [1] constructed the system with phase change material keep retain the compressor off time from 28.5–32.6% and autonomy of 4.7–8.5h. The stable working of compressor and its periodicity ultimately cuts off temperature fluctuations inner the storage compartment and resulting in approximately constant warmth for better food quality.

Current Development of Phase Change Material Placed Domestic Refrigeration System:

As on date so many experimental investigations are performed, to develop a PCM based domestic refrigerator. The quantity of phase change material and position of phase change material gives the COP of domestic refrigeration system. Below table gives the summary of the present studies are given in the below Table.1.

Table.1. Current development of domestic refrigeration system with phase change material

No	*Reference*	*Area of Connection of PCM*	*PCM Box material*	*Size of PCM Box*	*Types of PCMs*	*Result Tested*
1	*Azzouz et al*	*Between the evaporator section and the back side of the evaporator*	*Plexiglas*	*5and 10mm thickness*	*Eutectic and water*	*Compressor on-off run, pressure, evaporation temperature and COP.*

		section.				
2	*Afroz and Khan*	*Evaporator coil was immersed inside the PCM and placed behind the part of evaporator chamber.*	*Galvanized iron plate*	*0.03m^{3}and 0.04m^3*	*Water and eutectic*	*COP, evaporation temperature and pressure, compressor on–off cycling.*
3	*Gin et al*	*Phase change material used as a slab in each wall inside the evaporator chamber*	*Anodized aluminum plate*	*25mm diameter*	*Aqueous ammonium chloride solution*	*Energy enhancement, temperature fluctuations*
4	*Wang et al*	*Used as an additional heat exchanger with evaporator*	*Expanded natural graphite*	*Paraffin*		*Energy efficiency and co-efficient of performance.*

III. METHODOLOGY

For the experimental setup, a domestic refrigerator is having the dimensions of 50×60×105 cm^{3}and walls with thickness of 3.7 cm. The household refrigerator consists of freezer cabin at the top and refrigeration chamber below the freezer cabin. The Thermal Energy Storage system has two PCM cubic containers that are of 1×24×17.6 cm^{3}size and are placed on either sides of the evaporator and another with a specification of 1×34.8×17.6 cm^3 is placed under evaporator cabin that are made out of aluminum plates which are 1.2mm thick. Referring ASHRAE standard [2], it is accepted that refrigerator's environment is held between 1-5 °C, where we used pure water as phase change material. The Thermal conductivity and Latent thermal energies of melting water are 0.59 W/m. K and 334kJ/kg. In such arrangement, air is abstained from direct contact with cold evaporator surfaces at the top and both sides hence the evaporator cools down and also in turn freezes the water inside the PCM containers which then absorbs the energy in the form of heat from the refrigerator's cabin through free convection. The average temperatures of the cabin are shown in Fig.1.

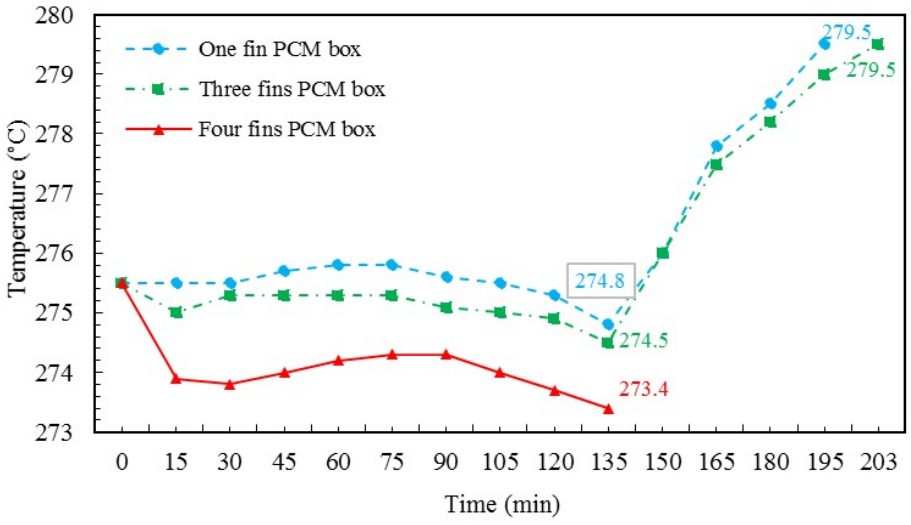

Figure.1. The cabin average temperature with different PCM container configurations

The experimental setup consists of a 16 feet conventional refrigerator, container with PCM, two six channel data acquisition system with ten thermocouples, whose detailed characteristics are illustrated in Table.2.

Table.2. Common place details of the equipment

Equipment		*Properties*
Refrigerator	*Dimensions*	*50×60×105 cm3*
	Power rate	*149 Watts*
Container with PCM	*Dimensions*	*1×24×17.6 cm3*
	Thickness	*1.2 mm*
	Material	*Copper*
Thermocouples	*J type*	

The three finned PCM container of aluminum plates (1.2mm thickness) provided fine heat transfer between phase change material, evaporator emerge during charging time, between cabin's air, PCM during discharging. An opening at the bottom of PCM container helped in injection of PCM and two slits at the front surface to mount thermocouples at two different levels to measure temperature of PCM. Similarly, two aluminum plates on either side of the cabin has a hole for injection and two provisions for thermocouple mounting. During the discharge cycle, the compressor gets turned off and temperature inside the cabin tends to increase. The warm air which is lower density raises up to the level of PCM containers and the cold air with higher density settle at the bottom of refrigerator. The warm air archive CTE from phase change material container thus turning the solidified PCM into liquid and this exchange of heat continues up until all the solid is converted into liquid and the cabin reaches at a mean temperature which is a highest permissible point set in the ASHRAE standard [2]. It is worthy to note that the evaporator cabin was closed and the air in it was kept secluded from the rest of the refrigerator cabin. Operation of refrigerator and CTES systems were assessed by measuring the temperatures of air and PCM at various points with the help of ten J type thermocouples with and accuracy of ±0.5°C for PCM and air, respectively.



Figure.2. The arrangement of PCM and thermocouples inside the refrigerator

IV. RESULTS AND DISCUSSION

Initially 2.35°C temperature was adopted. And the surface temperature of the evaporator was established to -5 °C for the CTC of phase change material. After 2 hours 30 minutes the phase change material frozen totally at the same time the compressor was turned off at this instant. As far as pretend compressor-off, evaporator emerges acts as an established emerge without mounting any position on the evaporator. Hence, at the end of phase change material liquid to solid state, the cold TESS maintains the refrigerator to normal low warmth. As we can see that, the cabin mean temperature was discharged from 2.35°C to 1.85°C during liquid to solid process. Afterward, in the without charging time, the cabin warmth increased to near the highest temperature at 6.35°C during30 minutes. Throughout this period, a solid PCM couldn't change to the liquid phase as per the mean temperature of phase change material at the end of the discharging period at -2.05°C. In this experiment water is used as a phase change material, which has the phase change temperature -0.15°C. Hence, to have solid to liquid phase change process the PCM should contain minimum of -0.15°C temperature.

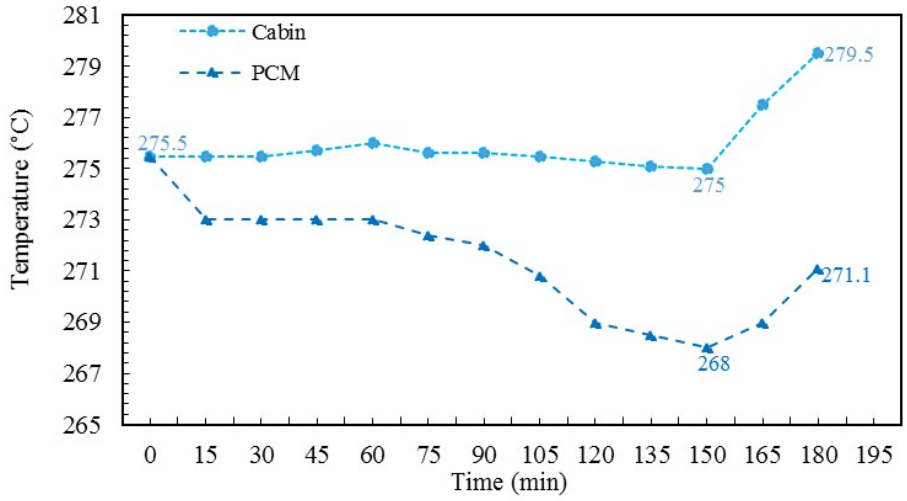

Figure.3. The numerical simulation result for simple PCM container

The experimental tests are attained in two sections:

1. Initially the normal working of domestic refrigerators power ratio was determined because which continues the cabin temperature in the established point. After the completion power ration, the working period of the domestic refrigerator was examined.

2. After completion of the initial test, the performance of the domestic refrigerator was analyzed by installing the CTESS. Throughout this procedure the phase change material storage time, charging and discharging processes were examined. By considering the thermocouples measured values, the behavior of the CTESS was plotted its working cycles.

By the completion of the first cycle, the time taken for the PCM to freeze completely was 135 minutes and at the end of second cycle it was reduced to 52 minutes. Based on these outcomes and the placing positions of the thermocouples, we come to know that 25 % of the PCM got melted at the end of the all discharging stages. For the next cycle during charging process the phase change material

needs only 52 minutes to freeze remained liquid. For the next charging and discharging cycles were taken same time as previous cycles took. This shows that at the end of the charging there is no alter in the volume of PCM available for discharging process. To calculate the volume of the melted PCM during every discharging period, thermocouples were mounted at the different places in the phase change box. As seen in the fig.4, the average temperature of the PCM reached to its melting point by the completion of the discharging period.

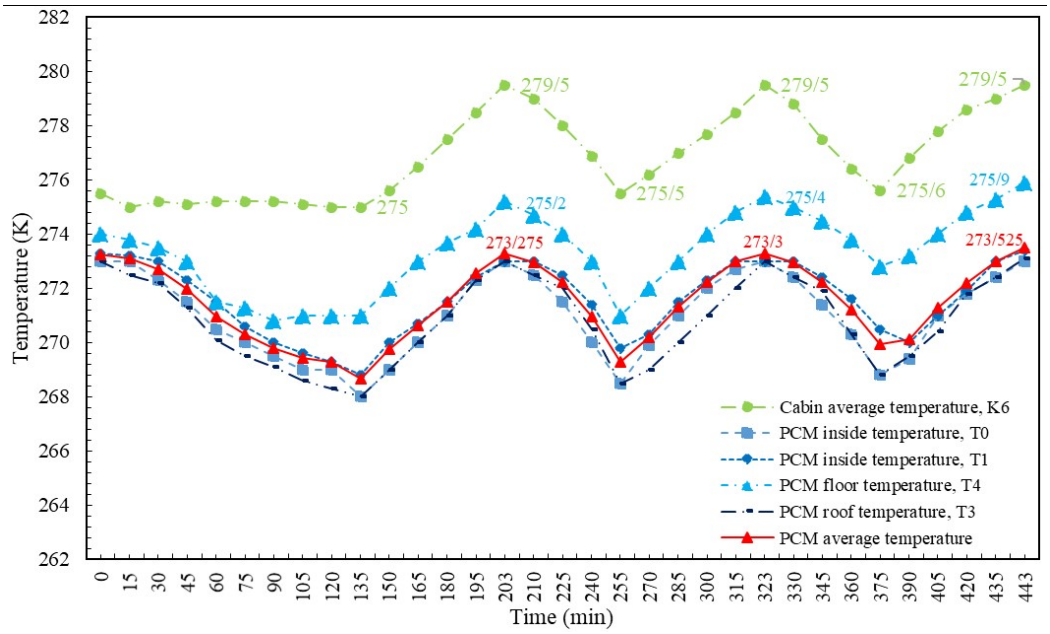

Figure.4. Trends of temperatures during charging and discharging in the experimental investigation.

The purpose of the conducting the experiment is to know the working period of the compressor as well as to have highest energy saving by using fins in cold thermal energy storage systems. Generally, compressor wants to work for 11 minutes in an hour to keep the cabin in normal condition. When the compressor is not in working condition then the cabin temperature increased to 4.15°C, and then reduces to 1.15°C, the compressor starts to work. For the first time of charging and discharging when the cold thermal energy storage system was used the cabin warmth was raised to 6.35°C, to reduce this warmth to normal 1.85°C the compressor needs to work for more than 11 minutes. By using of CTESS, as we can see that the total working period of the compressor was decreased. According to the experimental outcomes, the difference in the time taken by the compressor with CTES system and without CTES system was observed. When the cold thermal energy storage system was used during a day, the time taken for the compressor in which CTES system used shown 3.566 hours and the system without CTES shown 4.316 hours. By this comparison we can conclude that, by using CTESS reduces the working time of the compressor about 45 minutes per day.

V. CONCLUSION

The paper is a manifestation to observe the consequence of improvement of HTS of CTES system experimentally. Based on results obtained from Omid Ghahramani Zarajabad, Rouhollah Ahmadi [3], fin and finless construction of phase change material containers were considered. As per the results, a phase change material container with fin could increase discharge period and in turn decrease

charge period in comparison to a finless container. The most essential outcome is that the phase change material with finned container be capable of fuse in direction of discharge point, thus releasing LCTE. To gauge the digital outcomes an experimental setup of household refrigerator was used with the finned PCM container & 10 J type thermocouples were used to measure temperatures inside and outside the refrigerator. The time required for phase change material to freeze completely, and to maintain the cabins warmth in the STC were obtained by the experimental outcomes. Thermocouples were mounted at different levels to analyzed melting volume of phase change material and for that reason temperatures at discharge time were analyzed. The results obtained showed that 25% of PCM was melted and hence this proportion of PCM accounts for the heat capacity of Cold Storage Thermal Energy system and hence led to the electrical energy consumption. Referring to the compressor's power rating, a figure of 40kWh/year was obtained as the energy savings per refrigerator, i.e. 17.4% of energy reductions were estimated that can show positive effects over environment as well as economy. This could reduce conventional energy consumption.

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Optimization of process parameters on EDM of titanium alloy

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ABSTRACT

In this research paper, the effect of process parameters on electrical discharge machining (EDM) of Ti-6Al-4V has been investigated. The process parameters were discharge current, pulse on time, pulse off time and three types of dielectric fluid were used, they were deionized water, drinking water and mixed (25% deionized water with mixing of 75% drinking water) has been used for machining of Ti-6Al-4V. Experiments were carried out using Taguchi L_{27} (3^{13}) Orthogonal Layout. The output process performance was material removal rate (MRR) and surface roughness (Ra) was evaluated. Taguchi methodology were used to optimize the process parameters. It has been observed from the analysis, drinking water as dielectric fluid shows maximum material removal rate and reduced the surface roughness. The maximum material removal rate of Ti-6Al-4V was 5.46 mm^3/min and minimum surface roughness was 2.53 μm.
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1. Introduction

EDM is termed as Electrical Discharge machine which is a machining process of combination of electro-thermal energy whereas the electrical energy is utilized to generate an electrical spark [1]. The purpose of using EDM is to remove the material and to shape the material [2] from the work piece as we required. The thermal energy is generated due to the high electrical energy [3] of the machine. Using this generated thermal energy and electrical energy [4], the material is to be molten and the unwanted portion of the material is to be removed [5] from the work piece. The material used in the EDM must have the high strength temperature resistant alloys [6] and also electrically conductive. In EDM, the work piece and tool should be [7] electrically conductive. Both of these materials [8] were immersed in dielectric medium [9] like deionized water or kerosene [10]. The workpiece and tool [11] is separated by some distance. After this some voltage [12] or potential difference is applied between the tool and workpiece [13]. Based on the gap between workpiece and tool and the amount of potential difference [14] applied, the electric field is to be established [15]. Normally, this setup is having the positive terminal [16] and also the negative terminal. The tool is connected to the negative terminal of the generator and also the work piece is connected to the positive terminal of the generator. Because the electric field is induced between the tool and workpiece, [17] the free electrons created in the tool are applied to electrostatic forces. If the bonding energy between material and work piece of the electrons [18] is less, then a quantity of electrons is emitted from the tool and this emitted electron is known as cold emission. Then the emitted cold electrons are moving towards the work piece via the dielectric medium and get the velocity and energy. After moving towards the workpiece, [19] there is a collision is induced between the electrons and dielectric molecule and this collision may cause the ionization of the dielectric medium which is based on the bonding energy of the molecule and an electron. Due to collision, more amounts of negative and positive ions are accelerated [20]. This process will enhance the concentration of the ions and electrons in the dielectric medium between work piece and tool [21]. The matter presented in the channel is known as plasma and the electrical resistance [22] of this is very low. Then unfortunately, huge quantity of electrons and ions are to be flow from the tool and the workpiece [23]. This movement of electrons is called as avalanche motion of electrons. Such movement is to be create an electrical spark and the amount of energy is to be dissipated in the form of heat in spark. The high velocity electrons are fall on the workpiece and ions on the tool. The kinetic energy of the ions and electrons are impact with the surface of the workpiece and tool respectively and to be converted into thermal energy or heat flux. Such intense localized heat flux leads to extreme instantaneous confined rise in temperature and to material removal which would be in excess of 10,000 C [24]. The schematic diagram

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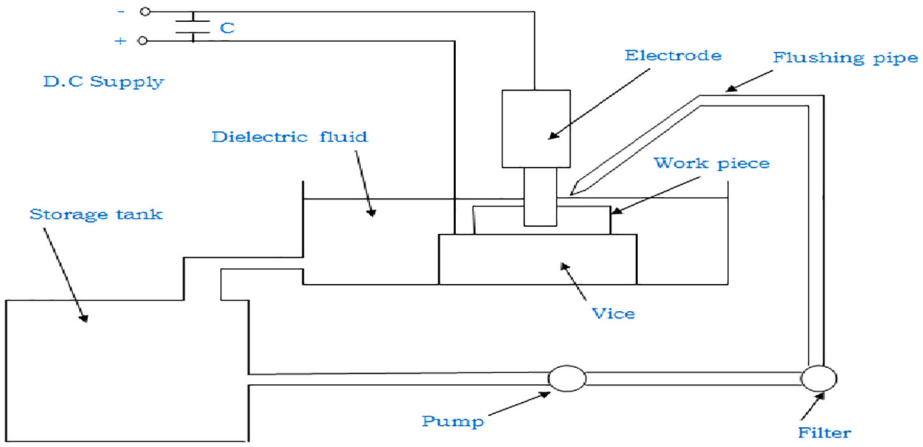

Fig. 1. Schematic diagram of EDM machine.

of the Electrical Discharge Machining used in this research is illustrated in Fig. 1.

2. Selection of the work piece material, electrode material and types of dielectric fluid

The workpiece material employed in this study is Ti-6Al-4V. Copper was used as an electrode material, drinking water, deionized water and combinations (25% deionized water + 75% drinking water) were used as dielectric fluids. The chemical composition and properties of Ti-6Al-4V were shown in Tables 1 and 2, respectively. The dielectric fluid characteristics of drinking water, drinking water properties and deionized water properties were shown in Tables 3–5. The experimental setup used for conducting actual experiments is given in Fig. 2.

2.1. Identification of the important EDM process parameters

The most important EDM Process parameters identified were discharge current, pulse on time. Pulse of time and dielectric fluids were used.

2.2. Determination of the levels for the process parameters and their working range

The working range of the selected process parameters under the present study is given in Table 6.

2.3. Selection of orthogonal array

In the present analysis, an L_{27} ($3^{1\ 3}$) orthogonal array is selected. The selected orthogonal array is presented in Table 7.

2.4. The response measures (i.e. MRR and SR)

The EDM responses was measured in terms of MRR, SR.
The MRR can be calculated as the following formulae.

Table 2
Properties of Ti-6Al-4V.

Property	Quantity
Hardness (HRC)	32–34
Melting point (°C)	1649
Density (g/cm^3)	4.5
Ultimate tensile strength (MPa)	897–1000
Thermal conductivity (W/m°K)	7.2
Specific heat (J/kg°K)	560
Mean coefficient of thermal expansion 100 °C/°C	08.6x10^{-6}
Volume electrical resistivity (ohm-cm)	170
Elastic Modulus (GPa)	114

Table 3
Characteristics of Drinking water.

Characteristic	Value
Appearance	Clear and Colorless
Specific gravity at 30 °C	1.0004
Flash point (°C)	–
Pour point (°C)	3
Viscosity at 38 °C (cst)	0.78
Copper corrosion	Not worse than 1
Dielectric strength (KV/min)	–

Table 4
Drinking water properties.

Total dissolved solids	98 mg/l
Total Suspended solids	10 mg/l
Total solids	120 mg/l
Dissolved O_2	7.0 mg/l
Dissolved CO_2	9 mg/l
Dissolved N_2	0.01 mg/l
Chlorides	20.7 mg/l
Sulphate	32.0 mg/l
Total alkalinity	34.0 mg/l
pH	6.55
Total hardness	55.1 mg/l
Resistivity at 25 °C	4000 Ω/cm^3

Table 1
Chemical Composition of Ti-6Al-4V.

Element	C	Al	V	N	O	Fe	H	Ti
%	Max. 0.08	5.5–6.5	3.5–4.5	0.05	0.13	0.25	0.01	Balance

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Table 5
Deionized water properties.

chloride	6.7 mg/l
Alkalinity	Nil mg/l
pH	4.96
Total Hardness	22.4 mg/l
Resistivity at 25 °C	33333 Ω/cm^3



Fig. 2. Experimental set up.

Table 6
Working range of the process parameters and their levels.

Parameters	Levels		
Dielectric fluid (A)	Deionised water	Drinking water	Mixed (25% deionised water + 75% drinking water)
Discharge current (B)	10	15	20
Pulse on time (C)	25	45	65
Pulse off time (D)	24	36	48

$$MRR(mm^3/min) = \frac{WWL(g) \times 1000}{\rho(g/cm^3) \times machining\ time(min)}$$

ρ = Density of work piece material

The SR is referred to the roughness or smoothness and it was measured by surface roughness tester. MRR and SR was evaluated for all the conditions and presented in Table 8.

MINITAB 17 software was used to prepare mean of response tables and mean of S/N graphs for MRR and SR.

Taguchi method allows evaluation of individual parameters effects independent of the other parameters for process parameters optimization. The design parameters prominently affecting the performance measures were determined by using analysis of variance (ANOVA).

In Fig. 3. Where S/N ratio was larger to better was considered for MRR. In Fig. 4 S/N ratio was lower to better was considered for SR.

Fig. 4 shows the S/N response graph for surface roughness.

Significance of each parameter were found by using percentage of contribution of each parameters in ANOVA table. High percentage contribution of process parameters on EDM has prominent effect on the response. ANOVA was applied to find out the significance of main factors and the percentage of contribution were used to analysis the process parameter significantly effects on the MRR and SR. The results of ANOVA for MRR and SR were presented in Tables 9 and 10 respectively.

3. Results and discussions

3.1. Analysis of variance (ANOVA)

The ANOVA were performed to find the effect of process parameters on various performance measures. Percentage of contribution were used to determine the relative significance of various process parameters. From the ANOVA analysis shown in Tables 9 and 10, it is observed that the dielectric fluid (A), discharge current (B) pulse on time (C) were the most significant factor affecting to MRR and SR. It was observed from the ANOVA tables that discharge current (B) and pulse on time (C) have a high percentage of contribution on various performance measures as compared to pulse off time (D).

Table 7
Experimental layout using an L_{27} (3^{13}) OA.

Exp. No.	Dielectric fluid (A)	Discharge current (B)	Pulse On Time (C)	Pulse Off Time (D)
1	Deionized	10	25	24
2	Deionized	10	45	36
3	Deionized	10	65	48
4	Deionized	15	25	36
5	Deionized	15	45	48
6	Deionized	15	65	24
7	Deionized	20	25	48
8	Deionized	20	45	24
9	Deionized	20	65	36
10	Drinking	10	25	24
11	Drinking	10	45	36
12	Drinking	10	65	48
13	Drinking	15	25	36
14	Drinking	15	45	48
15	Drinking	15	65	24
16	Drinking	20	25	48
17	Drinking	20	45	24
18	Drinking	20	65	36
19	Mixed (25% deionised water + 75% drinking water)	10	25	24
20	Mixed (25% deionised water + 75% drinking water)	10	45	36
21	Mixed (25% deionised water + 75% drinking water)	10	65	48
22	Mixed (25% deionised water + 75% drinking water)	15	25	36
23	Mixed (25% deionised water + 75% drinking water)	15	45	48
24	Mixed (25% deionised water + 75% drinking water)	15	65	24
25	Mixed (25% deionised water + 75% drinking water)	20	25	48
26	Mixed (25% deionised water + 75% drinking water)	20	45	24
27	Mixed (25% deionised water + 75% drinking water)	20	65	36

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Table 8
Average results of MRR and SR.

Exp. No.	Dielectric (A)	Discharge current (B)	Pulse On Time (C)	Pulse Off Time (D)	Average MRR (mm^3/min)	Average SR (Ra) μm
1	Deionized	10	25	24	1.6957	2.25
2	Deionized	10	45	36	2.1310	2.49
3	Deionized	10	65	48	2.46345	3.00
4	Deionized	15	25	36	2.5608	2.51
5	Deionized	15	45	48	4.0500	3.48
6	Deionized	15	65	24	3.2522	3.22
7	Deionized	20	25	48	3.4784	3.47
8	Deionized	20	45	24	4.4352	2.78
9	Deionized	20	65	36	4.5760	3.63
10	Drinking	10	25	24	2.2988	2.68
11	Drinking	10	45	36	2.4922	2.95
12	Drinking	10	65	48	2.6334	2.94
13	Drinking	15	25	36	3.7856	2.61
14	Drinking	15	45	48	4.1169	2.72
15	Drinking	15	65	24	4.0691	3.06
16	Drinking	20	25	48	4.2823	2.93
17	Drinking	20	45	24	4.5074	3.10
18	Drinking	20	65	36	5.4258	3.22
19	Mixed (25% deionised water + 75% drinking water)	10	25	24	1.8950	2.91
20	Mixed (25% deionised water + 75% drinking water)	10	45	36	2.2254	3.03
21	Mixed (25% deionised water + 75% drinking water)	10	65	48	2.7238	3.18
22	Mixed (25% deionised water + 75% drinking water)	15	25	36	3.0563	2.72
23	Mixed (25% deionised water + 75% drinking water)	15	45	48	3.4300	2.89
24	Mixed (25% deionised water + 75% drinking water)	15	65	24	3.6542	3.40
25	Mixed (25% deionised water + 75% drinking water)	20	25	48	3.7967	3.12
26	Mixed (25% deionised water + 75% drinking water)	20	45	24	4.5128	3.48
27	Mixed (25% deionised water + 75% drinking water)	20	65	36	4.6655	3.49

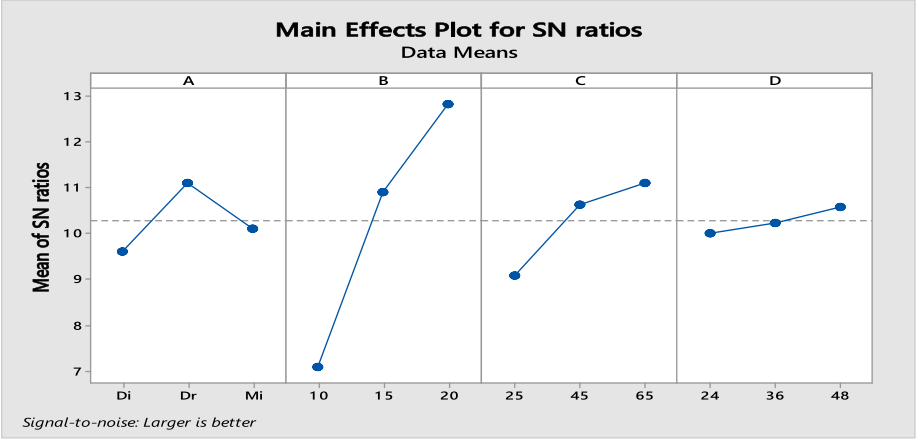

Fig. 3. Influence of EDM parameters on S/N graph for material removal rate.

3.2. Effect of machining parameters on MRR

S/N graphs of MRR was presented in Fig. 3 and the ANOVA was shown in Table 9. It is observed that for deionized water and drinking water, the MRR increases and after that it decreases in the mixed condition (25% deionized water + 75% drinking water) due to decrease in thermal conductivity. It is also observed that, as the current (I) increases from 10A to 20A, the MRR increases significantly. Discharge current controls the heat energy supplied for metal removal, as the discharge current enhances, heat energy also enhances. Thus the MRR increased from 10A current to 20A. The discharge current is sharing 79% and it is the first significant factor. The material removed is directly proportional to the amount of energy supplied in this. Thus it is the most important factor as far as sharing and importance is concerned. As the pulse on time increases from 25 μs to 65 μs, the MRR also increases almost non-linearly. Its contribution is 10%. Pulse off time is the least significant factor and shows minimum contribution. Its contribution towards MRR is 0.7%. It is observed that as the pulse off time increases from 24 μs to 48 μs, the MRR is improved by very small amount. At minimum pulse off time i.e. 24 μs, the dielectric fluid gets less time to deionize and flush away the debris.

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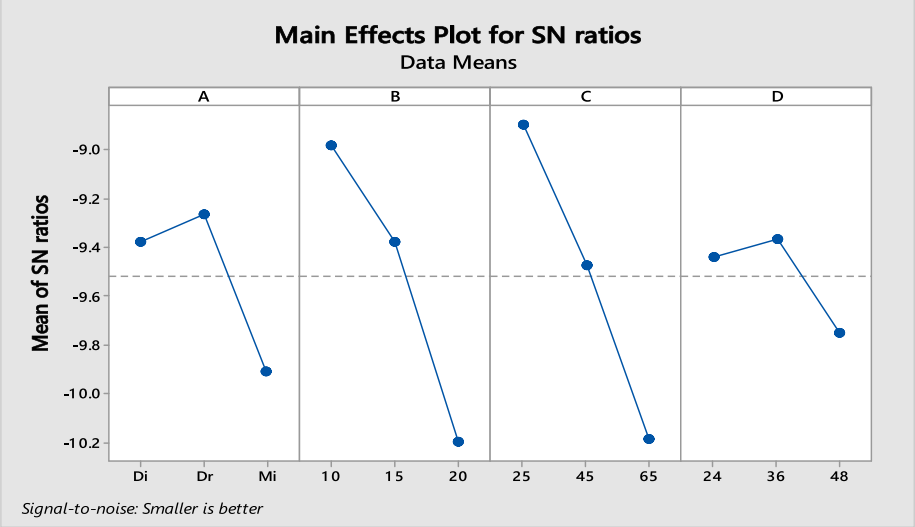

Fig. 4. Influence of EDM parameters on S/N graph for SR.

Table 9
ANOVA analysis for material removal rate (MRR).

Factor	Sum square	Degrees of freedom	Mean sum of square	Per. contribution (%)
(A)	10.78	2	5.39	5.58
(B)	153.72	2	76.86	79.69
(AXB)	0.67	4	0.16	0.34
C	19.33	2	9.66	10.02
AXC	2.45	4	0.61	1.27
D	1.45	2	0.72	0.75
AXD	1.02	4	0.25	0.53
Error	3.44	6	0.57	1.78
St	192.88	26		100

Table 10
ANOVA analysis for surface roughness (SR).

Parameter	Sum square	Degrees of freedom	Mean sum of square	Per.contribution
(A)	4.510561504	2	2.25	12.22
(B)	8.579256394	2	4.28	23.25
(AXB)	3.730956924	4	0.93	10.11
C	12.35823198	2	6.17	33.49
AXC	0.048866944	4	0.012	0.13
D	2.352982883	2	1.176	6.37
AXD	1.635441424	4	0.408	4.43
Error	3.678515757	6	0.613	9.97
St	36.89481381	26		100

3.3. Effect of machining parameters on SR

Fig. 4 presents the S/N graph and Table 10 presents ANOVA for SR. It is observed that for the dielectric fluid as deionized water and drinking water the SR decreases and after that it increases in the mixed condition (25% deionized water + 75% drinking water) which is due to lower thermal conductivity of water. Fig. 4 show that as the discharge current increases from 10A to 20A, the SR increases. As the discharge current increases the bombarding impulsive force of electrons also increases. In case of negative polarity, the bombardment of electrons takes place from work piece to electrode. The SR is higher at 10A as the amount of material deposited is less. When the discharge current is increased to 20A, the larger impulsive force produces deeper and greater craters with more amount of material being deposited. Hence the surface roughness is more. The contribution of dielectric fluid on the SR is 12% and it is the third largest. The contribution of discharge current is 23% and its significance is the second highest. The material removed by using the electrode is directly proportional to the amount of energy supplied. Thus it is the most significant factor. As the pulse on time increases from 25 μs to 65 μs, the SR also increases. Its contribution is 33%. Pulse off time is the least significant factor and shows minimum contribution as far as SR is concerned. Its contribution towards SR is 6%. It is observed that as the pulse off time increases from 24 μs to 48 μs, the SR becomes

Table 11
Optimum values of the machining performance evaluation parameters.

Parameters	Optimum condition	Predicted Optimum value
MRR (mm^3/min)	$A_2B_3C_3D_3$	5.46
SR (μm)	$A_2B_1C_1D_2$	2.53

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Table 12
The optimum results.

Parameter	Optimum condition	Predicted Optimum value	Experimental values
MRR (mm^3/min)	$A_2B_3C_3D_3$	5.46	5.90
SR (μm)	$A_2B_1C_1D_2$	2.53	2.98

low. At minimum T_{ON} of 24 μs, the dielectric fluid employed relatively less time to de-ionize and flush away the debris. Thus stability of the machining process and SR is influenced the optimum values of the machining performance evaluation parameters were given in Table 11 and the optimum results were given in Table 12.

4. Conclusions

In this study, the influence of dielectric fluid i.e. deionized water, drinking water and mixed (25% deionized water + 75% drinking water), the process parameters and optimization of titanium alloy (Ti-6Al-4V) in the die sinking EDM was studied by using Taguchi method. From the results it was found that drinking water, discharge current, pulse on time and pulse off time have been found to play significant role in EDM operations. Also, it was found that the optimal levels of the factors for MRR and SR are differing from each other. From ANOVA, pulse on time is more significant than discharge current for SR whereas discharge current is more significant than pulse on time for MRR. On the other hand, interaction between dielectric fluid and discharge current is also significant in case of SR.

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Influence of drinking water and graphite powder concentration on electrical discharge machining of Ti-6Al-4V alloy

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ABSTRACT

In the present investigation, the influence of drinking water as dielectric fluid and graphite powder concentration on electric discharge machining of Ti-6Al-4V alloy is studied. Taguchi parameter design approach was used to get an optimal parametric setting of EDM process parameters namely, discharge current, pulse on time, pulse off time and graphite powder concentration that give up optimal process performance characteristics such as material removal rate, surface roughness and recast layer thickness. Also individual effect of process Parameters on performance characteristics was studied. Experiments were conducted on experimental setup with modified dielectric fluid circulating system. To identify the significance of parameters on measured response, the analysis of variance (ANOVA) has been done. Further empirical models were developed by performing nonlinear regression analysis to predict the process performance characteristics. Confirmation tests were conducted at their respective optimum parametric settings to verify the predicted optimal values of performance characteristics.
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1. Introduction

Ti-6Al-4V shows better mechanical properties even at elevated temperatures. Despite such tremendous property, its applications are quite limited to military, aircraft, space craft and medical fields. The factor limiting its application is high cost and manufacturing intricacies. Ti-6Al-4V is a material which is difficult-to-machine due to its poor electrical and thermal conductivity. It chemically reacts with almost all cutting tool materials. Low cutting speeds, high feed rates, huge quantity of cutting fluids, sharp tools and rigid set up are essential for the conventional machining of Ti-6Al-4V and makes it uneconomical and inefficient [1–3]. EDM can be employed to overcome the problem faced in conventional machining of Ti-6Al-4V [4]. Die-sinking EDM is also used to manufacture the components used for aerospace, automobile, tools and machine tools. EDM is applied for making cavities and miniature holes. With the help of die-sinking EDM, it is possible to make intricate shaped dies with very less machining time. It can machine durable materials like Carbide, Steel, Stellites etc., with considerably good surface finish. EDM can be employed for removing broken taps, drills, studs, reamers, pins. Fragile materials are machined without any damage by EDM [5]. Tariq Jilani et al. Studied the different dielectric fluids and two different tool materials. It has been concluded that best machining was obtained by tap water [6]. Chen S. L. et al. made a comparative analysis of discharge machining ofTi-6Al-4V with Kerosene and distilled water as dielectric fluids. Distilled water as a dielectric fluid showed good performance compared to Kerosene for MRR and RWR [7]. Lin et al. optimized machining parameters in magnetic force assisted EDM based on Taguchi method and found higher MRR, lower RWR and smaller SR as compared to standard EDM. Significant machining and optimum combination levels of these parameters have been determined [8]. Hascalik et al. studied the comparative performance of Copper, Graphite and Aluminum electrodes. Increased surface cracks, MRR, SR and TWR observed with Copper for all process parameters. Higher MRR with Graphite and lower SR in Aluminum were found [9]. Azad et al. experimentally verified that voltage and current had influence on optimization of single quality characteristics and no influence on multiple quality characteristics [10]. Kung et al. analyzed machinability of Cobalt bonded Tungsten Carbide (94WC-6CO) with Aluminum powder mixed EDM. It has

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been concluded that using Aluminum powder mixed with dielectric distribute the discharge energy gets to increase the machining efficiency [11].

Kibria et al distinguished the influence of distinct dielectrics like Kerosene, de-ionized water, B_4C powder + Kerosene and B_4C powder + de-ionized water. MRR and TWR were observed to be more and RLT was less with de-ionized water compared with Kerosene. In case of B_4C powder mixed dielectric, material removal rate increases by de-ionized water, but TWR reduced with Kerosene [12]. EmreUnses et al observed improvement by adding Graphite powder into kerosene on EDM of Ti-6Al-4V [13]. Ekmekci et al Performed comparative study on the surface integrity of discharge machined plastic mold Steel while using Kerosene and de-ionized water as dielectric fluids. Graphite and Copper as electrodes. Formation of white layer was observed on the machined surface in case of all the dielectric fluids [14]. Bozdana et al. studied rapid drilling of holes on Ti-6Al-4V by EDM. Brass and Copper tubular electrodes were used with de-ionized water as dielectric and negative polarity. It has been observed that MRR increased and TWR decreased with Brass electrode than Copper electrode [15]. Jahan et al developed model and investigated the effect of Nano-powders like Graphite powder (Gr), Aluminum (Al) and Alumina (Al_2O_3) separately mixed with Kerosene in micro-EDM of Tungsten Carbide. Particle size, concentration, density, electrical and thermal conductivity of powder were found to be the most significant factors affecting the performance [16].

2. Experimental setups, procedure and equipment:

The die sink EDM (Make: Formatics, Bangalore, India) with power supply unit and controller PSR-20 (Make: Electronica, Pune, India) was used for conducting the experiments. The details of the experimental set up and the closed view of working tank are shown in Fig. 1.

The experimental set up was modified for conducting the experiments in the case of powder mixed dielectric fluid. The schematic diagram of experimental set up for PMEDM is shown in Fig. 1. In this modified experimental set up, powder is mixed into the dielectric fluid in a separate tank. For conducting experiments, the work material Ti-6Al-4V. The workpiece of 160 mm length, 60 mm breadth and 6 mm thickness is selected. The Copper electrode of 12 mm diameter is employed for the experiments. The workpiece material employed in this study is Ti-6Al-4V. Copper is used as an electrode. Drinking water, are used as dielectric fluids.

The hardness of the material is measured at different points and average hardness value was found to be 32–34 HRC. The chemical composition of the Ti-6Al-4V alloy is shown in Table 1. The mechanical and physical properties of Ti-6Al-4V alloy are presented in Table 2. Owing to higher thermal conductivity low electrical resistivity and high melting point, the graphite powder (particle size 20 to 30 μm) is chosen to add into the dielectric fluid. The graphite powder morphology can be observed under SEM and is shown in Fig. 2.

The preliminary experiment result shows that lower MRR is observed when straight polarity was used. Hence, this study is focusing on increasing the MRR of the work piece. Using reverse polarity [17–19]. When the discharge current was kept above 10A, it was observed that the MRR was significant, and when more than 20A current was selected, it resulted in higher MRR necessitating the selection of values. The range selected for the pulse-on time and pulse-off time is based on the pilot experiments and the literature [20]. The pilot experiments were carried out with the addition of graphite powder from 1 to 20 g/L into the dielectric fluid. The working range of process parameters in this study is presented in Table 3.

Three trials of each experiment were conducted to average of these values to minimize the pure experimental error. Machining time has been chosen for conducting each experiment is 30 min, which is sufficient to produce tool shape on work material during EDM machining of Ti-6Al-4V alloy. The experimental layout for the present investigation is presented in Table 4.

3. Results and discussion

It is possible to sort out each process parameter on response at different levels since the experiments are designed in orthogonal nature.

3.1. Influence of process parameters on MRR

The mean of three trails runs of MRR, SR, and RLT are presented in the Table 4.

The effect of process parameters on the MRR are presented in Fig. 3. With the increase in discharge current from 10A to 20A, significant increase in MRR is noticed from the response graphs. Dis-



Fig. 1. Modified Experimental setup.

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Table 1
Chemical Composition of Ti-6Al-4V.

Element	C	Al	V	N	O	Fe	H	Ti
%	Max. 0.08	5.5–6.5	3.5–4.5	0.05	0.13	0.25	0.01	Balance

Table 2
Mechanical and physical Properties of Ti-6Al-4V.

Property	Quantity
Hardness (HRC)	32–34
Melting point (°C)	1649
Density (g/cm^3)	4.5
Ultimate tensile strength (MPa)	897–1000
Thermal conductivity (W/m°K)	7.2
Specific heat (J/kg°K)	560
Mean coefficient of thermal expansion 100 °C/°C	08.6×10^{-6}
Volume electrical resistivity (ohm-cm)	170
Elastic Modulus (GPa)	114

charge energy in inter electrode gap is directly influenced by the discharge current. MRR increases at higher discharge current conditions as a result of high current density that is rapidly over heating the work piece that caused because of increase in spark energy [20]. With an enhancement in discharge current, a stronger spark with high thermal energy is produced and a major portion of heat is transferred to the electrodes. Further as current increases, discharge strikes the surface of work piece intensively which creates an impact force on the molten material in the molten puddle and this results into ejection of more material out of the crater [21]. The trend in variation of MRR with enhancement in discharge current is similar with the findings of the pulse on time and is the 2nd significant factor as far as improvement and importance are concerned. It is clear from Fig. 3 that, as the pulse on time increases from 25 μs to 65 μs, MRR increases to a smaller extent due to increase in energy supplied per cycle [22]. Since discharge energy is not present during pulse off time material removal from work piece will not take place. With the increase in T_{on} from 24 μs to 36 μs, MRR increases initially and then decreases. Debris that is not flushed due to short time available will not allow effective sparking at low pulse off time and results in unstable machining process. Debris flushing takes place effectively with the increase in pulse off time and paves way for effective sparking and stable machining. Due to this, with pulse off time of 36 μs, MRR enhances initially and then reduces as quantum of energy supplied to the process decreases.

MRR decreases initially and increases marginally later with the increase in Graphite powder combination from 4.5 g/l to 9 g/l. Excess powder accumulation in the gap reduces the discharge transitivity and results in MRR reduction Fig. 3 shows that input parameters like pulse on time, pulse off time, discharge current, and Graphite powder concentration impact the MRR mean values. Maximum MRR can be achieved when T_{on} is at 65 μs (level 3), T_{off} is at 36 μs (level 2), discharge current is at 20A (level 3) and powder combination is at 4.5 g/lt (level 1). Table 5 presents the input parameters importance on MRR through ANOVA of the data and. Equation (2) gives the regression equation of MRR. For MRR values prediction, the R^2 and R^2_{adj} are in the variability acceptable range and the values found are (98.9%) and (95.1%) respectively. MRR is predicted between the operating ranges of EDM process parameters by using the regression model.

$$MRR = 3.76 - 0.892A + 0.0516B + 0.280C - 0.511D + 0.03052A^2 - 0.001239B^2 - 0.00526C^2 + 0.0400D^2 + 0.00791AB + 0.00494AC - 0.01929AD \quad (2)$$

3.2. Influence of EDM parameters on Ra

The mean values of surface roughness for individual parameters effect values are given in Table 6. Response curve for the individual effect of discharge current, pulse on time, pulse off time and Graphite powder concentration on the average values of Ra is shown in Fig. 4. It is observed from the Fig. 4 that improvement in surface roughness value is noticed by increase in discharge current. It is due to the reason that the increase in discharge current enhanced spark power resulting in the creation of wide and higher cavity which results in enhanced surface roughness. With the increase of Graphite powder combination increase from 4.5 g/litre to 9 g/litre, surface roughness initially decreases and then increases further with the increase of powder concentration. Dielectric fluid insulation strength decreases with the addition of electrical energy and Graphite powders in dielectric fluid results in gap widening between electrodes that stabilizes the discharge condition. Lower surface roughness, shallow craters are produced due to the reduced electrical density by the widened and enlarged discharge channel. More heat dissipation from electrode gap through dielectric fluid takes place because of increase in dielectric fluid thermal

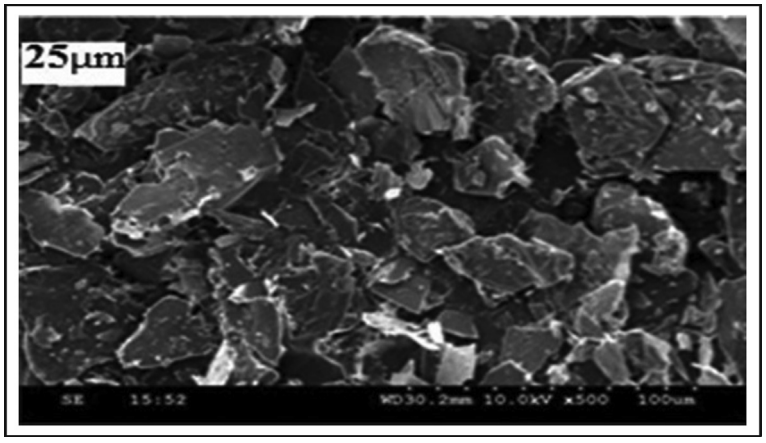

Fig. 2. Morphology of graphite powder.

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Table 3
Working range of the process Parameters and their levels.

Parameters	Units	Levels		
Discharge current (A)	Amps	10	15	20
Pulse on time (B)	μs	25	45	65
Pulse off time (C)	μs	24	36	48
Graphite powder concentration (D)	g/l	4.5	9	13.5

conductivity due to powder addition and also the thermal conductivity available in the work surface decreases [23]. With the Graphite powder combination increase from 4.5 to 9.0 g/lt, surface roughness is decreased and further Graphite powder combination increases from 9 to 13.5 g/lt increases Ra value marginally. Surface roughness is not significantly affected by the Graphite powder concentration from 9 g/l to 13.5 g/l. Table 6 and Fig. 4.

Fig. 4 indicates that minimum work surface roughness can be obtained when Ton is at 25 μs (level 1), T_{off} is at 24 μs (level 1), discharge current is at 10A at level 1 and powder concentration is at 9 g/litre at level 2. Table 6 shows input parameters influence on Ra from ANOVA of the data which is given. From Table 6 it is noticed that surface roughness is most significantly affected by the

Table 4
Average values of MRR, R_a, and Recast Layer Thickness (RLT).

Ex. No	A (Discharge Current) Amps	B (Pulse-On Time) μs	C (Pulse-Off Time) μs	D (Graphite Powder Concentration) g/l	*Avg MRR (mm3/min)	*Avg R_a (μm)	*Avg Recast Layer Thickness) (RLT) (μm)
1	10	25	24	4.5	2.5	2.14	8.04
2	10	25	36	9	2.212	2.126	8.9
3	10	25	48	13.5	2.277	3.641	10.109
4	10	45	24	9	3.057	2.001	8.25
5	10	45	36	13.5	3.681	4.211	8.9054
6	10	45	48	4.5	2.410	4.67	11.253
7	10	65	24	13.5	3.983	3.650	8.4
8	10	65	36	4.5	4.063	4.288	10.379
9	10	65	48	9	1.949	5.27	11.867
10	15	25	24	4.5	3.944	2.308	8.7
11	15	25	36	9	3.327	2.787	9.03
12	15	25	48	13.5	2.217	3.502	9.78
13	15	45	24	9	3.557	2.703	8.6945
14	15	45	36	13.5	4.276	3.657	11.19
15	15	45	48	4.5	4.089	4.33	11.44
16	15	65	24	13.5	5.111	4.25	10.295
17	15	65	36	4.5	6.788	4.495	11.804
18	15	65	48	9	3.223	5.56	11.515
19	20	25	24	4.5	5.029	3.505	9.88
20	20	25	36	9	4.147	3.221	9.5774
21	20	25	48	13.5	3.401	3.654	11
22	20	45	24	9	6.721	4.27	10.9
23	20	45	36	13.5	7.746	4.01	13.24
24	20	45	48	4.5	8.55	4.589	10.536
25	20	65	24	13.5	7.606	5.46	13.449
26	20	65	36	4.5	9.414	5.533	12.615
27	20	65	48	9	8.059	6.41	10.876

*Mean of three values

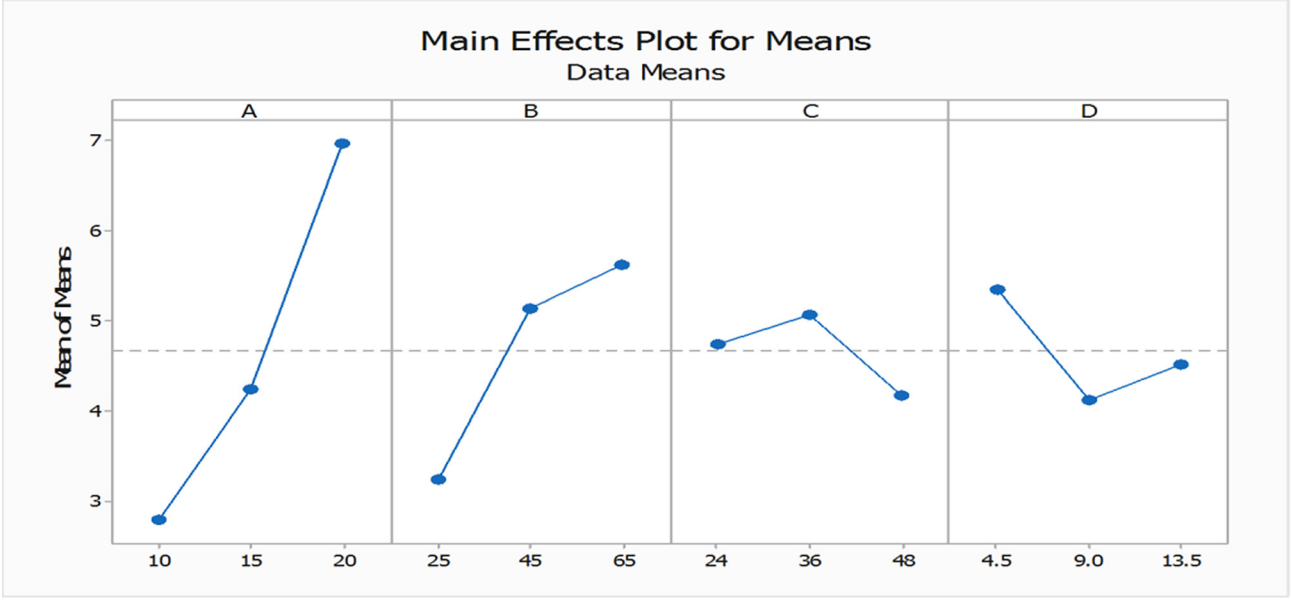

Fig. 3. EDM parameters on S/N Ratio of MRR.

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Table 5
Analysis of Variance (ANOVA) for MRR.

Source	DF	Seq SS	Adj SS	Adj MS	F -Ratio	P value	Percentage of Contribution (%C)
A (Discharge Current	2	276.095	276.095	138.048	147.91	0.000	56.02
B (Pulse-On-Time	2	89.435	89.435	44.718	47.91	0.000	18.14
C (Pulse-Off-Time)	2	26.554	26.554	13.277	14.23	0.005	5.39
D (Graphite Powder Concentration)	2	28.505	28.505	14.252	15.27	0.004	4.77
A * B	4	27.961	27.961	6.990	7.49	0. 016	5.67
A * C	4	13.107	13.107	3.277	3.51	0. 083	2.65
A * D	4	25.558	25.558	6.390	6.85	0.020	5.18
Residual Error	6	5.600	5.600	0.933			
Total	26	492.816					100

S = 0.9661 R^2 = 98.9% R^2(adj) = 95.1%

Table 6
ANOVA for SR (R_a).

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Percentage of contribution (%)
A (Discharge Current	2	27.223	27.2228	13.6114	28.57	0.001	14.10
B (Pulse- On-Time	2	92.903	92.9033	46.457	97.49	0.000	48.13
C (Pulse-Off-Time)	2	42.737	42.7369	21.3685	44.85	0.000	22.13
D (Graphite Powder Concentration)	2	5.082	5.0822	2.5411	5.33	0.0047	2.63
A * B	4	0.446	0.4459	0.1115	0.23	0. 909	0.23
A * C	4	14.629	14.6290	3.6572	7.68	0. 015	7.57
A * D	4	7.152	7.1518	1.7879	3.75	0.0073	3.70
Residual Error	6	2.859	2.8588	0.4765			
Total	26	193.031					100

S = 0.6903 R-Sq = 98.5% R-Sq(adj) = 93.6%

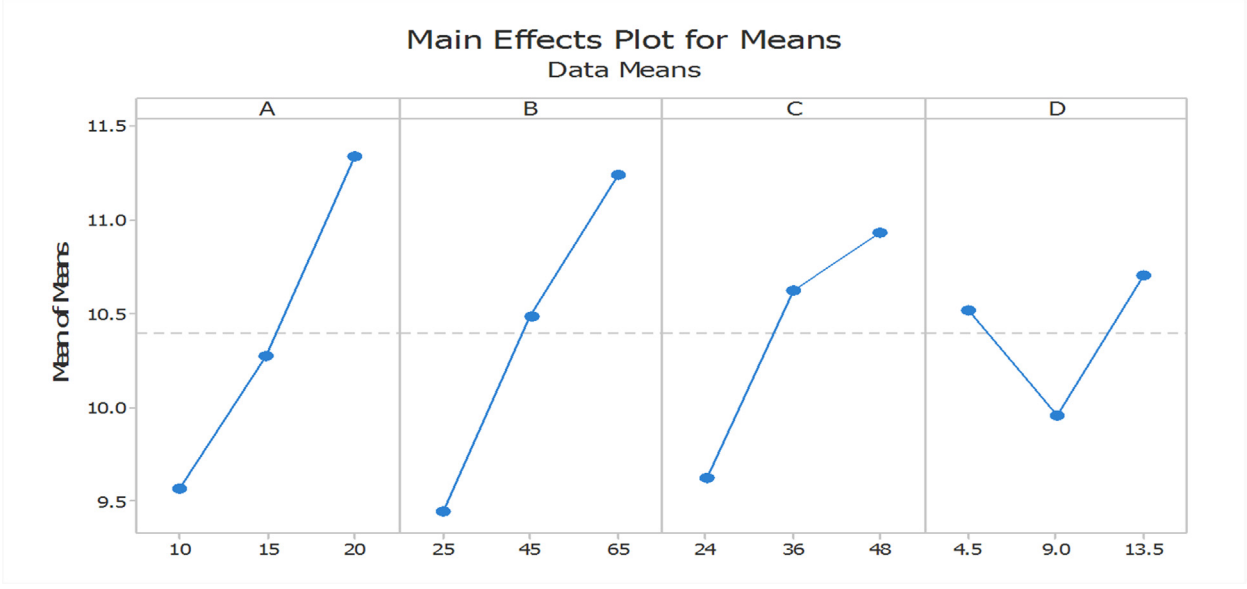

Fig. 4. Influence of EDM parameters on signal to noise ratio of Ra.

discharge current whereas other powder concentration doesn't have that much effect which is because of the interaction effect between the parameters. Ra values are predicted by developing the empirical model using nonlinear regression analysis. Equation (3) gives the regression equation of SR. The regression equation of Ra is presented is given in Eq. (3). The R^2 and R^2adj values are found to be 98.5% and 93.6% respectively. The R^2 and R^2adj is in the accepted range of values in predicting Ra value.

$$SR = 0.91 - 0.084A - 0.0079B + 0.0531C - 0.105D + 0.01215A2 + 0.000405B2 + 0.001256C2 + 0.00877D2 + 0.00143AB - 0.00607AC - 0.00336AD \quad (3)$$

3.3. Effect of process parameters on recast layer thickness (RLT)

EDM generated heat affected surface has upper layer called as recast layer, phase transformative zone and conversional zone in order given. SEM photo graphs are taken at the cutting machined zone at the edge of the machined surface to measure RLT for all the samples machined. Table 4 shows the RLT average values measured from SEM.

Fig. 5 and Table 7 indicates the parameters effect on the response. With the increase in discharge current, significant increase in recast layer thickness is noticed which can be due to more discharge energy generation causing unstable concentrated discharge resulting in dielectric flushing efficiency decrease in the gap. Also, more heat energy leads to increased molten metal

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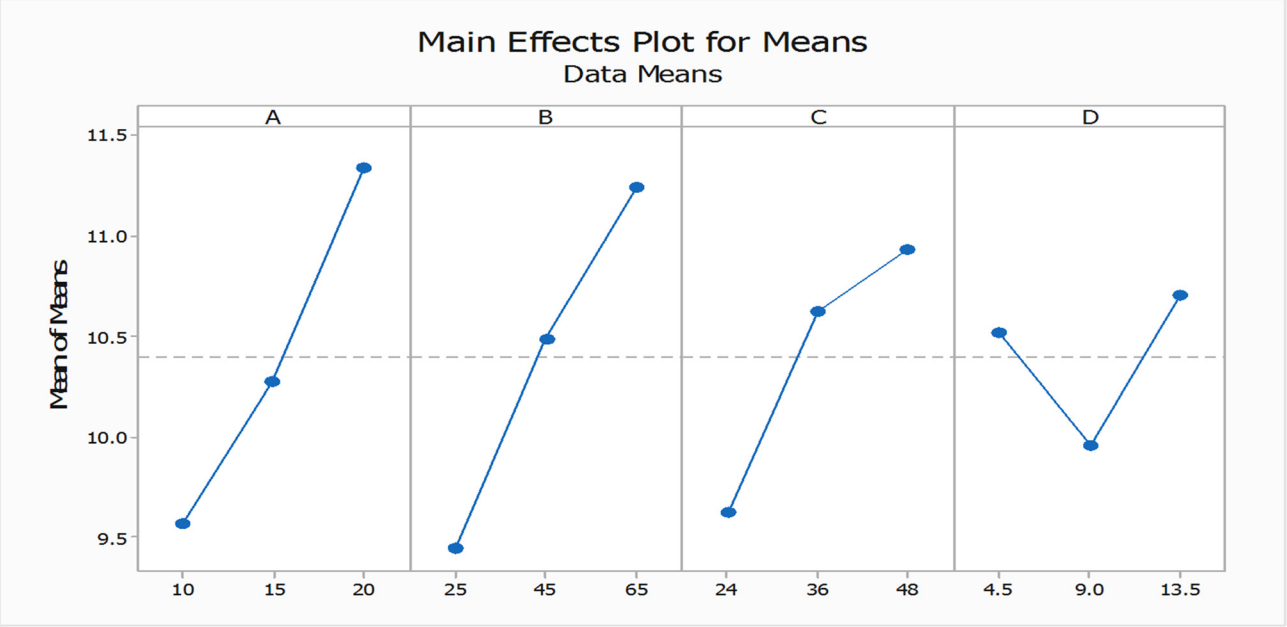

Fig. 5. Influence of EDM parameters on signal to noise ratio of RLT.

Table 7
Analysis of Variance (ANOVA) for RLT.

Source	DF	Seq SS	Adj SS	Adj MS	F	P	Percentage of Contribution (%)
A (Discharge Current)	2	10.1679	10.1679	5.08396	97.48	0.000	24.84
B (Pulse-On-Time)	2	9.8915	9.8915	4.94573	94.83	0.000	24.16
C (Pulse-Off-Time)	2	7.0165	7.0165	3.50826	67.27	0.003	17.14
D (Graphite Powder Concentration)	2	1.7927	1.7927	0.89633	17.19	0.003	4.38
A * B	4	0.6256	0.6256	0.15639	3.00	0. 0111	1.52
A * C	4	7.2974	7.2974	1.82435	34.98	0. 000	17.83
A * D	4	3.8222	3.8222	0.95554	18.32	0.002	9.33
Residual error	6	0.3129	0.3129	0.05215			
Total	26	40.9267					100

formation which decreases flushing condition that makes more re-solidified material resulting in the increase of white layer thickness.

As the pulse on time increases from 25 μs to 65 μs, the RLT also increases almost linearly. This is due to the fact that at longer pulse on time, the material removed in vaporized form remains in same state for longer duration of time and effectively flushed away.

SEM values are observed from Table 4 RLT decreases with increase in powder combination from 4.5 g/lt to 9 g/lt and increases with further enhancement in powder combination from 9 to 13.5 g/lt. RLT reduces due to decrease in amount of heat available at work piece, this accounts by lower single spark discharge energy and increased spark frequency with the addition of Graphite powder in dielectric fluid. Recast layer thickness increases with increase in concentration of powder in dielectric up to 9 g/lt to 13.5 g/lt. It can be observed that RLT value is minimum when Graphite powder combination is 9 g/lit i.e. Level 2, T_{on} at 25 μs (level 1), discharge current at 10 A (level 1), T_{off} at 24 μs (level 1). Mathematical model of RLT (response variable) is developed by nonlinear regression analysis which is given in Eq. (4). The values R^2 and R^2_{adj} are in acceptable range which is 91.70% and 85.62% respectively.

However, R^2_{adj} (85.62%) is low due to the inclusion of insignificant parameters in the model. Further, we can predict RLT using by Eq. (4).

$$RLT = 1.02 + 0.138A + 0.0414B + 0.445C - 0.945D + 0.00729A^2 - 0.000361B^2 - 0.00243C^2 + 0.0324D^2 + 0.00240\,AB - 0.01438\,AC + 0.02561\,AD \quad (4)$$

4. Confirmation experiments for influence of drinking water and Graphite powder concentration on electrical discharge machining of Ti-6Al-4V alloy

Material removal rate, surface roughness and recast layer thickness predicted values were confirmed. Table 8 represents the data of confirmation experiments, compared with respective prediction values and the deviations of prediction results.

5. Conclusions

Based on the experimental results in the present work, the following conclusions are drawn:

1. In the case of drinking water with Graphite powder addition, the maximum MRR is 10.567 mm^3/min. The optimum condition of MRR is 10.567 mm^3/min at $A_3B_3C_2D_1$ (discharge current (I) at 20A, pulse on time (T_{on}) at 65 μs, pulse off time (T_{off}) at 36 μs and Graphite powder combination at 4.5 g/l).

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Table 8
Prediction and experimental results of MRR, SR, and RLT at various optimum conditions.

SNO	Optimum parameters				Optimum response	Optimum condition	Predicted value	Experiential value	% of Error
	A (Discharge Current)	B (Pulse On-Time)	C (Pulse Off-Time)	D (Graphite Powder Concentration)					
1	20	65	48	4.5	MRR (mm^3/min)	$A_3B_3C_2D_1$	9.64352	10.567	9.57
2	10	25	24	9	SR (μm)	$A_1B_1C_1D_2$	1.2545	2.231	7.78
3	10	25	24	9	RLT (μm)	$A_1B_1C_1D_2$	7.78446	8.432	8.31

Average of three values

2. The minimum surface roughness is during EDM of Ti-6Al-4V is observed to be 2.231 μm at $A_1B_1C_1D_2$ (discharge current (I) at 10A, pulse on time (T_{on}) at 25 μs, pulse off time (T_{off}) at 24 μs and Graphite powder concentration at 9.0 g/l).
3. The minimum recast layer thickness is 8.432 μm during EDM of Ti-6Al-4V is observed at $A_1B_1C_1D_2$ (discharge current (I) at 10A, pulse on time (Ton) at 25 μs, pulse off time (Toff) at 24 μs and Graphite powder concentration at 9.0 (g/l)
4. When powder concentration is 9 g/lt SR value attains maximum, below that concentration SR increases and then decreases with increase in concentrated powder to 13.5 g/lt.
5. RLT value decreases with Powder combination from 4.5 to 9 g/lt and further enhances with improvement in powder concentration from 9 g/lt to 13.5 g/lt.
6. Based on the results, ANOVA analysis, discharge current is found to be most significant parameter affecting MRR, SR, and RLT. However, powder concentration is having less significance
7. Optimal parametric settings were found for all performance characteristics. Corresponding optimum response values are calculated and also confirmation experimentation was managed at particular optimum parametric location to check predicted optimal value. The matching % error values were estimated and the values are in the range of 7.78% to 9.57%.
8. Different Graphite powder concentration in drinking water is used as the input process parameter, the optimal level of Graphite powder found to be as 4.5 g/l is sufficient to maximize the MRR and 9.0 g/lt to reduce the SR and RLT.

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Reinforcing Adhesive Plastic-Coated Grins through FRP Compounds

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Abstract: ***This paper portrays the strategy for upgrading the vitality and solidness attributes of wooden and diverse wood basically based glulam frameworks. The need for fortifying structures - timber frameworks comprehensive – is because of weakening through additional transporter use, age and the need for economical advancement done by utilizing turning away destruction and re-creation. Fortified FRP Composite substances were shown to be a viable chance to regular steel plate reinforcing techniques for solid frameworks from results of a determination of scientists during the last two numerous years; this paper investigates utilizing this material for same fortifying reason in timber structures. The sum total of what examples had been inspected underneath 4 factor bowing at a stacking addition pace of 0.5kN, the horizontal diversion had been recorded much of the time. The information preparing comprised of burden, diversion and second shape plots creation which were then utilized for assessment and perceptions.***

Keywords: Reinforcement; CFRP; Adhesive; Grins; Compounds.

I. INTRODUCTION

Timber while contrasted with other generation materials including solid, metallic and block, has one of a kind plastic qualities and thus might be strengthened in the strain zone to effectively use its compressive attributes [1]. In current years logical examinations had demonstrated utilizing fiber reinforced polymer (FRP) composites on the grounds that the most extreme promising innovation for fixing, fortifying or retrofitting existing frameworks to oppose better hundreds and to amend broken flexural auxiliary variables [2]. For maintainable advancement it's been set up that reestablish and retrofit be contemplated sooner than a choice is made to refresh a shape [3]. It is additionally less time eating to fix than to refresh, diminishing supplier interference periods. In the equivalent yr, past to above, posted a paper on prestressed FRP sheets as outside fortification for timber patrons [4]. Likewise referenced the wet blanket conduct of FRP- reinforced wood [8-10]. Examined the power and firmness of wood pillars fortified with carbon fiber and glass fiber composites [5] that equivalent year posted work they'd accomplished at the auxiliary portrayal of half breed FRP-glulam boards for scaffold decks. In 2003 [6] considered the plan of (FRP) Strengthened wooden bars. A methodology for flexural support of antique wooden bars with CFRP substances [7] contemplated the fix of wooden heaps the utilization of pre-assembled FRP composite shells. In 2006 [8] contemplated the results of routinely attaching FRP strips to timber people as a fortifying trademark. That indistinguishable a year, [9] took a shot at a couple glulam givers supported via carbon fiber fortification by methods for first taking strolls haul out keeps an eye on four sets of glulam givers at uncommon tying down lengths; 100, one hundred fifty, 200 and 250mm at that point performing four factor bar tests on ten glulam pillar examples the utilization of close to floor set up fortifications (NSMR) as the fortifying texture [10-13]. This paper depicts a test investigate variable width on remotely fortified carbon FRP supported glulam shaft members.

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II. MATERIALS USED

1) Plywood

The strengthened glulam texture comprised of twenty-four compressed wood bar areas, arranged for trial flexural giving it a shot; examples had been cut in lengths of 400mm with four particular widths fluctuating among 50, a hundred, one hundred fifty and 200mm. The thickness of the handle fabric utilized wound up 25mm [14].

2) Carbon FRP

The sheet is furnished with groundwork and overlaying gums and organization a piece of the Selfix Carbofibe Externally Bonded Reinforcement System [15].

Table 1: Mechanical Properties of the CFRP Used

Mechanical Properties	Mean value
Ultimate tensile strength (MPa)	1900.0
Elastic modulus (GPa)	222.5
Ultimate strain capacity (%)	0.9

III. SPECIMEN PREPARATION

The compressed wood constituents were diminish to sizes comprising six shaft individuals for every width and gutted off with the helpful asset of a pointy sand paper to make certain a level, uncontaminated and degreased floor [16]. Saw earth particles were expelled with the asset of a hand vacuum purifier [17]. In like manner, the CFRP strengthening texture become sliced to the equivalent widths as the pillars anyway at a

term of 300mm and vacuumed prepared for solicitation [18].

IV. TEST PROCEDURE

A picture of the sunbeam assessment procedure is placed in Fig. 1. The mid-span dislodgment was leisurely through the utility of a knob instrument situated at the sunbeam middle line [19-21].



Fig. 1 – Beam investigate game plan.

The bars have been stacked to disappointment at the 4 point twisting investigate gear; the heap additions had been 0.5kN.

V. TEST RESULTS

Any reasonable person would agree that with most fortifying techniques there will in general be an ideal point of confinement whereby any expansion in support never again gives the ideal impact as far as expanded execution [22]. Accordingly, look into specialists set aside some effort to break down test results to decide the ideal support level with an end goal to improve structure as shown in fig.2; this is a critical disclosure and reveals to us that any further increment in width never again brings about a productive increment in burden bearing limit. It is believed that further investigation into this region is legitimate [23-25].

Table 2: Normal failure freight and refraction consequences after trials

Specimen Description	Average Failure Load	Average Deflection at Failure
50x25x400mm control	3.00kN	4.38mm
50x25x400mm CFRP	3.75kN	3.11mm
100x25x400mm control	6.00kN	3.36mm
100x25x400mm CFRP	8.50kN	2.68mm
150x25x400mm control	8.00kN	2.54mm
150x25x400mm CFRP	12.00kN	2.49mm
200x25x400mm control	12.00kN	3.39mm
200x25x400mm CFRP	16.00kN	2.91mm

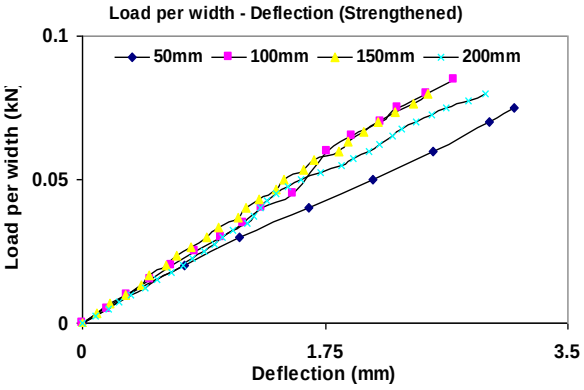

Fig. 2 – Load redirection diagram for CFRP strengthened employ bars

VI. CONCLUSIONS

This paper has displayed test results planned for setting up the adequacy of CFRP composite frameworks flexural fortifying of glulam bars. Four elective width estimations for the overhauling framework have been examined. In all cases, a similar cement plan was utilized in one single activity, which included lay-up, utilization of vacuum and holding of the CFRP layer. Each of the twenty-four compressed wood pillars were exposed to four-point stacking and the overhauled utilize bar widths came to and surpassed the plastic breakdown heap of like-width un-fortified handle bars. The widths of somewhere in the range of 100mm and 150mm showed the best increment in burden bearing limit when reinforced with the one layer CFRP. Further examinations are as of now sought after to look at different shaft widths, reinforced with more than one layer of CFRP composites wanting to further improve the bar properties.

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Observation of Different Experimental Parameters Effect using Friction Stir Welding Through Simulation of Tailor Welded Blanks

Aruna Jyothi Anumula

Abstract*: *In the present scenario, the industries of automobile are focusing in decrease in the weight of the automotive body by using which we can increase the efficiency of fuel orally. Many researchers are working keeping this as motto, many joining techniques and engineering materials are used to decrease the decrease in weight for increasing the fuel efficiency. By synchronizing this, there is a technique called tailor welded blanks (TWB) is recommended highly by many automobile industries and researchers have been chosen this technology. In the current work, the motto is the behavior of forming in the TWBs using the process of friction stir welding (FSW) in two welding speeds (90 mm/min and 100 mm/min). The simulations of forming were conducted using the test called limiting dome height (LDH). Eight strain paths were considered for the simulation with maximum size of 200×200 mm to minimum size of 25×200 mm. The base metal Forming limit diagrams, the sheets of FSW are plotted and compared. From the results of simulation, it has noted that base material has lesser formability than FSW sheets. At 100 mm/min welding speed, FSW sheet fabricated and has noted increasing the formability than the welding speed of FSW sheet at 90 mm/min.

Index Terms*: *FSW sheets, Forming limit diagram, speed of welding.

I. INTRODUCTION

The new joining process in solid-state called Friction stir welding (FSW) has been developed at The Institute of Welding in 1991. Now a day's FSW process took the lead to join the non-ferrous materials in addition to advanced high strength ferrous material. This process involves many process parameters, especially tool related and welding parameters plays a vital role during the joining [1],[2](Mishra and Maa (2005) and Nandan et al. (2007)). There were many studies carried out on the process parameters effect on joint formation, mechanical properties compared to base metals, microstructure analysis over different zones, formability of FSW sheets etc, on the different materials.

A few formability studies based on numerical and experimental analysis were carried out on the sheet of FSW made of aluminum alloys and concluded that FSW sheets are having better formability than base metal. For example, Lee et al. (2009) estimated the results of formability of Tailor weleded blank FSW, via experiments and simulation of numerical. In that work, they took blanks of FSW made of, 5083-H18, 6111-T4, 5083-O, AZ31 magnesium alloy sheet materials and dual-phase steel (DP590). The increased ductility in the weld aid the results of AA5083-O, AA5083-H18, and AZ31 Tailor welded blank sheets. Similar work (Chung et al. (2010) and Kim et al. (2010)) was accomplished to look into the performance of formability for four automotive sheets, viz.,5083-H18, 6111-T4, 5083-O, DP590 and 5083-O steel sheets, each having one or two varying thicknesses. Kim et al. (2010) studied the formability performance in FSW aluminum alloy 6111-T4 sheet with 1.5 mm thickness with respect to material directional combination. They compared the material direction combinations in three different types.

Recently Janaki Ramulu et al. (2013 b) carried out an initial investigation on the effect of tool rotation speed and welding speed on the formability of Friction Stir Welding sheets made of AA 6061. Based on the experimental data the current work aimed the speed of welding effect on the formability of Friction Stir Welding sheets and compared with base material formability. The two levels of the speeds of welding (90 mm/min and 100mm/min) experimental data have considered at which better weld properties are seen from Ramulu and Ganesh (2013) research work.

II. METHODOLOGY

A. Base material and friction stir welded blanks mechanical properties

For the present work, AA6061 aluminum alloy base material and FSW fabricated at two different welding speeds was considered. The base material mechanical properties and FSW blanks were shown in the Table.1. All the properties were taken from the available literature (Ramulu et al. (2013 a, b, c) and Ramulu and Ganesh (2013)).

B. Modeling of limit dome height test simulation

In a test of Limit Dome Height (LDH), the sheet was deformed by a hemispherical punch with diameter of 101.6mm inside a die opening diameter of 105.7mm. Simulations were performed for eight strain paths with sheet dimensions of 200x200, 175x200, 150x200, 125x200, 100x200, 75x200, 50x200 and 25x200mm. The required tools for Limit Dome Height test are die, punch, blank holder, draw bead and blank generated in a CAD package Solid Works and meshed in PAM STAMP 2G using Delta Mesh facility. The base material contains elements of quadrilateral shell in Belytschko–Tsay formulation

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Table. 1 AA 6061 Base material and friction stir welded (FSW) blanks mechanical properties

Blank	FSW parameters	Yield Strength (σ) (MPa)	N	K (MPa)	R0	R45	R90
Base Material	--	0.271	0.1	0.42	0.79	0.95	0.851
FSW 1	TRS: 1400 rpm Welding Speed: 90 mm/min Plunge depth: 1.9 mm Shoulder Diameter: 18 mm	0.182	0.3	0.535	1	1	1
FSW 2	TRS:1400 rpm Welding Speed: 100 mm/min Plunge depth: 1.9 mm Shoulder Diameter: 18 mm	0.184	0.28	0.535	1	1	1

with five through-thickness points of integration. Hill's and Holloman's strain hardening law 1948 isotropic hardening yield criterion used as the plasticity model. Throughout the simulation the same size of mesh 1mm was used. It was found that necking criterion is sensitive to size of mesh and limit strain is optimum to the mesh size of 1–5mm is based on the thickness gradient. Throughout the study the constant coefficient of friction μ taken as 0.2. The force of Blank holder (100kN) was taken in such a way that neither the blank tears nor draws in near draw beads during the prediction of forming.

A. Failure criterion and Forming limit diagram (FLD) construction

The obtained displacement at failure can be from the gradient of thickness – based necking criterion. The necking in the sheet metal occurs when the gradient of thickness (ratio of thickness of nearest elements or circles) falls below 0.92. Here the ratio of thickness is equals or less than 0.92 are taken as necked elements (Ramulu and Ganesh (2011)).

Major limit strain and minor limit strain were evaluated from the deformed sheets using TGNC during simulation for each steel grade sheets. According to the TGNC the ratios of the two meshing elements thickness is calculated and major strain and minor strain were considered where thickness ratio 0.92 or lesser has obtained. For constructing FLD, on y-axis major strain values and on x-axis minor strain values were taken. FLD was plotted by joining these limit strain co-ordinates. This procedure was followed for all the materials.

III. RESULTS AND DISCUSSION

A. Forming limit diagrams (FLD)

A FLD is used in forming of sheet metal for estimating the sheet metal forming behavior. The diagram seeks to give a graphical description of material failure tests, such as a limit dome test. In FLD, there are two important zones called as drawing side and stretching side. In this work three FLD are constructed from the LDH simulation test results.

B. Base material FLD

Fig.1 shows the forming limit diagram of the base material. It is observed that FLC is slight decreased towards the in-plane stretching from the drawing side whereas it increased towards stretching side. The minimum major strain is noted at plane strain i.e. 100x200 mm strain path as 0.0653 mm and maximum major strain is at biaxial stretching i.e. 200x200 mm as 0.315 mm. in whole formability of the base material is increased in the stretching zone as compared to the drawing zone.

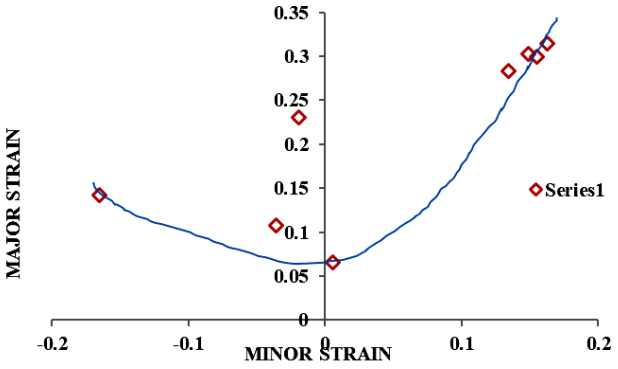


Figure 1 Forming limit diagram of AA 6061 base metal

C. FSW blanks FLD

Fig.2 & 3 shows the FLD's of the Friction Stir welded sheets made of AA 6061. Fig.2 is made the speed of welding at 90 mm/min whereas 100 mm/min is of Fig. 3.

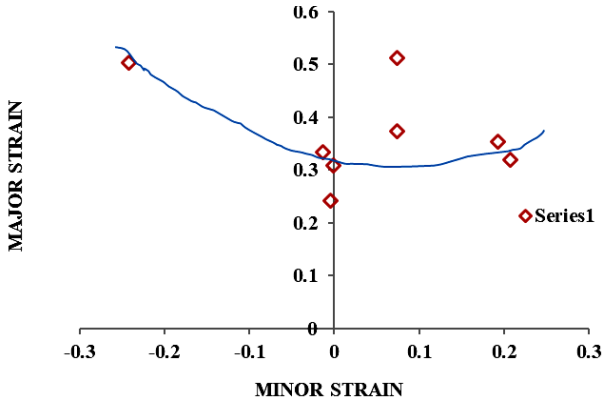


Figure 2 Forming limit diagram of FSW blanks fabricated at 90 mm/min welding speed; 1400 tool rotational speed; 1.9 mm plunge depth using 18 mm shoulder diameter

It is clear that drawing side and stretching FLC is almost similar in Fig. 2 and minimum is reported at the plane stain zone as 0.26 mm and maximum at 0.511 mm at biaxial stretching.Whereas in the other FSW condition, it is seen that drawing zone to stretching zone forming was come down as shown in Fig.3.

maximum major strain is noted as 0.64 mm for 25x200 mm strain path and minimum is at plane stain zone as 0.299 mm.

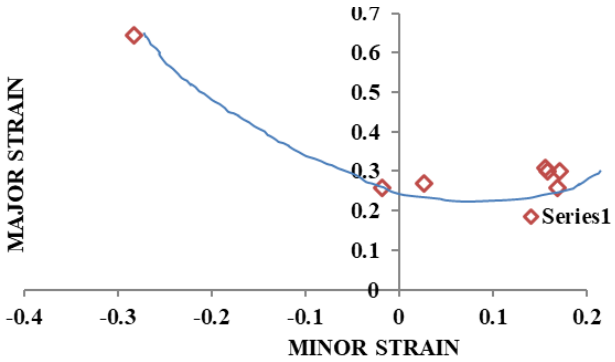
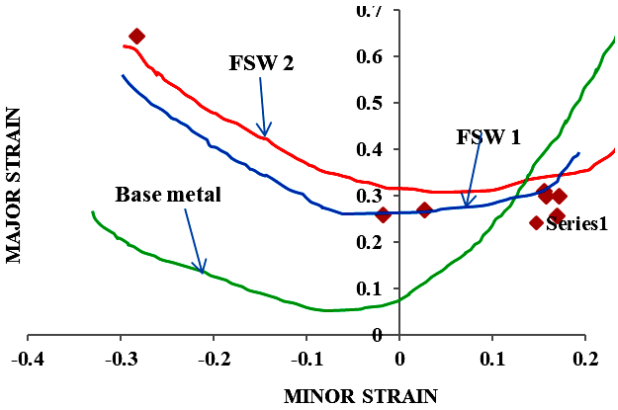


Figure 3 Forming limit diagram of FSW blanks fabricated at 100 mm/min welding speed; 1400 tool



rotational speed; 1.9 mm plunge depth using 18 mm shoulder diameter

Figure 4 Comparison of three FLCs

D. FLD's comparison

The comparison among the three FLC's is made in the Fig.4. It is clear that formability of base is showing the less formability than FSW sheets forming. FSW1 is showing better formability in stretching side whereas FSW2 is better in the drawing side. The overall formability is for FSW1 than other two FLC's. it indicates that by increasing the speed of welding for FSW joints, the formability will come down.

IV. CONCLUSIONS

From the current numerical simulations, the conclusions are drawn in the following way.

- From the forming limit diagram of the base material, formability is increased when strain path width is increased. The same observation is noticed in other FSW sheets also.
- The overall formability of base material is less compared to the FSW sheets.
- The formability of FSW sheet is better at 90 mm/min than the FSW sheet at 100 mm/min
- By increasing the welding speed of the FSW sheets, formability is decreased.

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Full length article

Assessment of dynamic properties of hybrid ribbon reinforced multifunctional composite sandwich plates: Numerical and experimental investigation

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ABSTRACT

This study investigates numerically and experimentally the effect of longitudinal ribbon reinforcement in conventional honeycomb structure on the various dynamic characteristics of a hybrid composite sandwich plate. Longitudinal strips are considered to be embedded along the transverse directions at various locations of a honeycomb core material without and with carbon nanotubes (CNT) reinforcement in a composite sandwich plate. The governing differential equations of motion of the various hybrid honeycomb composite sandwich plate configurations with strips inserted in conventional honeycomb structures as core layer having top and bottom face composite layers are derived using higher order shear deformation theory (HSDT) and solved numerically using a four noded rectangular finite element. Further, experimental investigations are performed by fabricating the various strips embedded hybrid honeycomb core material with and without CNT reinforcement to evaluate the shear and loss moduli using the alternative dynamic approach. The efficacy of the developed finite element formulation is demonstrated by comparing the experimental and numerical results obtained in terms of natural frequencies and loss factors for the various prototypes of honeycomb composite sandwich plates. Also, the effect of variation in CNT content and thickness of longitudinal ribbon reinforcement in conventional honeycomb core material and ply orientation of the face sheets on the various dynamic properties of hybrid composite structures are studied under various end conditions. This study proposes that the ribbon reinforcement location and the addition of CNTs in honeycomb core materials strongly influence the stiffness, damping and transverse vibration displacements of the ribbon reinforced hybrid composite sandwich plates.

1. Introduction

An increasing demand for the development of efficient, cost effective, corrosion resistant and reliable materials is being widely realized to control the vibration in various transportation modes where the structure needs to be stiff and lightweight. Such a structure can be made by reinforcing the strips in conventional honeycomb core materials in the sandwich configuration. The environmental fatigue and excessive vibration in those structures are controlled adequately by enhancement of damping with CNT reinforcement in honeycomb core materials without any significant change in weight of those structures. This is due to the fact that the distribution of CNT randomly in honeycomb composites increases the shear force between the resin matrix and nanoparticles. These structures have better load carrying capacity that are being realized due to their demand in various industrial applications to tailor the stiffness and damping properties under various dynamic environments. The effects of fiber type, resin quality, number of stacking layers, ply orientation, type of core material and variation in core thickness could influence the vibration frequency spectrum of the composite sandwich plates.

Schwingshack et al. [1] investigated numerically and experimentally the transverse shear properties of orthotropic sandwich panel with aluminum honeycomb core using the alternative dynamic approach method. It was observed that the shear modulus along longitudinal and transverse directions could improve the dynamic properties of the structure. Nia and Sadeghi [2] examined experimentally the mechanical characteristics of honeycomb sandwich structures with and without usage of soft flexible foam in honeycomb pattern as core materials. It was seen that the effectiveness of the cell size, thickness of hexagonal walls and panel of the core structure filled with soft foam could

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influence the capacity of energy absorption, average crushing strength, and wavelength over the core without foam reinforcement. Sadowski and Bec [3] investigated numerically the static and dynamic responses of polymer foam-filled aluminum honeycomb core sandwich plates. It was shown that the honeycomb core filled with foam could improve the eigenvalues of the sandwich structure. Natarajan and Manickam [4] analyzed the free vibration and flexural responses of a sandwich plate made of FGM viz., metallic and ceramic face sheets and core materials under thermal and mechanical loadings using HSDT. It was concluded that the increase in the volume fractions of metallic and ceramic material could influence the flexural stiffness of the sandwich plate. It was also seen that the increase in core thickness could decrease the displacement and stresses developed in the structure. Zhen et al. [5] presented numerically the free vibration responses of composite sandwich plates. It was seen that the C^0 finite element in HSDT are more accurate in predicting the dynamic responses than those of three dimensional elasticity solutions. Stocchi et al. [6] observed numerically and experimentally the effectiveness of the sandwich structure with the honeycomb core made of natural fabrics. It was seen that the jute reinforced honeycomb cores significantly improves the elastic properties and sustains the compressive static loads. Han et al. [7] presented numerically the effectiveness of the sandwich honeycomb core with hybrid corrugation made of aluminum materials. It was observed that combined aluminum honeycomb corrugation could improve not only the compressive strength but also the energy absorption. Liu et al. [8] examined experimentally and theoretically the bending failure behaviors of composite sandwich structures with pyramidal truss core made up of metallic material under the thermal environment. It was observed that the bending failure load could be decreased with increase in temperature due to the degradation of properties of the resin and fiber-resin interface. Liu et al. [9] studied experimentally and analytically the mechanical responses of the composite sandwich structures with Y-shaped core layer made up of CFRP composites. It can be observed that the specific strength of composite sandwich structure with Y-shaped CFRP core layer is greater than that of the Y-shaped steel core layer.

Lu and Meng [10] investigated numerically and experimentally the dynamic responses of electrorheological (ER) fluid composite sandwich plate. It was observed that the natural frequencies and modal damping of the sandwich plate are significantly increased by the applied electric field. Hasheminejad and Maleki [11] presented the free and forced vibration responses of composite sandwich plate with ER fluid. It was seen that the natural frequencies and damping of the sandwich plate are greatly influenced by increasing the applied electric field than the thickness of core layer. Eshaghi et al. [12] reviewed the dynamic responses of fully and partially treated ER/Magnetorheological (MR) sandwich structures. It was concluded that the partially treated low density sandwich structures could provide better stiffness and damping properties than those of the fully treated ER/MR sandwich structures. Further, the semi active controllers could attenuate the resonant deflection of the sandwich structures while the active controllers could suppress the complete vibration of the adaptive structures. Manoharan et al. [13,14] examined numerically and experimentally the dynamic responses of fully and partially treated MR fluid sandwich composite plate. Yeh [15] presented numerically the vibration responses of sandwich plate with magnetorheological elastomer under various magnetic fields. The results revealed that the modal loss factors and natural frequencies of the sandwich plate are greatly influenced by the magnetic field intensities. Vemuluri and Rajamohan [16] presented numerically and experimentally the vibration responses of the tapered sandwich composite plate with MR elastomer as the core material. It was seen that the frequencies and damping ratio could be enhanced due to the changes in taper angle of the face layers, variations in aspect ratio, and variation in the ply orientations at the face layers of MRE sandwich plate in addition to the application of external magnetic field intensities over the structures. Vemuluri et al. [17] investigated numerically the optimal layout of partially treated magneto rheological elastomer composite sandwich plate under various magnetic fields. It was observed that the natural frequencies and loss factors of the sandwich plate are greatly influenced by the location of MRE pockets under magnetic field intensities. Arumugam et al. [18] investigated numerically the vibration and instability analysis of the MR sandwich composite plate. It was noticed that the primary and secondary instability regions could be altered due to the increase in magnetic field. Even though many investigators have analyzed the various core layer materials such as aluminum based honeycomb patterns, MR fluid and MR elastomer, the usage of these materials is limited due to their limited viscoelastic and damping characteristics and external power requirements. After the discovery of CNT by Iijima [19] in 1991, their unique physical properties have brought a huge attention from numerous designers to develop CNT reinforced hybrid composite materials to achieve the enhanced elastic and damping properties of the structures.

Thostenson et al. [20] reviewed the recent developments made in the hybrid composite materials with reinforcements of nano particle, nano platelet, nano fiber, and CNT in the traditional fiber composites. It was concluded that CNT reinforced nanocomposites are more effective materials than those of other fillers due to their superior physical and mechanical properties. Lehman et al. [21] reviewed the effectiveness of dispersion of nanoparticles, bonding between CNTs and composites, and the chemical functionalization on the characteristics of CNT reinforced polymer composite materials. It was concluded that the mechanical properties of nanocomposite are significantly influenced by the weak bonding, dispersion and functionalization of CNT reinforcements in composites. Singh et al. [22] studied the effectiveness of aspect ratio of CNTs on the stiffness of the composite and identified that the longer CNTs (length $>$ 350 μm) in epoxy composite material have better elastic properties than those of shorter CNTs in epoxy composite. Zhou et al. [23] observed a significant increase in damping factors of the composite structures with least amount of CNT reinforcement in the polymer composite. Various investigations have demonstrated that the random dispersion of multi-walled CNT in the composite could enhance the transverse shear, flexural behavior, damping and thermal characteristics of the hybrid composites [24]. Khan et al. [25] demonstrated experimentally the significant increase in the damping characteristics of carbon fabric reinforced composites with the reinforcement of 0.5% and 1% wt. of nanoparticles in the composite material.

Rahaman and Kar et al. [26] examined the dynamic characteristics of CNT coated glass fabrics reinforced polymer based composite structures. It was observed that the CNT coated fibers could increase the storage modulus and glass transition temperature of the composite materials. Jakkamputi and Rajamohan [27] observed experimentally the modal vibration responses of glass fiber reinforced polymer (GFRP) composites with and without 0.5 wt% of CNT reinforcement in a composite laminate exposed to higher thermal environment. It was seen that the natural frequencies decrease while the damping ratios increase by increasing temperature. Praveen et al. [28] investigated experimentally the material, mechanical and dynamic characterization of GFRP composites without and with 1 wt% of CNT reinforcement. The results revealed that the elastic properties, natural frequencies and damping factor of CNT-GFRP composites are higher than those of the GFRP without CNT reinforcement.

Nagasankar et al. [29] investigated theoretically and experimentally the dynamic responses of the propylene honeycomb sandwich structures. It was observed that the transverse shear damping could be improved significantly with increase in thickness of core layer. Zhou et al. [30] investigated analytically and numerically the dynamic responses of honeycomb sandwich composite plate filled with viscoelastic damping material. It was demonstrated that stiffness could be influenced not only by the thickness of aluminum reinforcement but also with the inner angle of the honeycomb geometry. Droz et al. [31] presented numerically and experimentally the vibration characteristics of sandwich composite plate with Nomex honeycomb core layer. The

results revealed that the Young's modulus and shear modulus obtained from the inhomogeneous wave correlation method using vibration technique is more accurate and closer to the existing mechanical test results. Dai et al. [32] examined numerically and experimentally the vibration behavior of honeycomb sandwich plates. It was shown that the resonant response frequencies are significantly increased by the increase in thickness of the face layers. Zhang et al. [33] studied numerically the dynamic responses of honeycomb sandwich plate under cantilever boundary conditions. The results revealed that the chaotic, periodic and multi-periodic motions are existed in the cantilever sandwich plate when subjected to in-plane and transverse excitations. Bai et al. [34] presented numerically and experimentally the vibration responses of a composite sandwich structure with Nomex honeycomb core under thermal environment. The results revealed that the natural frequencies decrease while the damping ratios increase with the increase in the glass transition temperature. Praveen et al. [35] made an effort to investigate numerically and experimentally the vibration responses of multifunctional hybrid honeycomb-based composite sandwich plate. Even though various researchers have studied the performance of various hybrid sandwich structures, an effective passive vibration control mechanism with adaptable damping could be accomplished by reinforcing the ribbon based honeycomb composite in critical parts of a huge structure.

In this study, the dynamic responses of the various types of ribbon reinforced hybrid honeycomb composite (RHC) sandwich plate are investigated. Various ribbon reinforced glass fiber polymer composite honeycomb core material with and without CNT reinforcement as the core layer and top and bottom face sheet layers of composite plates are considered. The governing differential equations of motion of the various hybrid honeycomb composite sandwich plate configurations are derived using higher order shear deformation theory (HSDT) and solved numerically using the rectangular finite element (FEM) with nine degrees of freedom at each node. Further, the mechanical properties of various honeycomb core materials with and without CNT reinforcement and composite face sheet materials are experimentally evaluated using the alternative dynamic approach. The effectiveness of the developed FEM formulation is validated by comparing the results in terms of natural frequency and loss factor obtained experimentally on the various prototypes of composite sandwich plates. Also, various parametric studies are performed to study the effects of variation in CNT wt% and thickness of core material on the dynamic characteristics of honeycomb composite sandwich plate. Further, the forced vibration responses of three different configurations of hybrid honeycomb composite sandwich plate under harmonic excitation are analyzed at various wt% of CNTs to demonstrate the efficacy of CNT reinforcement and embedment of strips in the conventional honeycomb core materials in enhancing the stiffness and damping properties of sandwich structures simultaneously and attenuate the transverse deflection.

2. Mathematical modelling of ribbon reinforced honeycomb core hybrid composite sandwich plates

A novel sandwich composite plate comprising honeycomb core reinforced with ribbon sheets as the middle layer and the laminated composite as the top and bottom face sheets are considered for the development of mathematical modelling based on higher order shear deformation theory [35]. Further, CNTs are considered in the core material of the sandwich plate. Since the composite core material is commonly soft but stiff in shear, the Young's moduli of the honeycomb core material is considered to be negligible than those of the face layers of composite. The normal stresses acting in the composite honeycomb layer are also neglected. The top and bottom layers of the hybrid honeycomb sandwich plate consist of many layer (composite plies) and are modelled as an equivalent single layer theory as shown in Fig. 1 (a) & b)).

Fig. 1 represents the three different configurations of a hybrid sandwich composite plate of length L and width B with ribbon reinforcement at various locations viz., single ribbon reinforced between the two hexagonal pattern (RHC 1), single ribbon reinforced along and between the hexagonal pattern (RHC 2) and double ribbon reinforced along and single ribbon between the hexagonal pattern (RHC 3) of honeycomb structure. Further, the ribbon and hexagonal pattern core materials are considered to be reinforced with CNT. The top and bottom face layers of the sandwich plates are made of orthotropic materials. The composite face layer thicknesses, h_t and h_b and honeycomb layer thickness, h_c are considered to be very small compared to their length L and width B of the complete sandwich plate. The slip between composite face sheet and honeycomb core layers is ignored. All composite layers in the top and bottom face sheets are considered to be well bonded together. The damping due to the composite face layers is assumed to be negligible and the energy dissipation in the core layer is assumed to exist due to the transverse shear only. Furthermore, the transverse displacement at any given cross section is assumed to be uniform along the sandwich plate.

2.1. Total strain energy of the sandwich plate

The in-plane displacement field equation of the mid-plane of the top and bottom composite face sheets with higher order form can be presented as:

$$u_i = u_{0i} + z\theta_x - \frac{4z^3}{3h^2}\phi_x$$

$$v_i = v_{0i} + z\theta_y - \frac{4z^3}{3h^2}\phi_y \quad (i = t,\ b)$$

$$w = w_0 \tag{1}$$

where u_t,v_t,u_b and v_b denote the axial deformations at any point about x and y axes presented as a function of z which are referred from the neutral axis of the top (t) and bottom (b)face sheets of composite sandwich, respectively. u_{0t},u_{0b},v_{0t} *and* v_{0b} are mid-plane deformations at the top and bottom composite face sheets about x and y directions, respectively. θ_x and$\theta_y$are the slopes about y and x axes of the sandwich composite plate. ϕ_x and ϕ_y are the higher order terms about y and x axes. w_0 is the mid plane transverse deflection of the sandwich composite plate. h is the thickness of composite plate.

The ribbon reinforced honeycomb core layer with and without reinforcement of CNT are considered as equivalent single layer in a sandwich composite plate. The schematic representation of transverse shear deformations of the sandwich plate along xz and yz planes are shown in Fig. 2.

The total strain energy of the sandwich plate can be represented as the summation of the strain energy due to axial deformation, transverse deflection at the top (t) and bottom (b) face sheets and transverse shear deformation at the core layer such that:

$$U = \left(\frac{1}{2}\int_0^L\int_{-\frac{B}{2}}^{\frac{B}{2}} (\{\varepsilon_{t,b}(x,y)\}^T [W]\ \{\varepsilon_{t,b}(x,y)\})\, dxdy\right) +$$

$$2\left(\frac{1}{2}\int_0^L\int_{-\frac{B}{2}}^{\frac{B}{2}} (\{\vartheta(x,y)\}^T [k]\ \{\vartheta(x,y)\})\ dxdy\right) +$$

$$\left(\frac{1}{2}\int_v ((\gamma_{xz})_c^T [(G_{xz}^*)_c]\ (\gamma_{xz})_c + (\gamma_{yz})_c^T [(G_{yz}^*)_c]\ (\gamma_{yz})_c)\ dv\right) \tag{2}$$

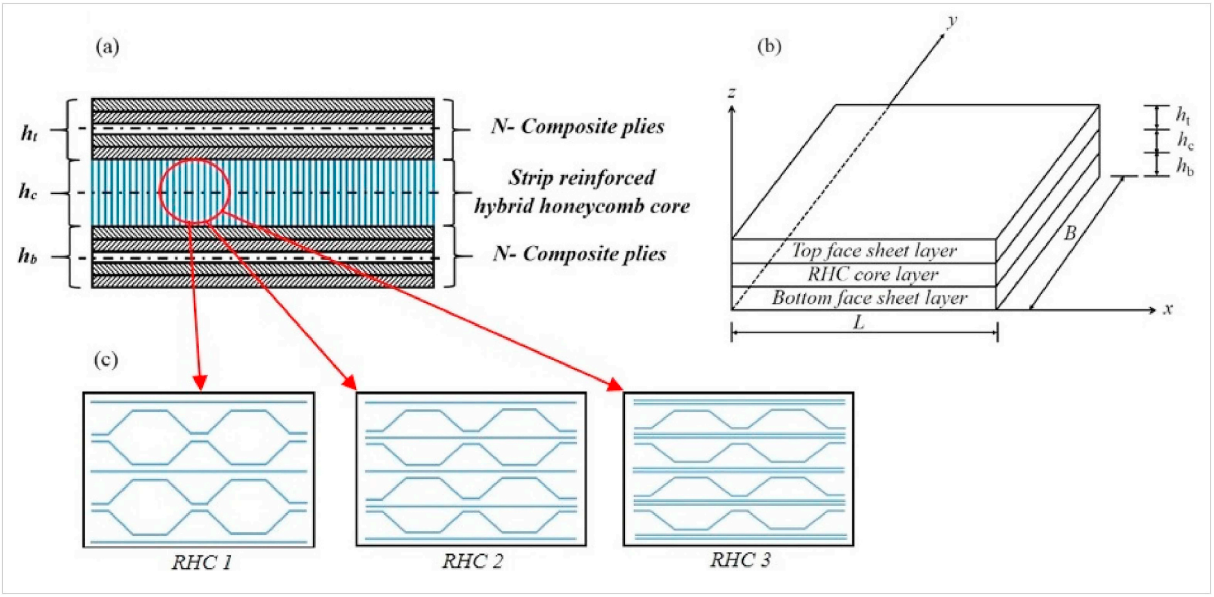


Fig. 1. (a) Illustration of ribbon reinforced hybrid honeycomb sandwich composite plate with *N*-number of composite laminas (b) GFRP ribbon sheets reinforced hybrid honeycomb composite sandwich plate (c) Cross sectional view of the various core layer configurations RHC 1, RHC 2 & RHC 3.

where

$$[W] = \begin{bmatrix} A_{ij} & B_{ij} & E_{ij} \\ B_{ij} & D_{ij} & F_{ij} \\ E_{ij} & F_{ij} & H_{ij} \end{bmatrix} \quad (i,\ j = 1,\ 2,\ 6)$$

$$(A_{ij},\ B_{ij},\ D_{ij},\ E_{ij},\ F_{ij},\ H_{ij}) = \int_{-h/2}^{h/2} Q_{ij}(1,\ z,\ z^2,\ z^3,\ z^4,\ z^6)\ dz$$

$$[k] = \begin{bmatrix} A_{ij}^s & D_{ij}^s \\ D_{ij}^s & F_{ij}^s \end{bmatrix} \quad (i,\ j = 5,\ 4)$$

$$(A_{ij}^s,\ D_{ij}^s,\ F_{ij}^s) = \int_{-h/2}^{h/2} Q_{ij}(1,\ z^2,\ z^4)\ dz$$

$$(\gamma_{xz})_c = \left(\frac{u_{0t} - u_{0b}}{h_c}\right) - \left(\frac{h_t + h_b}{2h_c}\right)\theta_x + \left(\frac{h_t + h_b}{6h_c}\right)\phi_x + \left(\frac{\partial w_0}{\partial x}\right)$$

$$(\gamma_{yz})_c = \left(\frac{v_{0t} - v_{0b}}{h_c}\right) - \left(\frac{h_t + h_b}{2h_c}\right)\theta_y + \left(\frac{h_t + h_b}{6h_c}\right)\phi_y + \left(\frac{\partial w_0}{\partial y}\right)$$

where $[W]$is the membrane and bending stiffness matrix with the higher order terms, A_{ij} is the extensional stiffness matrix, B_{ij} is the coupling stiffness matrix, $D_{ij}$is the bending stiffness matrix, E_{ij}, $F_{ij}$and $H_{ij}$are the stiffness matrix which relate the higher order terms, $[k]$is the shear stiffness matrix. $\{\varepsilon_{t,b}(x, y)\}$ is the normal strain field vector of the top and bottom face sheets, $\{\vartheta\ (x, y)\}$ is the shear strain vector for the face sheets, $[Q_{ij}]$is the coefficient of transformed material as presented in Appendix A. $(\gamma_{xz})_c$ and $(\gamma_{yz})_c$ denote the transverse shear strains of the core about *xz* and *yz* directions. $(G^*_{xz,yz})$ is the complex shear modulus along corrugated (*xz*) and joined (*yz*) directions. The shear stress and strain properties of the various honeycomb core materials are strongly influenced by the addition of CNTs and strip reinforcements. The complex shear modulus [36] is represented as the summation of the storage modulus $(G'_{xz,yz})$ and loss modulus$(G''_{xz,yz})$, such that:

$$G^*_{xz,yz} = G'_{xz,yz} + jG''_{xz,yz} \tag{3}$$

where

$$G'_{xz,yz} = -\left(\frac{(-12(I_{mx,my})(\omega_{hx,hy})^2 h_c + a_c^4)\ m(\omega_{hx,hy})^2 h_c}{(3(\omega_{hx,hy})^2 h_m^2 h_c m + 12(I_{mx,my})(\omega_{hx,hy})^2 h_c - a_c^2 E_z)\ a_c^2}\right)$$

$$\frac{G''_{xz,yz}}{G'_{xz,yz}} = \frac{\delta}{\pi} \tag{4}$$

$(G'_{xz,yz})$ denotes the shear storage modulus of the hybrid honeycomb

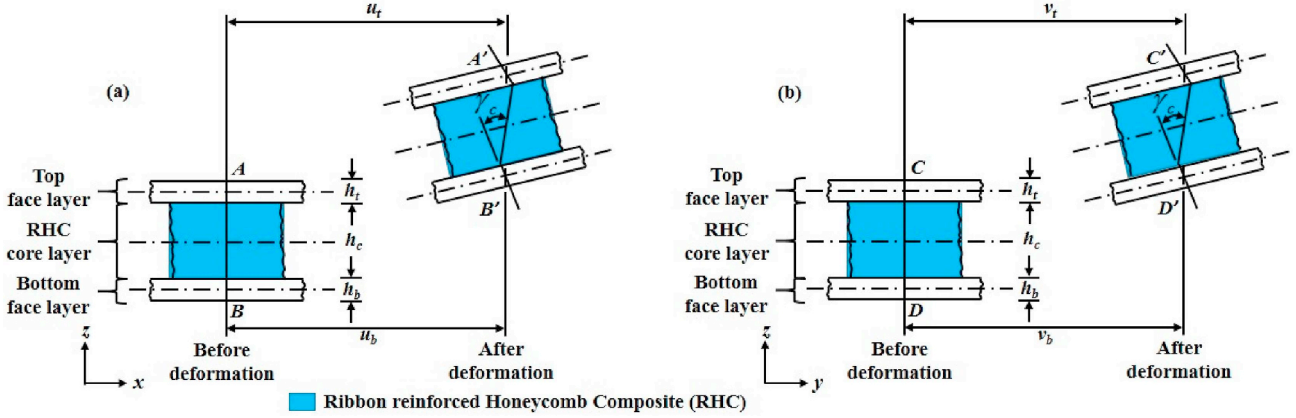


Fig. 2. Schematic representation of ribbon reinforced honeycomb composite sandwich plate model under transverse shear deformation (a) *xz* plane (b) *yz* plane [35].

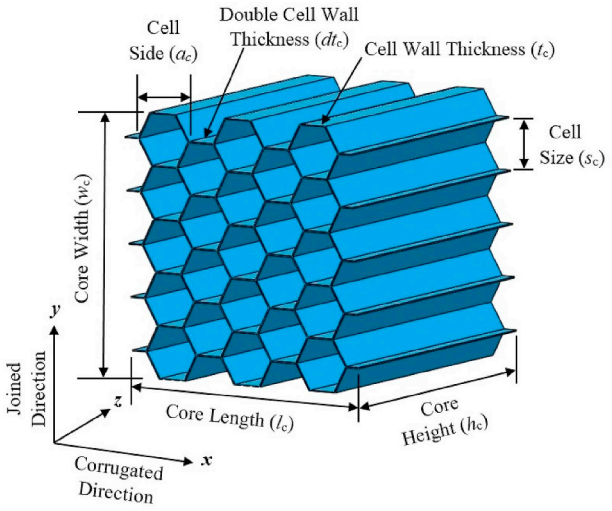


Fig. 3. Diagrammatic illustration of honeycomb core geometry [35].

material which could be evaluated by substituting the known values of Young's modulus of the core along the out of plane directions (E_z), fundamental resonant frequency measured along x and y directions($\omega_{hx,hy}$), mass moment of inertia along x and y directions($I_{mx,my}$), m is the mass of the metal block, h_m is the height of the metal block mounted on the honeycomb material and other geometrical parameters as presented in Fig. 3. Fig. 3 represents the hybrid honeycomb core structure of length (l_c) and breadth (w_c) considered for modelling. (δ)denotes the logarithmic decrement and $j = \sqrt{(-1)}$.

2.2. Total kinetic energy of the sandwich plate

The total kinetic energy equation of the top and bottom face sheets and core layer can be expressed as:

$$T = \left(\frac{1}{2}\int_0^L \int_{-\frac{B}{2}}^{\frac{B}{2}} \rho \{\dot{d}_{t,b}(x,y)\}^T [I_{t,b}] \{\dot{d}_{t,b}(x,y)\}\, dxdy\right) + \left(\frac{1}{2}\int_v \rho_c z^2 \left\{\left(\frac{(\gamma_{xz})_c}{\partial t}\right)^2 + \left(\frac{(\gamma_{yz})_c}{\partial t}\right)^2\right\} dv\right) \quad (5)$$

where $\{\dot{d}_{t,b}(x,y)\}$ is the displacement vector for the top and bottom face sheets, $[I_{t,b}]$ is the translational and rotational inertia matrix as presented in Appendix A, $\rho_c$is the density of the core layer and $\rho$is the density of each ply of the top and bottom face sheets [35].

3. Governing equation of motion using finite element formulation

A four-noded rectangular element with nine degrees of freedom (DOF) at each node is considered to develop the governing differential equations of motion of sandwich composite plate and solve numerically. The nine degrees of freedom are presented as $[u_t, u_b, v_t, v_b, w, \theta_x, \theta_y, \phi_x, \phi_y]$, where u_t,v_t,u_b and v_b denote the axial deformations at any point in the x and y directions of the sandwich composite plate.w is the transverse deflection of the sandwich composite plate. θ_x and$\theta_y$are the slopes about y and x axes of the sandwich composite plate. ϕ_x and ϕ_y are the higher order terms about y and x axes sandwich composite plate.

The in-plane and transverse displacement can be expressed in terms of nodal displacement vectors and shape function as:

$$\{d\} = \sum_{i=1}^{4} [N_i]\{d_i\}_{t,b} \quad (i = 1,2,3,4) \quad (6)$$

where

$$\{d_i\}_t = \{u_{0t1}, v_{0t1}, w_1, \theta_{x1}, \theta_{y1}, \phi_{x1}, \phi_{y1}, \cdots u_{0t4}, v_{0t4}, w_4, \theta_{x4}, \theta_{y4}, \phi_{x4}, \phi_{y4}\}^T$$

$$\{d_i\}_b = \{u_{0b1}, v_{0b1}, w_1, \theta_{x1}, \theta_{y1}, \phi_{x1}, \phi_{y1}, \cdots u_{0b4}, v_{0b4}, w_4, \theta_{x4}, \theta_{y4}, \phi_{x4}, \phi_{y4}\}^T$$

where$\{d_i\}$denotes the displacement vector of the element; $[N_i]$ represents the shape functions for the sandwich plate elements as presented in Appendix A [35].

The relation between strain and the displacement field for an element can be presented as:

$$\{\varepsilon\}_{t,b} = [B_i]\{d_i\} \quad (i = 1,2,3,4) \quad (7)$$

$$\{\varepsilon\}_{t,b} = \left\{\left(\frac{\partial u_{0t,0b}}{\partial x}\right), \left(\frac{\partial v_{0t,0b}}{\partial y}\right), \left(\frac{\partial u_{0t,0b}}{\partial y} + \frac{\partial v_{0t,0b}}{\partial x}\right), \left(\frac{\partial \theta_x}{\partial x}\right), \left(\frac{\partial \theta_y}{\partial y}\right), \left(\frac{\partial \theta_x}{\partial y} + \frac{\partial \theta_y}{\partial x}\right), \left(\frac{\partial \phi_x}{\partial x}\right), \left(\frac{\partial \phi_y}{\partial y}\right), \left(\frac{\partial \phi_x}{\partial y} + \frac{\partial \phi_y}{\partial x}\right)\right\}^T$$

where $\{\varepsilon\}_{t,b}$denote the element strain vector for the top and bottom face sheets; $[B_i]$ is the strain displacement matrix.

The element stiffness matrix can be obtained from the strain energy equation of the top and bottom face sheets and the core layer for the composite sandwich plate by substituting Eq. (7) in Eq. (2) such that:

$$k^e = \left(\int_{-b}^{b}\int_{-a}^{a} [B_{t,b}(x,y)]^T [W][B_{t,b}(x,y)]\}\, dxdy\right) + 2\left(\int_{-b}^{b}\int_{-a}^{a} [B_s(x,y)]^T [k]\ [B_s(x,y)]\, dxdy\right) + \left(\int_{-b}^{b}\int_{-a}^{a} [B_c(x,y)]^T [(G^*_{xz,yz})_c]\ [[B_c(x,y)]]\, dxdy\right) \quad (8)$$

where $[B_{t,b}(x,y)]$, $[B_s(x,y)]$ and $[B_c(x,y)]$are the strain displacement matrices in the bending, shear and core shear respectively, a and b denote the length and width of the four noded rectangular element of the sandwich plate, $[(G^*_{xz,yz})_c]$is the transverse shear properties of the core.

The element mass matrix can be obtained from the kinetic energy equation of the top and bottom face sheets and core layer for the laminated composite plate by substituting Eq. (6) in Eq. (5) such that:

$$m^e = \left(\int_{-b}^{b}\int_{-a}^{a} [N_i(x,y)_{t,b}]^T [I_{t,b}]\ [N_i(x,y)_{t,b}]\, dxdy\right) + \left(b\frac{h_c^3}{12}\int_{-b}^{b}\int_{-a}^{a} [N_i(x,y)_c]^T [I_c]\ [N_i(x,y)_c]\, dxdy\right) \quad (9)$$

where I_t, I_b, I_c are the translatory and bending inertia matrices of face sheets and shear of the core inertia respectively as presented in Appendix A [35].

The governing equations of motion of the hybrid honeycomb sandwich composite plate is obtained by assembling the element mass and stiffness matrices and the force vector together for all the elements such that:

$$[M]\{\ddot{d}\} + [K]\{d\} = \{F\} \quad (10)$$

where$[M]$, $[K]$ and $\{F\}$denote the global mass and stiffness matrices, and the global force vector of hybrid honeycomb sandwich composite plate configurations, respectively.

From Eq. (10), the governing differential equations of motion can be rewritten for the free vibration of the honeycomb sandwich composite

plate configurations such that:

$$[M]\{\ddot{d}\} + [K]\{d\} = \{0\} \tag{11}$$

The generalized solution for Eq. (11) can be expressed as:

$$\{d\} = \{\varphi\} e^{j\lambda_i} \tag{12}$$

where $\{\varphi\}$denotes the arbitrary constant and e is the exponential term.

The reduced form of the characteristic equation of the eigenvalue problem can be presented by substituting Eq. (12) in Eq. (11) such that:

$$[K]\{\varphi\} = [M]\lambda_i^2\{\varphi\} \tag{13}$$

where $[K]$ is the global stiffness matrix expressed with combination of real $[K_r]$ and imaginary $[K_i]$ parts of the stiffness matrix such that:

$$[K] = [K_r] + j[K_i]$$

Further, the loss factor of the hybrid sandwich structure at each mode is given by:

$$(\eta_i) = \left(\frac{\{\phi_r\}_i^T[K_i]\{\phi_r\}}{\{\phi_r\}_i^T[K_r]\{\phi_r\}}\right)$$

where $\{\phi_r\}_i$ is the normalized eigen vector with respect to each mode 'i'; λ_i and η_i are the square of the natural frequency and loss factor at each mode.

4. Experimental investigation

4.1. Evaluation of elastic properties of composite face sheets

An experimental test was conducted on three different prototypes of hybrid composite ribbon reinforced honeycomb sandwich plates. The fabrication materials E-glass fiber (92145 fabric), epoxy resin (LY556) and hardener (HY951) are manufactured by the Interglass® and Hunstman®. The top and bottom face sheet layers were made up of unidirectional E-glass fiber and epoxy resin with 10:1 ratio of hardener using hand layup method. Further, curing of the face sheet laminates was done by using vacuum assisted oven with 750 Hg pressure at 75 °C. The ply orientation of face sheet layers for all configurations of sandwich plate (RHC 1, RHC 2 and RHC 3) is $[0^\circ/90^\circ/0^\circ]_s$ with 0.26 mm ply thickness. The composite face sheets are assembled with honeycomb core using the Huntsman 2021® Araldite under 750 Hg pressure at 75 °C with the vacuum assisted oven. The mechanical properties of various composite face sheets with 0.280 vol fraction were identified using ASTM E-1876 [37] procedure and the results are presented in Table 1.

4.2. Identification of mechanical properties of composite honeycomb core material

The core structures of glass fiber reinforced polymer composites were made without and with reinforcement of MWCNT using hand layup method. Initially, 0.5 wt% of MWCNT was added into the solvent (extra pure acetone) and stirred thoroughly using the mechanical shear mixture for 30 min. Then the mixture was sonicated using the ultrasonic liquid processor having 12.5 mm diameter of titanium probe with pulsed on-off cycles with period of 5 s for 1 h at room temperature to separate the entangled MWCNT. The measured quantity of epoxy resin (LY556) was added into the mixture of MWCNT/acetone and the mixture was sonicated again using the ultrasonic liquid processor for 2 h to achieve the dispersion. Then, the mixture of acetone/epoxy/CNT was kept in hot air oven at 75 °C operated for 48 h to evaporate the solvent (acetone). Further, the homogenous dispersion of CNTs in epoxy resin was enhanced by using shear mixture for 30 min. The hardener (HY951) was then added into the homogenously sheared epoxy/MWCNT mixture with 1:10 ratio. Finally, the glass fiber reinforced polymer composite core structure having $[0^\circ/90^\circ]$ ply orientation with 0.26 mm ply thickness were fabricated without and with MWCNT reinforcement using hand-layup method, by adding 1:10 ratio of hardener into the epoxy/MWCNT mixture, prepared earlier and reinforced with E-glass unidirectional fabrics (220 GSM). Following this, the fabricated specimens were partially cured in the room temperature for 20 min which was then mounted into the high carbon-high chromium steel honeycomb die and then cured at room temperature for 5 h. After this, the specimens were post cured in oven at 75 °C operated for 2 h using the vacuum assisted oven. Further, the cured corrugated composite sheets were taken out from the oven and kept at room temperature for 24 h before the cutting of laminated composite into required geometry. The required dimension 80 mm × 80 mm x 10 mm of honeycomb core material is achieved by using the ultrasonic cutter (Sonofile®). The fabrication of core structure was carried by joining the corrugated and ribbon sheets without and with CNT reinforcement using the huntsman 2021® fast setting araldite. This procedure was followed for the fabrication of various configurations of honeycomb core materials by joining the corrugated and ribbon sheets without and with 0.5, 1 and 1.5 wt percentage of CNT reinforcement having $[0^\circ/90^\circ]$ ply orientation with 0.26 mm ply thickness of glass fibers and epoxy composites using a high carbon-high chromium steel honeycomb die as presented in Fig. 4. The various geometrical parameters used during the fabrication of various configurations of honeycomb core materials are presented in Table 2. The experimental analysis in Fig. 5 was carried out on various hybrid honeycomb core materials to identify their transverse shear properties.

The resonant response frequencies from the dominant peaks in the frequency response function (FRF) of the various hybrid honeycomb cores with and without CNT reinforcement under fixed-fixed boundary condition were acquired by using the DEWESOFT 7.1.1® experimental analysis software. The measured natural frequency data were analyzed for the evaluation of the complex shear modulus of the hybrid honeycomb material for the prototypes of sandwich structure. The shear storage modulus ($G'_{xz,yz}$) of the hybrid honeycomb material is evaluated along the corrugated (xz) and joined (yz) directions from the alternative dynamic approach [1] for the various prototypes of the composite sandwich structure, which is proportionate to the average energy stored per unit volume of the honeycomb material during a deformation cycle. Further, the damping factor was calculated at each dominant resonant peak response by using the half power bandwidth method. The loss modulus ($G''_{xz,yz}$) could be evaluated by substituting the known values of shear storage modulus and the logarithmic decrement in Eq. (4), which is proportionate to the energy dissipated per unit volume of honeycomb material over a cycle. The complex modulus of the various honeycomb core without and with CNT reinforcement along xz and yz directions in terms of storage ($G'_{xz,yz}$) and loss moduli ($G''_{xz,yz}$) obtained from the measurement are represented in Table 3.

It can be seen from Table 3 that the incorporation of CNT in various ribbon reinforced hybrid honeycomb composite increases the

Table 1
The mechanical properties of top and bottom face sheets of the various sandwich plates [35]

E-glass fiber and resin matrix	E_1	22.92 GPa	Resin	E	3.45 GPa	MWCNT	E_{cnt}	4.45 GPa (Young's Modulus)
	E_2	5.70 GPa		ν	0.30		ν_{cnt}	0.28 (Poisson's ratio)
	ν_{12}	0.26		G	1.33 GPa		G_{cnt}	1.67 GPa (Shear Modulus)
	G_{12}	2.25 GPa		ρ_r	1200 kg m^{-3}		ρ_{cnt}	2514 kg m^{-3} (Density)
	G_{23}	2.06 GPa					L_{cnt}	10 μm (Length)
	ρ	1592 kg m^{-3}					D_{cnt}	16.96 nm (Outer Diameter)

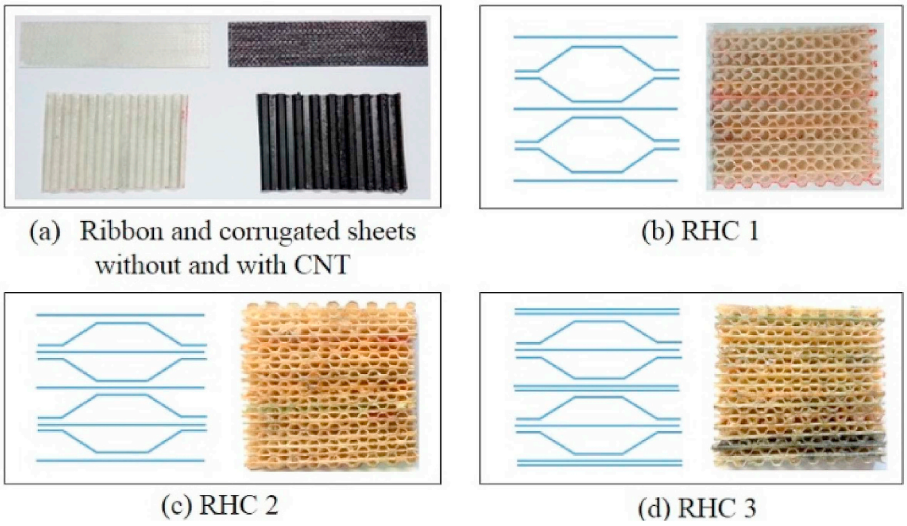


Fig. 4. Various ribbon reinforced honeycomb core materials without and with CNT reinforcement.

transverse shear stiffness along *xz* and *yz* than those of without CNT reinforcement which subsequently enhances the complex shear moduli of the honeycomb core material. This can be due to the fact that the dispersion of CNTs randomly in GFRP composites, as shown in Fig. 6, improves the inter-lamina shear force between the epoxy matrix resin and CNT. This can also be attributed to the fact that the shear storage and loss moduli of the structure as in Eq. (4) increases with the increase in CNT wt% which leads to increase in complex shear modulus as in Eq. (3).

The various storage and loss moduli of the various hybrid honeycomb core material with ribbon reinforcement at various wt% of CNT could be represented with empirical relations presented as:

Core Layer Configuration – RHC 1

$$(G'_{xz})^{RHC1} = (1e^{12})n^2 + (2e^{09})n + 6e^{8}$$

$$(G'_{yz})^{RHC1} = (1e^{12})n^2 + (4e^{09})n + 3e^{8}$$

$$(G''_{xz})^{RHC\,1} = 87n^2 + 6.481n + 0.2477$$

$$(G''_{yz})^{RHC\,1} = 40n^2 + 8.548n + 0.2253 \quad (14)$$

Core Layer Configuration – RHC 2

$$(G'_{xz})^{RHC2} = (1e^{12})n^2 + (7e^{09})n + 8e^{8}$$

$$(G'_{yz})^{RHC\,2} = (2e^{12})n^2 - (7e^{09})n + 5e^{8}$$

$$(G''_{xz})^{RHC2} = 23n^2 + 6.593n + 0.2803$$

$$(G''_{yz})^{RHC2} = 6n^2 + 6.722n + 0.2605 \quad (15)$$

Core Layer Configuration – RHC 3

$$(G'_{xz})^{RHC3} = (5e^{11})n^2 + (2e^{10})n + 1e^{9}$$

$$(G'_{yz})^{RHC3} = (4e^{11})n^2 + (2e^{10})n + 6e^{8}$$

$$(G''_{xz})^{RHC3} = 20n^2 + 4.492n + 0.3335$$

$$(G''_{yz})^{RHC3} = 29n2 + 3.987n + 0.3115 \quad (16)$$

where "*n*" denotes the CNT content in weight percentage reinforced in the honeycomb core material with ribbons; *e* is the exponential term.

Further, it can be observed that the various complex shear moduli along the corrugated direction (*xz*) is higher than that of joining direction (*yz*) of the various configuration of honeycomb core layer materials irrespective of the CNT content. This can be due to the better stiffness and shear force distribution of the honeycomb with ribbon materials along the continuous triple cell wall in corrugated directions.

4.3. Validation of the developed mathematical modelling

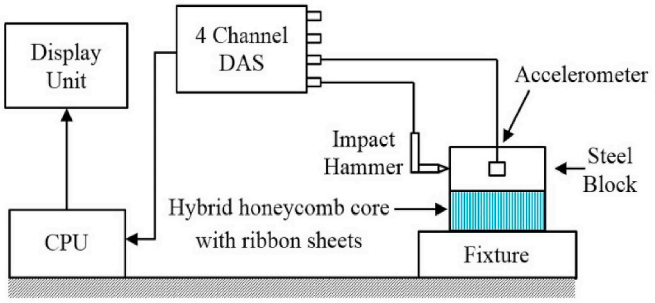
The various ribbon reinforced hybrid honeycomb composite sandwich plate configurations of length (*L*) 300 mm, width (*B*) 200 mm and thickness 5 mm were fabricated without and with 0.5 wt% of CNT reinforcement in honeycomb core layers (Fig. 7). The volume fractions of the top and bottom face sheets with 0.26 mm ply thickness having $[0^{\circ}/90^{\circ}/0^{\circ}]_s$ ply orientation of unidirectional glass fiber were identified as 0.286.

The hybrid honeycomb sandwich plate was clamped at steel fixture. So that, the vibration analysis can be performed under all four ends clamped (CCCC), two ends clamped and two ends free (CFCF), three ends free and one end clamped (CFFF), and all four ends free (FFFF) boundary conditions as represented in Fig. 8. The transient response acceleration was obtained with uni-axial accelerometer located at the tip of top surface of composite sandwich plate by exciting the honeycomb structure using impact hammer (5800SL). A four channel digital data acquisition system (ATA-DAQ042451) was utilized to identify the natural frequency and loss factor from the dominant resonant response peaks of the functional response graphical data by using the Dewesoft 7.1.1® experimental test software as shown in Fig. 9 (a) & (b). Further, the damping factor corresponding to each dominant peak response was identified by adapting the half power bandwidth method. Following this, the logarithmic decrement relations was adapted to obtain the loss factor.

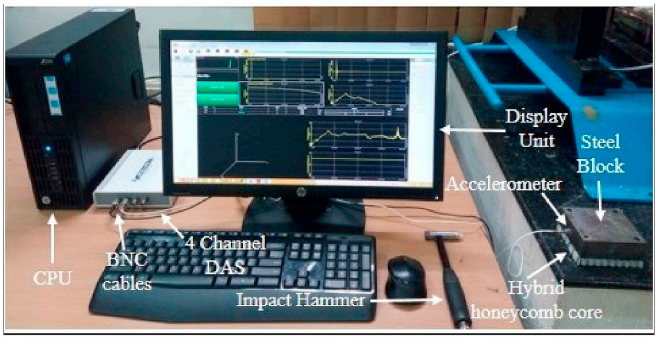
The numerical simulations were carried out by considering the mechanical properties (Tables 1 and 3) of different configurations of hybrid sandwich composite plate. The mesh size of 13 × 13 was used to obtain the computational results. Further, the convergence requirements were satisfied by performing the simulations at various mesh size. The resonant response frequencies and loss factors are presented with respect to the mode numbers (*m, n*) which are associated to the mode shapes acquired along the longitudinal (*m*) and transverse (*n*) directions of the ribbon reinforced hybrid honeycomb composite sandwich plates.

Table 2
Various geometrical parameters of the ribbon reinforced honeycomb composite sandwich structures with and without reinforcement of CNT.

Geometrical Parameters & Symbol	Core length (l_c)	Core width (w_c)	Core height (h_c)	Weight of solid block (m), kg	Height of solid block (h_m)	Hexagonal honeycomb cell side (a_c)	Hexagonal honeycomb cell size (a_c)	Honeycomb Cell wall thickness (t_c)
Measured dimensions "m"	0.08	0.08	0.01	1.36	0.02	0.006	0.008	0.0006



(a)



(b)

Fig. 5. (a) Diagrammatic illustration and (b) experimental test setup of ribbon reinforced honeycomb core material [35].

Table 3
Complex shear moduli of the various configuration of ribbon reinforced honeycomb composite core layer for the three different configurations without and with reinforcement of CNT.

Core layer Configurations	CNT wt % (n)	Complex shear modulus along corrugated direction, G^*_{xz}, MPa	Complex shear modulus along joined direction, G^*_{yz}, MPa
RHC 1	0	629.11 (1 + j 0.2511)	302.34 (1 + j 0.2272)
	0.5	690.69 (1 + j 0.2721)	377.45 (1 + j 0.2615)
	1	784.65 (1 + j 0.3314)	441.91 (1 + j 0.3124)
	1.5	984.27 (1 + j 0.3611)	631.11 (1 + j 0.3427)
RHC 2	0	767.98 (1 + j 0.2815)	479.74 (1 + j 0.2614)
	0.5	855.38 (1 + j 0.3101)	483.90 (1 + j 0.2914)
	1	961.17 (1 + j 0.3522)	571.21 (1 + j 0.3311)
	1.5	1180.34 (1 + j 0.3831)	738.41 (1 + j 0.3617)
RHC 3	0	945.57 (1 + j 0.3319)	629.05 (1 + j 0.3105)
	0.5	1100.09 (1 + j 0.3601)	755.63 (1 + j 0.3353)
	1	1183.24 (1 + j 0.3717)	842.12 (1 + j 0.3512)
	1.5	1390.53 (1 + j 0.3979)	1011.02 (1 + j 0.3789)

A comparison of first four natural frequencies and loss factors of various configurations of hybrid honeycomb core sandwich plates are evaluated numerically and experimentally as represented in Tables (4–7). Very good agreement between the FEM and experimental test results of various ribbon reinforced honeycomb composite sandwich plate configurations with and without reinforcement of CNT namely RHC 1, RHC 2 and RHC 3, was observed. The percentage deviation between the numerical and experimental test results could be due to manufacturing inaccuracies such as the fabrication of top and bottom face sheets, and core layer materials with hand layup method, measurement of shear and loss moduli of hybrid honeycomb composite core material for the sandwich plates.

It can be seen that the natural frequency and loss factor of CNT reinforced hybrid honeycomb sandwich composite plate configuration "RHC 1" at 1st mode increase by 13.45%, 19.03% and 20.07% under

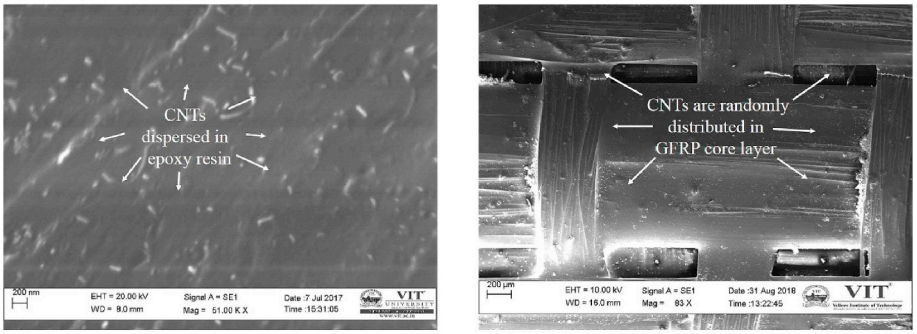


Fig. 6. SEM images of the (a) CNTs randomly distributed in Epoxy (b) CNTs randomly distributed in GFRP-HCC.

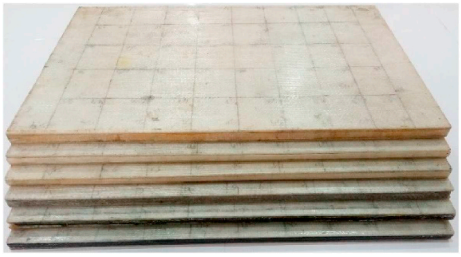
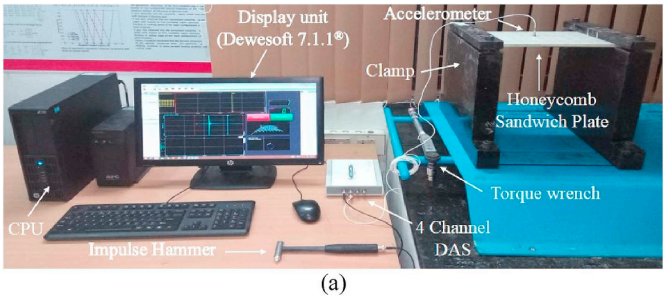


Fig. 7. Photograph of the fabrication of various ribbon reinforced honeycomb composite sandwich plate configurations without and with CNT reinforcement.



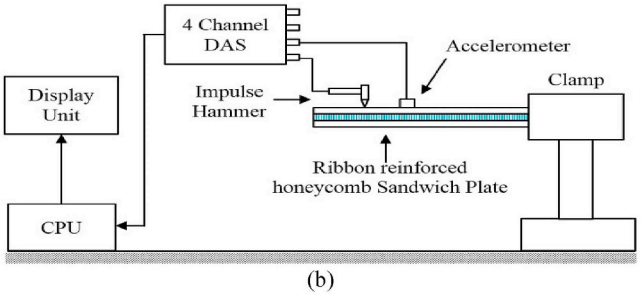


Fig. 9. Experimental analysis of various ribbon reinforced honeycomb composite sandwich plates (a) Snapshot of experimental setup under CFCF end conditions (b) Schematic representation of the test setup [35].

FFFF, CFFF and CFCF boundary conditions and 21.69%, 22.95% and 25.12% under CFCF, CFFF and FFFF boundary conditions, respectively, as compared to those of GFRP-honeycomb sandwich plates. It can also be seen that the natural frequency and loss factor of CNT reinforced hybrid honeycomb sandwich composite plate configuration "RHC 2" at 1st mode increase by 15.08%, 20.67% and 22.43% under FFFF, CFFF and CFCF boundary conditions and 24.32%, 27.51% and 24.91% under CFCF, CFFF and FFFF boundary conditions, respectively, as compared to those of GFRP-honeycomb sandwich plates. Further, it can be observed that the natural frequency and loss factor of CNT reinforced hybrid honeycomb sandwich composite plate configuration "RHC 3" at 1st mode increase by 18.23%, 21.27% and 25.19% under FFFF, CFFF and CFCF boundary conditions and 30.65%, 32.62% and 34.04% under CFCF, CFFF and FFFF boundary conditions, respectively, as compared to those of GFRP-honeycomb sandwich plates.

A significant increase in natural frequency and loss factor at all the modes of hybrid sandwich structures could be realized with the addition of CNTs. This can be accredited to the existence of CNT in honeycomb material that limits the polymer chains motion which subsequently enhances yield strength of the material and shear force distribution. This results in a significant increase in stiffness and damping of the hybrid sandwich plate than those of sandwich plate without CNT reinforcement. This can also be related to the fact that the increase in shear storage modulus with addition of CNTs could increase the total strain energy as seen in Eq. (2) which increases the natural frequency of the structure. Similarly, an increase in loss modulus could increase the dissipated energy as seen in Eq. (4) which yields increase in loss factor with the addition of CNT.

Further, it can be seen that the natural frequency and loss factor of the double ribbon reinforced hybrid honeycomb composite sandwich plate "RHC3" increase significantly than those of the other two configurations RHC 1 and RHC 2. This can be attributed to the fact that an increase in ribbon reinforcement at the honeycomb core layer increases both stiffness and shear force distribution among the honeycomb structure. This is also evident with the increase in storage and loss moduli of the core materials as seen in Table 3 and Eqs. (14)–(16). Even though the addition of ribbon reinforcement at the honeycomb core layer increases both the mass and stiffness of the sandwich plate, the increase in mass of the structures is dominated by the increase in stiffness of the hybrid composite structure and hence increase in natural frequency is being observed.

Furthermore, it can be observed that the CFFF and CCCC boundary condition lead to the lowest and highest natural frequencies, irrespective of ribbon reinforced honeycomb sandwich plate configurations. This can be due to the fact that the boundary condition CCCC yields the highest stiffness for the sandwich plate, whereas the boundary

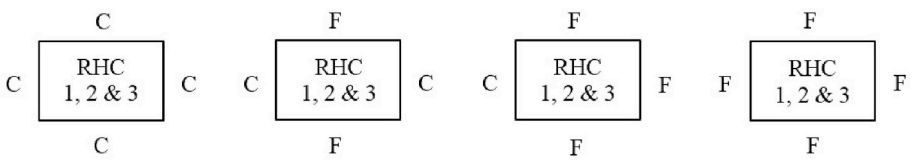


Fig. 8. Illustration of various boundary conditions used to perform the experiments ribbon reinforced honeycomb (RHC 1, RHC 2 and RHC 3) sandwich composite plates.

Table 4
Comparison of natural frequencies of various composite sandwich plates without CNT reinforcement in ribbon reinforced honeycomb core materials using numerical and experimental investigations.

		Natural Frequencies (Hz)								
		FEM			Experimental			% deviation		
Boundary Conditions	Mode(m,n)	RHC 1	RHC 2	RHC 3	RHC 1	RHC 2	RHC 3	RHC 1	RHC 2	RHC 3
CFFF	(1,1)	70.91	74.88	80.72	67.191	75.56	85.21	5.24	0.91	5.56
	(1,2)	144.40	151.19	160.95	132.14	146.44	171.54	8.49	3.14	6.58
	(2,1)	436.77	465.19	502.33	402.81	439.19	525.37	7.78	5.59	4.59
	(2,2)	559.29	589.59	632.43	510.31	565.31	679.15	8.76	4.12	7.39
CFCF	(1,1)	323.51	344.11	374.19	297.44	328.79	383.13	8.06	4.45	2.39
	(1,2)	371.01	392.89	424.62	341.82	383.15	461.53	7.87	2.48	8.69
	(2,1)	886.22	944.89	1030.00	815.31	905.91	1073.21	8.00	4.13	4.20
	(2,2)	950.06	1010.60	1097.90	874.43	974.69	1153.1	7.96	3.55	5.03
FFFF	(2,2)	215.99	225.42	238.56	198.00	219.17	246.78	8.33	2.77	3.45
	(1,1)	449.81	475.22	512.48	428.14	480.84	559.96	4.82	1.18	9.26
	(3,2)	621.66	654.53	700.23	579.06	648.38	758.19	6.85	0.94	8.28
	(2,3)	814.57	834.71	923.90	751.43	850.14	996.62	7.75	1.85	7.87

Table 5
Comparison of natural frequencies of various composite sandwich plates with 0.5 wt% of CNT reinforcement in ribbon inserted honeycomb core materials using numerical (FEM) and experimental investigations.

		Natural Frequencies (Hz)								
		FEM			Experimental			Percentage deviation		
Boundary Conditions	Mode(m,n)	RHC 1	RHC 2	RHC 3	RHC 1	RHC 2	RHC 3	RHC 1	RHC 2	RHC 3
CFFF	(1,1)	83.42	89.21	100.22	82.98	95.25	108.23	0.53	6.77	8.16
	(1,2)	167.12	176.13	192.19	153.8	170.15	205.40	7.97	3.40	6.87
	(2,1)	517.2	554.35	624.42	489.4	582.44	674.40	5.38	5.07	8.00
	(2,2)	652.3	693.84	770.03	594.69	668.13	805.63	8.83	3.71	4.62
CFCF	(1,1)	384.04	414.84	473.78	372.14	437.87	512.14	3.10	5.07	8.10
	(1,2)	436.81	468.62	528.46	401.94	448.23	560.56	7.98	4.35	6.07
	(2,1)	1051.50	1139.40	1306.20	994.87	1120.5	1383.41	5.39	1.66	5.91
	(2,2)	1122.10	1211.30	1379.10	1088.1	1279.2	1493.10	3.03	5.61	8.27
FFFF	(2,2)	248.32	260.18	279.69	228.78	258.1	301.81	7.87	0.80	7.91
	(1,1)	528.91	558.43	636.19	505.94	581.56	680.31	4.34	4.14	6.94
	(3,2)	723.69	754.79	847.18	665.11	793.05	915.56	8.09	5.07	8.07
	(2,3)	948.49	976.11	1107.3	867.14	984.38	1190.00	8.58	0.85	7.47

Table 6
Comparison of loss factors of various composite sandwich plates without CNT reinforcement in ribbon reinforced honeycomb core materials using numerical and experimental results.

		Loss Factor (η)								
		FEM			Experimental			Percentage deviation		
Boundary Conditions	Mode (m,n)	RHC 1	RHC 2	RHC 3	RHC 1	RHC 2	RHC 3	RHC 1	RHC 2	RHC 3
CFFF	(1,1)	0.0498	0.0628	0.0844	0.0470	0.0585	0.0789	5.62	6.85	6.52
	(1,2)	0.0226	0.0267	0.0342	0.0210	0.0249	0.0314	7.08	6.74	8.19
	(2,1)	0.0570	0.0699	0.0917	0.0542	0.0638	0.0870	4.91	8.73	5.13
	(2,2)	0.0427	0.0506	0.0650	0.0399	0.0478	0.0599	6.56	5.53	7.85
CFCF	(1,1)	0.0733	0.0896	0.1167	0.0675	0.0834	0.1077	7.91	6.92	7.71
	(1,2)	0.0597	0.0724	0.0941	0.0559	0.0684	0.0881	6.37	5.52	6.38
	(2,1)	0.0832	0.0995	0.1269	0.0760	0.0928	0.1155	8.65	6.73	8.98
	(2,2)	0.0757	0.0900	0.1145	0.0701	0.0842	0.1063	7.40	6.44	7.16
FFFF	(2,2)	0.0520	0.0651	0.0868	0.0480	0.0602	0.0810	7.69	7.53	6.68
	(1,1)	0.0355	0.0419	0.0542	0.0335	0.0399	0.0498	5.63	4.77	8.12
	(3,2)	0.0249	0.0301	0.0414	0.0232	0.0285	0.0382	6.83	5.32	7.73
	(2,3)	0.0329	0.0395	0.0425	0.0303	0.0365	0.0461	7.90	7.59	8.47

condition CFFF yields the lowest stiffness for the sandwich plate due to the flexibility of the end conditions. It can also be seen that loss factors under CFCF boundary condition are higher than those under CFFF boundary conditions irrespective of ribbon reinforced honeycomb sandwich plate configurations. The loss factor is a ratio of the energy dissipated per radian to the total strain energy of the structure. The energy dissipated per cycle of operation dominates the total strain of the sandwich structures which leads the loss factor to be higher in CFCF end conditions than those of under CFFF end condition.

Table 7
Comparison on loss factors of various composite sandwich plates with 0.5 wt% of CNT reinforcement in ribbon reinforced honeycomb core materials using numerical and experimental results.

		Loss Factor (η)								
		FEM			Experimental			Percentage deviation		
Boundary Conditions	Mode (m,n)	RHC 1	RHC 2	RHC 3	RHC 1	RHC 2	RHC 3	RHC 1	RHC 2	RHC 3
CFFF	(1,1)	0.0660	0.0862	0.1264	0.0610	0.0807	0.1171	7.58	6.38	7.36
	(1,2)	0.0286	0.0355	0.0497	0.0266	0.0336	0.0464	6.99	5.35	6.64
	(2,1)	0.0738	0.0937	0.1335	0.0674	0.0891	0.1255	8.67	4.91	5.99
	(2,2)	0.0543	0.0673	0.0942	0.0518	0.0629	0.0885	4.60	6.54	6.05
CFCF	(1,1)	0.0939	0.1183	0.1655	0.0862	0.1102	0.1553	8.20	6.85	6.16
	(1,2)	0.0766	0.0962	0.1355	0.0701	0.0894	0.1268	8.49	7.07	6.42
	(2,1)	0.1048	0.1289	0.1757	0.0976	0.1177	0.1620	6.87	8.69	7.80
	(2,2)	0.0953	0.1169	0.1595	0.0884	0.1089	0.1490	7.24	6.84	6.58
FFFF	(2,2)	0.0684	0.0885	0.1288	0.0641	0.0849	0.1228	6.29	4.07	4.66
	(1,1)	0.0452	0.0564	0.0797	0.0428	0.0528	0.0747	5.31	6.38	6.27
	(3,2)	0.0320	0.0399	0.0597	0.0299	0.0371	0.0554	6.56	7.02	7.20
	(2,3)	0.0427	0.0514	0.0592	0.0403	0.0488	0.0618	5.62	5.06	4.39

5. Results and discussion

The developed finite element formulation is being used to study the various dynamic characteristics of the hybrid honeycomb composite sandwich plates with different honeycomb configurations as core layers. These characteristics are highly influenced by not only the geometrical and material properties, but also by the variation of CNT wt %, longitudinal strips reinforcement in core material and core layer thickness. The effect of CNT wt% on the transverse vibration response of the various configurations of the hybrid honeycomb sandwich composite plates are also studied. The various elastic properties of face sheet layers used for the numerical simulations are represented in Table 1. The complex modulus of the various ribbon reinforced honeycomb core layers with and without reinforcement of CNT used for the simulation is presented in Table 3. The dimensions for all the configurations of sandwich composite plates considered for the numerical simulations are 300 mm × 200 mm x 5 mm. The ply orientations of the composite face sheet layers are considered as $[0^{\circ}/90^{\circ}/0^{\circ}]_s$ for all sandwich plate configurations RHC 1, RHC 2 and RHC 3, with a ply thickness of 0.26 mm. The volume fraction for all the ribbon reinforced composite sandwich plate configurations considered for face sheet layers are identical.

5.1. Effects of variation in wt% of CNT content on natural frequencies and loss factors of various ribbon reinforced honeycomb sandwich plates

A numerical simulation is carried out to identify the influence of the addition of CNT on the natural frequencies and loss factors of various honeycomb composite sandwich plates under CFFF boundary condition with variation from 0 to 1.5 wt% of CNT content, and the results are presented in Table 8.

It can be seen that the natural frequency and loss factor at the first mode of the hybrid honeycomb sandwich composite plate configurations RHC 1, RHC 2 and RHC 3 with 1.5 wt% CNT under CFFF boundary condition are higher than those of GFRP-honeycomb sandwich plates without CNT content by 5.34%, 6.27% and 6.43%, 13.94%, 16.11% and 17.10%, respectively. A significant increase in the resonant frequencies and loss factors are identified in various configurations of the hybrid sandwich composite plates. This can be due to the stick slip mechanism between the nano wall layer and interfacial sliding motion of epoxy-CNT at the honeycomb material. This can also be related to the fact that an increase in wt% of CNT at the honeycomb core material increases the shear storage modulus which could increase the total strain energy as seen in Eq. (2). Similarly, an increase in wt% of CNT increases the loss modulus and consequently increases the dissipated energy of the structure as seen in Eq. (4) which yields a significant increase in loss factor at all modes presented. Further, it can be seen that the natural frequencies and loss factors of the CNT-ribbon reinforced hybrid honeycomb sandwich plate “RHC 3” is higher than those of the other two sandwich plate configurations (RHC 1 & RHC 2).

5.2. Effects of variation in core thickness on natural frequencies and loss factors of various ribbon reinforced hybrid honeycomb sandwich plates

The numerical simulation is carried out to study the influence of honeycomb core thickness in the ribbon reinforced honeycomb composite sandwich plate configurations (RHC 1, RHC 2 and RHC 3) on the natural frequencies and loss factors with 1.5 wt% of CNT reinforcement under CFFF boundary conditions, and the results are presented in Table 9. It can be seen that fundamental natural frequency of configuration RHC 1 under CFFF boundary condition increase by 16.14%, 21.30% and 31.05%, while the loss factor decrease by 15.42%, 14.47%, and 13.49% respectively, with an increase in the core layer thickness of the CNT reinforced hybrid honeycomb composite sandwich plates from 2.5 mm to 10 mm with an increment of 2.5 mm. Similarly trend has also been observed for the configurations RHC 2 and RHC 3 under CFFF end condition. An increment in natural frequency and decrement in loss factor for all configurations of the hybrid honeycomb sandwich plates with increase in thickness of the core layer at all modes is observed. This can be due to the fact that the increase in thickness of the core material increases the stiffness of the sandwich structure. Even though, the mass is being increased with increase in thickness, the increase in stiffness may dominate the increase in mass of the structure which leads a significant increase in natural frequency. Further, as the thickness of core materials increases, both the strain energy and dissipated energy increase. However, the increase in dissipated energy is being dominated by the increase in strain energy of the structure which leads to decrease in loss factor with the increase in thickness of core material.

5.3. Transverse vibration responses of ribbon reinforced honeycomb sandwich plates

The transverse responses of a ribbon reinforced honeycomb composite sandwich plate configuration RHC 3 are investigated with four different wt% of CNTs (0%, 0.5%, 1%, and 1.5%) under CFFF boundary condition. The honeycomb sandwich plate is exposed to a sinusoidal excitation of magnitude 1 N provided at a distance of 100 mm × 100 mm from the left lower end corner. The forced vibration response of the ribbon reinforced hybrid composite sandwich plate is calculated over the frequency range of 1–700 Hz under various wt% of CNTs and various plate configurations, and the results are presented in Figs. 10 and 11. It can be observed that the natural frequency increases

Table 8
Variation of natural frequencies and loss factors of various ribbon reinforced honeycomb composite sandwich plates without and with CNT reinforcement at various volume fraction under CFFF boundary conditions.

Core material configurations	Mode (m,n)	Natural Frequencies (Hz)				Loss Factors (η)			
		0%	0.5%	1%	1.5%	0%	0.5%	1%	1.5%
RHC 1	(1,1)	70.49	71.19	72.27	74.47	0.0500	0.0581	0.0778	0.0999
	(1,2)	143.51	144.22	145.19	147.00	0.0226	0.0252	0.0322	0.0391
	(2,1)	437.25	442.22	449.77	464.58	0.0571	0.0651	0.0852	0.1063
	(2,2)	556.02	561.22	568.33	581.81	0.0427	0.0478	0.0610	0.0743
RHC 2	(1,1)	72.05	73.03	74.21	76.57	0.0651	0.0776	0.0958	0.1201
	(1,2)	145.03	145.80	146.77	148.59	0.0271	0.0315	0.0378	0.0460
	(2,1)	448.19	454.85	462.84	478.47	0.0716	0.0840	0.1022	0.1258
	(2,2)	567.09	572.87	580.11	593.78	0.0513	0.0597	0.0717	0.0875
RHC 3	(1,1)	74.022	75.70	76.59	78.78	0.0892	0.1076	0.1167	0.1389
	(1,2)	146.66	147.96	148.63	150.23	0.0352	0.0415	0.0447	0.0527
	(2,1)	461.57	472.71	478.56	492.85	0.0955	0.1134	0.1223	0.1441
	(2,2)	579.22	588.99	594.09	606.29	0.0669	0.0788	0.0849	0.1001

with an increase in wt% of CNT reinforcement in the honeycomb sandwich plate configuration "RHC 3", which can be accredited to higher stiffness. It can also be observed that the peak responses of the ribbon reinforced hybrid honeycomb sandwich plate decrease in all the modes with increase in the wt% of CNT, which can be accredited to higher loss factors, and enhancement in stiffness.

It can be seen that the natural frequencies and loss factors increase in the order of RHC1, RHC 2, and RHC 3 (Fig. 11). It can also be observed that the addition of CNT-ribbon reinforcement in RHC 1, RHC 2, and RHC 3 along the corrugated direction, dominates the stiffness and damping. Further, it can be seen that configuration "RHC 3″ yields the highest natural frequencies and lowest amplitudes among the three samples of the hybrid honeycomb sandwich plate. This demonstrates that hybrid honeycomb sandwich structure can be effectively used in the attenuation of vibration of multi-layer structures. Hence, it can be concluded that the amplitude of vibration could be passively suppressed using the hybrid honeycomb sandwich plates and this can be expediently applied to a portion of large structural components in order to identify the efficiency of vibration control.

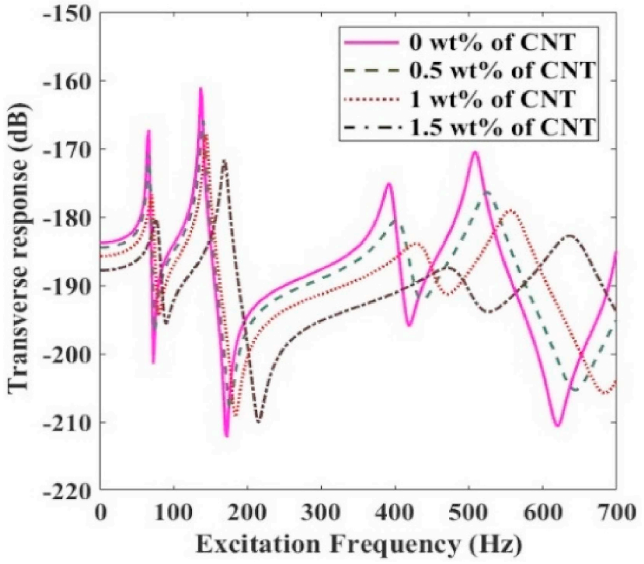


Fig. 10. Effect of CNT addition on the transverse vibration responses of double ribbon reinforced honeycomb composite sandwich plate configuration (RHC 3) under CFFF end condition.

6. Conclusions

This study investigated the dynamic characteristics of the three different ribbon reinforced hybrid honeycomb composite sandwich plate configurations. The governing differential equations of motion of ribbon reinforced hybrid honeycomb composite sandwich plates were represented in a finite element formulation using HSDT. Experimental investigations were also carried out on the various configurations of a ribbon reinforced hybrid honeycomb composite sandwich plates. A very good agreement was noticed among the results obtained using the present FEM and experimental results. The various parametric studies comprising the effect of variation in CNT wt% content, effect of honeycomb core thickness and transverse vibration responses on the

Table 9
Effect of variation in thickness of core on the variation of natural frequencies and loss factors of various ribbon reinforced hybrid honeycomb composite sandwich plates under CFFF end conditions.

Core material configurations	Mode (m,n)	Natural Frequencies (Hz)				Loss Factors (η)			
		2.5 mm	5 mm	7.5 mm	10 mm	2.5 mm	5 mm	7.5 mm	10 mm
RHC 1	(1,1)	51.35	74.47	94.63	112.84	0.1168	0.0999	0.0845	0.0731
	(1,2)	98.80	147.00	190.18	229.34	0.0431	0.0391	0.0360	0.0343
	(2,1)	322.30	464.58	586.95	695.84	0.1198	0.1063	0.0942	0.0858
	(2,2)	398.46	581.81	741.78	884.36	0.0820	0.0743	0.0682	0.0648
RHC 2	(1,1)	53.05	76.57	96.89	115.16	0.1394	0.1201	0.1023	0.0887
	(1,2)	99.98	148.59	192.05	231.46	0.0517	0.0460	0.0415	0.0386
	(2,1)	333.24	478.47	602.39	712.38	0.1421	0.1258	0.1108	0.1000
	(2,2)	407.61	593.78	755.62	899.89	0.0981	0.0875	0.0787	0.0732
RHC 3	(1,1)	54.83	78.78	99.26	117.60	0.1601	0.1389	0.1191	0.1037
	(1,2)	101.22	150.23	193.98	233.64	0.0599	0.0527	0.0467	0.0428
	(2,1)	344.60	492.85	618.22	729.17	0.1626	0.1441	0.1267	0.1137
	(2,2)	417.22	606.29	769.97	915.83	0.1134	0.1001	0.0887	0.0811

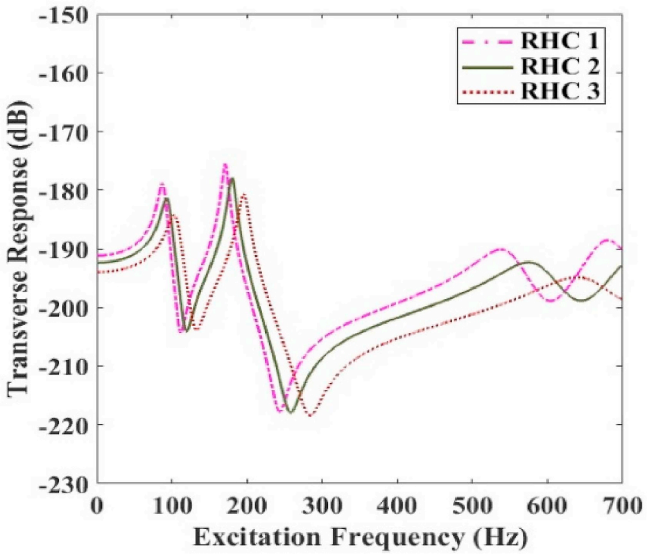


Fig. 11. A comparison of transverse vibration responses of three different configurations (RHC 1, RHC 2 and RHC 3) of ribbon reinforced honeycomb sandwich composite plate with 1.5 wt% of CNT under CFFF end condition.

natural frequencies and loss factors of the three different configurations. The several conclusions from the investigations are presented as follows:

- The complex shear modulus of the honeycomb structure increases with the increase in wt% of CNT which yields increase in shear and loss moduli.
- The natural frequencies and loss factors increase with the increase in wt% of CNT reinforcement in various configurations of the ribbon reinforced honeycomb composite sandwich plates.
- The strip reinforcement in the three different honeycomb core materials leads to increase in the natural frequencies and loss factors simultaneously, irrespective of the addition of CNT.
- Among the various ribbon reinforced honeycomb composite sandwich plate configurations, RHC 3 yields the highest stiffness followed by RHC 1 and RHC 2 due to the distributed strain energy.
- An increase in the thickness of core layer decreases the loss factors of the sandwich structures.
- A significant deviation in the natural frequencies is identified with the reinforcement of single and double ribbons at the various locations of honeycomb composite sandwich plate configurations.
- The transverse displacements of the various configurations of the hybrid honeycomb sandwich plate decrease with increase in CNT wt %.
- The peak responses of the honeycomb sandwich plates endorse that the amplitude of vibration could be suppressed considerably using the passive control methods.

Hence, it can be concluded that the applicability of ribbon reinforced hybrid honeycomb composite to critical parts of a huge structure to achieve a more efficient and compact control mechanism of vibration with adaptable damping has been evidenced.

Declaration of conflicting interests

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix A

The strain displacement field vectors for the top and bottom face sheets can be represented as:

$$\{\varepsilon\,(x,y)\}_{t,b} = \begin{Bmatrix} \left(\frac{\partial u_{0t,0b}}{\partial x}\right) & \left(\frac{\partial v_{0t,0b}}{\partial y}\right) & \left(\frac{\partial u_{0t,0b}}{\partial y} + \frac{\partial v_{0t,0b}}{\partial x}\right) \\ \left(\frac{\partial \theta_x}{\partial x}\right) & \left(\frac{\partial \theta_y}{\partial y}\right) & \left(\frac{\partial \theta_x}{\partial y} + \frac{\partial \theta_y}{\partial x}\right) \\ \left(\frac{\partial \phi_x}{\partial x}\right) & \left(\frac{\partial \phi_y}{\partial y}\right) & \left(\frac{\partial \phi_x}{\partial y} + \frac{\partial \phi_y}{\partial x}\right) \end{Bmatrix}^T \tag{A.1}$$

The shear strain displacement field vector for the top and bottom face sheets can be presented as:

$$\{\vartheta\,(x,y)\}^T = \left\{\left(\frac{\partial w_0}{\partial x} + \theta_x\right)\left(\frac{\partial w_0}{\partial y} + \theta_y\right)\left(-\frac{4}{h^2}\phi_x\right)\left(-\frac{4}{h^2}\phi_y\right)\right\}^T \tag{A.2}$$

The transverse shear properties of the core layers can be presented as:

$$[(G^*_{xz})_c] = \begin{bmatrix} G^*_{xz} & 0 \\ 0 & G^*_{xz} \end{bmatrix} \quad \text{and} \quad [(G^*_{yz})_c] = \begin{bmatrix} G^*_{yz} & 0 \\ 0 & G^*_{yz} \end{bmatrix} \tag{A.3}$$

The coefficient of transformed material can be presented as:

$$[Q_{ij}] = [T_1]^{-1}[\bar{Q}_{ij}]_k[T_1]^{-T} \quad (i,j = 1,2,6)$$

$$[Q_{ij}] = [T]_2^{-1}[\bar{Q}_{ij}]_k[T_2]^{-T} \quad (i,j = 5,4) \tag{A.4}$$

where

$$[T_1] = \begin{bmatrix} \cos^2\theta & \sin^2\theta & 2\cos\theta\sin\theta \\ \sin^2\theta & \cos^2\theta & -2\cos\theta\sin\theta \\ -\cos\theta\sin\theta & \cos\theta\sin\theta & \cos^2\theta - \sin^2\theta \end{bmatrix}$$

$$[T_2] = \begin{bmatrix} cos\,\theta & sin\,\theta \\ -sin\,\theta & cos\,\theta \end{bmatrix}$$

where T_1 and T_2 are the transformation matrices which have been used to obtain the material properties on the fiber direction.

$$[\overline{Q_{ij}}]_k = \begin{bmatrix} \overline{Q_{11}} & \overline{Q_{12}} & 0 \\ \overline{Q_{12}} & \overline{Q_{22}} & 0 \\ 0 & 0 & \overline{Q_{66}} \end{bmatrix} \quad (i,\ j = 1,\ 2,\ 6)$$

$$[\overline{Q_{ij}}]_k = \begin{bmatrix} \overline{Q_{55}} & 0 \\ 0 & \overline{Q_{44}} \end{bmatrix} \quad (i,\ j = 5,\ 4)$$

$$[\overline{Q_{11}}] = \left(\frac{E_1}{1 - (\nu_{12} * \nu_{21})}\right);$$

$$[\overline{Q_{12}}] = \left(\frac{(\nu_{12} * E_2)}{1 - (\nu_{12} * \nu_{21})}\right)$$

$$[\overline{Q_{22}}] = \left(\frac{E_2}{1 - (\nu_{12} * \nu_{21})}\right);\ [\overline{Q_{66}}] = (G_{12})$$

$$[\overline{Q_{55}}] = (G_{13});\ [\overline{Q_{44}}] = (G_{23})$$

where $[\overline{Q_{ij}}]_k$ denotes the constitutive matrix at the lamina.

The displacement vector for the top and bottom face sheets can be presented as:

$$\{d_{t,b}(x, y)\}^T = \left\{\left(\frac{\partial u_{0t,0b}}{\partial t}\right)\left(\frac{\partial v_{0t,0b}}{\partial t}\right)\left(\frac{\partial w_0}{\partial t}\right)\right.$$

$$\left.\left(\frac{\partial \theta_x}{\partial t}\right)\left(\frac{\partial \theta_y}{\partial t}\right)\left(\frac{\partial \phi_x}{\partial t}\right)\left(\frac{\partial \phi_y}{\partial t}\right)\right\}^T \tag{A.5}$$

Inertia matrix for the top and bottom face laminate can be presented as:

$$[I_{t,b}] =$$

$$\begin{bmatrix} I_{011} & 0 & 0 & I_{111} & 0 & -(I_{311}\,c_1) & 0 \\ 0 & I_{011} & 0 & 0 & I_{111} & 0 & -(I_{311}\,c_1) \\ 0 & 0 & I_{011} & 0 & 0 & 0 & 0 \\ I_{111} & 0 & 0 & I_{211} & 0 & -(I_{411}\,c_1) & 0 \\ 0 & I_{111} & 0 & 0 & I_{211} & 0 & -(I_{411}\,c_1) \\ -(I_{311}\,c_1) & 0 & 0 & -(I_{411}\,c_1) & 0 & (I_{611}\,c_1^2) & 0 \\ 0 & -(I_{311}\,c_1) & 0 & 0 & -(I_{411}\,c_1) & 0 & (I_{611}\,c_1^2) \end{bmatrix} \tag{A.6}$$

where

$$I_{011},\ I_{111},\ I_{211},\ I_{311},\ I_{411},\ I_{611} = \int_{-h/2}^{h/2} \rho\,(1,\ z,\ z^2,\ z^3,\ z^4,\ z^6)\ dz;$$

$$c_1 = \frac{4}{3h^2}$$

Inertia matrix for the core layer can be presented as:

$$[I_c] = \begin{bmatrix} c_3^2 & 0 & C_1 & 0 & c_3 & C_2 & 0 & C_3 & 0 \\ 0 & c_3^2 & 0 & C_1 & 0 & 0 & C_2 & 0 & C_3 \\ C_1 & 0 & c_4^2 & 0 & 0 & C_4 & 0 & C_5 & 0 \\ 0 & C_1 & 0 & c_4^2 & 0 & 0 & C_6 & 0 & C_5 \\ 0 & 0 & 0 & 0 & C & 0 & 0 & 0 & 0 \\ C_2 & 0 & C_4 & 0 & 0 & c_5^2 & 0 & C_6 & 0 \\ 0 & C_2 & 0 & C_4 & 0 & 0 & c_5^2 & 0 & C_6 \\ C_3 & 0 & C_5 & 0 & 0 & C_6 & 0 & c_6^2 & 0 \\ 0 & C_3 & 0 & C_5 & 0 & 0 & C_6 & 0 & c_6^2 \end{bmatrix} \tag{A.7}$$

where

$C = \rho \times t_c$; $C_1 = c_3 \times c_4$; $C_2 = c_3 \times c_5$; $C_3 = c_3 \times c_6$; $C_4 = c_4 \times c_5$; $C_5 = c_4 \times c_6$; $C_6 = c_5 \times c_6$; $c_3 = \left(\frac{1}{h_c}\right)$; $c_4 = -\left(\frac{1}{h_c}\right)$; $c_5 = -\left(\frac{d-h_c}{h_c}\right)$; $c_6 = \left(\frac{d-h_c}{3(h_c)}\right)$

The shape functions for the sandwich plate elements can be presented as:

$$N_1 = \left(\frac{1}{4}\right)(1-\xi)(1-\eta);$$

$$N_2 = \left(\frac{1}{4}\right)(1+\xi)(1-\eta);$$

$$N_3 = \left(\frac{1}{4}\right)(1+\xi)(1+\eta);$$

$$N_4 = \left(\frac{1}{4}\right)(1-\xi)(1+\eta) \tag{A.8}$$

The strain displacement matrices for the sandwich plate elements can be presented as:

$$[B_{t,b}(x,y)] = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{\partial N_i}{\partial x} & 0 & \frac{\partial N_i}{\partial y} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\partial N_i}{\partial y} & \frac{\partial N_i}{\partial x} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\partial N_i}{\partial x} & 0 & \frac{\partial N_i}{\partial y} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\partial N_i}{\partial y} & \frac{\partial N_i}{\partial x} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \frac{\partial N_i}{\partial x} & 0 & \frac{\partial N_i}{\partial y} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & \frac{\partial N_i}{\partial y} & 0 \end{bmatrix}$$

$$(i = 1,\ 2,\ 3,\ 4) \tag{A.9}$$

$$[B_s(x,y)] = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{\partial N_i}{\partial x} & N_i & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\partial N_i}{\partial y} & 0 & N_i & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_2 \times N_i & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & c_2 \times N_i \end{bmatrix}$$

$$(i = 1,\ 2,\ 3,\ 4) \tag{A.10}$$

$$[B_c(x,y)] = c_3\begin{bmatrix} N_i & 0 & -N_i & 0 & e\frac{\partial N_i}{\partial x}\cdots \\ 0 & N_i & 0 & -N_i & e\frac{\partial N_i}{\partial x}\cdots \\ \cdots -(d-h_c)N_i & 0 & \frac{d-h_c}{3}N_i & 0 & \\ \cdots & 0 & -(d-h_c)N_i & 0 & \frac{d-h_c}{3}N_i \end{bmatrix} \quad (A.11)$$

where

$$[N_i(x,y)] = \begin{bmatrix} N_i & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & N_i & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & N_i & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & N_i & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & N_i & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & N_i & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & N_i & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & N_i & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & N_i \end{bmatrix}$$

$$(i = 1,\ 2,\ 3,\ 4) \quad (A.12)$$

where $e = \left(\frac{h_c}{a}\right)$; $[(G^*_{xz,yz})_c] = \begin{bmatrix} G^*_{xz} & 0 \\ 0 & G^*_{yz} \end{bmatrix}$; $[(G^*_{xz})_c] = \begin{bmatrix} G^*_{xz} & 0 \\ 0 & G^*_{xz} \end{bmatrix}$; $[(G^*_{yz})_c] = \begin{bmatrix} G^*_{yz} & 0 \\ 0 & G^*_{yz} \end{bmatrix}$

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tws.2019.106365.

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Tensile, Flexural and Surface Hardness Properties of Wool Grit/Silicone Polymer Composites

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Abstract*: Grit fortified polymer Compounds obligate numerous tenders as a class of auxiliary ingredients as a result of the instance of manufacture, generally minimal effort of generation. The grit which fills in as a fortification in strengthened plastics might be engineered or regular. An examination has been completed to utilize Wool grit which is a characteristic grit copiously accessible in India. The target of the contemporary graft is to think about the impact of grit stacking and mechanical conduct of Wool grit fortified Silicone Polymer Compoundss. This paper demonstrates the assessment of elasticity, flexural quality and external rigidity of the Wool-Silicone Polymer Compounds. It likewise finishes up the impact of grit stacking on elasticity, flexural quality and external rigidity of the Wool Silicone Polymer Compounds.

Key words*: Wool Grit; Silicone Polymer; Tensile test; Flexural test; Hardness test.

I. INTRODUCTION

Whenever at least two ingredients with various properties are consolidated together, they structure a Compounds material [1-4]. Compounds are multifunctional material frameworks that give qualities not realistic from any discrete material [32-35]. They are firm structures made by physically joining at least two good ingredients, distinctive in piece and qualities and once in a while in structure [5-9]. The Compounds are multiple ingredients which contrast from combinations by the way that the individual parts hold their qualities however are so consolidated into the Compounds as to exploit just of their properties and not of their deficiencies, so as to acquire improved ingredients [10-15].

This broadside demonstrates the conduct of mechanical properties under grit stacking [36,37]. Assessment examples are set up by hand lay-up strategy utilizing Wool as regular grit fortification in polymer network utilizing Silicone Polymer sap and hardener [15-20]. Regular Wool strands treated by sodium hydroxide to expel dampness. Grit sheets remained arranged and afterward blue-penciled into wanted contour and measurements [21-25].

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II. EXPERIMENTAL

Examples for tractable, flexural and rigidity tough remained set up in polymer framework Compounds alongside Wool normal grit. Following table 1 demonstrates the organization of different examples arranged [21-23].

Table 1: Illustration Configuration

Configuration	No. of Trials
Silicone Polymer	15
Silicone Polymer (95%) + Wool Grit (5%)	15
Silicone Polymer (90%) + Wool Grit (10%)	15
Silicone Polymer (80%) + Wool Grit (20%)	15
Silicone Polymer (75%) + Wool Grit (25%)	15
Silicone Polymer (70%) + Wool Grit (30%)	15

Table 2: Summary of tests

Assesment	Machine Used	Operational Variables	No of Sampling Verified	Standard Used
Malleable	1.0kN UTM	Weight cell = 600KN Rate = 6mm/min	30	ASTM D638 [24]
Flexural	1.0kN UTM	Weight cell = 600KN Rate =1.32mm/min	30	ASTM D790 [25]
Hardness	Rockwell hardness tester, PSI New Delhi	l indentor size = ¼ inch	30	ASTM D785 [26]

Categorization of Mechanical Possessions:

Malleable and flexural assessments are done on Instron 3382, 1.0kN UTM at a hotness of 23±2˚C, and with comparative stickiness of 38±5% [22-27]. Tough systems is done in ASTM D638 for tractable tests and ASTM D790 for flexural tests. Rockwell Rigidity assessment is through as per ASTM D785

[28-31].

Consequences:

The possessions of Wool grit fortified Silicone Polymer Compoundss with various grit stacking underneath this examination exhibited in table 3.

Table 3: Mechanical qualities of Compounds

Grit Content (%)	Orientation (degree)	Tensile Strength (MPa)	Flexural Strength (MPa)	Hardness (HRL)
0	Random	18.16	19.03	46
5	Random	26.22	27.88	49
10	Random	37.98	37.48	56
15	Random	45.28	43.82	62
20	Random	*53.61*	*51.47*	*67*
25	Random	46.91	48.15	68

Impact of grit stacking on elasticity:

Figure 1 demonstrates the impact of grit stacking on elasticity of Wool grit Compounds substantial.

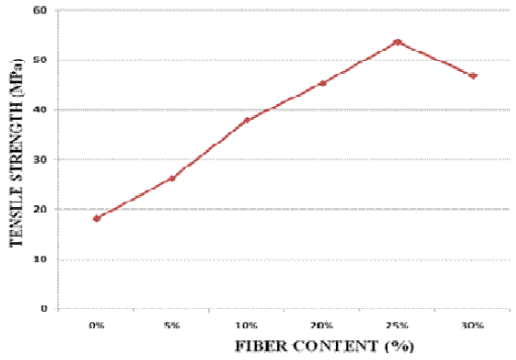

Figure 1: Effect of grit stacking on elasticity of Compounds

Impact of grit stacking on flexural quality of Composites:

Figure 2 demonstrates the impact of grit stacking on flexural quality of Wool grit Compounds substantial.

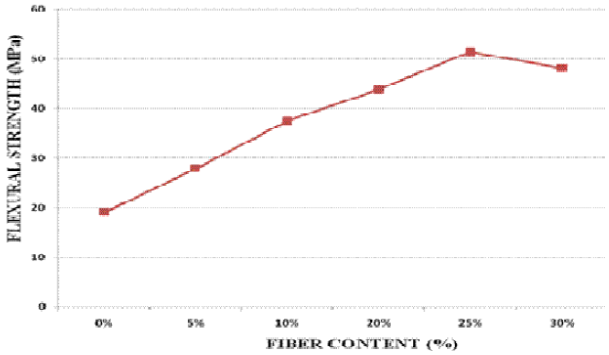

Figure 2: Consequence of grit stacking on flexural qualityof Compounds

Impact of grit stacking on superficial rigidity of Composites:

Figure 3 demonstrates the impact of grit stacking on superficial rigidity of Wool grit Compounds substantial.



Figure 3: Consequence of grit stacking on external rigidity of Compounds

III. CONCLUSION

The contemporary investigation demonstrates that the elasticity of Wool-Silicone Polymer Compounds increments to the specific degree of grit stacking and afterward begins diminishing on further grit stacking. The greatest estimation of elasticity is acquired at 25wt% of grit stacking also investigation uncovers that the flexural quality of Wool-Silicone Polymer Compounds increments to the specific degree of grit stacking and after that begins diminishing on further grit stacking. The most extreme estimation of flexural quality is acquired at 25wt% of grit stacking. Likewise demonstrates that the miniaturized scale external rigidity of Wool-Silicone Polymer stacking and after that the rigidity is almost steady.

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Experimental Research on Abaca/Agave/ Fly ash Nano Powder Reinforced Hybrid Composites

T. Naresh Kumar, D. David and S. Shankaranarayanan

Abstract*: Regular grit are those which are made normally, for example, Abaca, Jute, Hemp, cotton, hair, fleece coir and etc. Because of numerous points of interest Ordinary grit are supplanting glass grit and carbon grit, for example, its biodegradable nature so it dumps it beyond all detectable inhibitions space after it takes retirement, and its simplicity of accessibility, low weight, and better quality in multi hub support with including Nano powder particles with it. In this examination work motorized conduct of Flyash Nano powder/Abaca/Agave grit strengthened epoxy based half and half compounds and its creation has been considered. Work has been done to examine the flexural properties,tensile quality, hardness, and effect quality of the compounds. It has been seen that effect quality is improved with the expansion in the weight portion of normal strands to certain degree. The morphology of compounds is contemplated by utilizing Scanning Electron Microscope (SEM).

***Key words*: Abaca, Agave, Flyash nanopowder, Scanning Electron Microscope.**

I. INTRODUCTION

Regular grit fortified compounds are elective ingredients for some building applications, for example, aviation applications, little wind turbine edges, and vehicle applications [1-3]. Characteristic grit show indicates prevalent properties, for example, ductile, fk=lexural and sway at that point glass grit [3-5]. The primary points of interest of common strands are of ease, light weight, simple generation and amicable to condition [6]. Then again, there are a few downsides, for example, their poor mechanical properties and high dampness assimilation [32-34]. The fortification can be manufactured (for example glass, carbon, boron and aramid) or of regular sources [35-37]. By the by, some composite segments recently fabricated with glass strands are presently created with characteristic filaments [7-9]. Applications including entryway boards, trunk liners, instrument boards, inside rooftops, bundle racks, among other inside segments, are as of now being used in European autos because of the more positive financial, natural and social parts of the vegetable filaments [10-12]. Low degree of volume part of filaments gave not just higher modulus of versatility and mechanical quality under elastic and flexural loadings yet in addition have estimations of obvious thickness, evident porosity and water ingestion [13]. The expansion of Flyash can improve the firmness by keeping up its low thickness [14-16]. The quality of short grit compounds relies upon the sort of grit network, grit length, grit direction, grit focus and the holding between the grit and grid matrix [17].

II. EXPERIMENTAL

A. Ingredients

The fundamental points of interest of normal filaments are their accessibility, biodegradable, sustainable, natural cordial, minimal effort, low thickness, high explicit properties, great warm properties and improved the vitality recuperation, low vitality utilization, nonabrasive nature and ease [18]. These strands are ease filaments with low thickness and high explicit properties which are similar to manufactured filaments. The crude ingredients utilized in this work are, Abaca grit, Agave grit , Flyash Nano power Epoxy , Hardener.

B. Methodology

Strands in this exploration it compounds are manufactured by hand layup process. Abaca and Agave were cut into the components of length and broadness of 300×200mm was utilized to set up the example. The composite example comprises of absolutely 6 woven layers. A measure amount of gum and Flyash are taken and which is get blended with hardener in the proportion of 1:1 [19]. The layers of strands were manufactured by including the required measure of epoxy tar, 17% of Abaca ,17% of Agave and 6% of Flyash Nano powder is utilized. The six 6 layers of various strands (Abaca and Agave) are created utilizing hand layup process. The epoxy pitch connected is conveyed to the whole surface by methods for roller [20-24]. The air holes framed between the layers during the preparing were delicately crushed out, the handled wet composite were then squeezed hard and abundance sap is evacuated. At that point it is dried by keeping it in environmental conditions for 1 day to get the ideal examples as appeared in figure 1.

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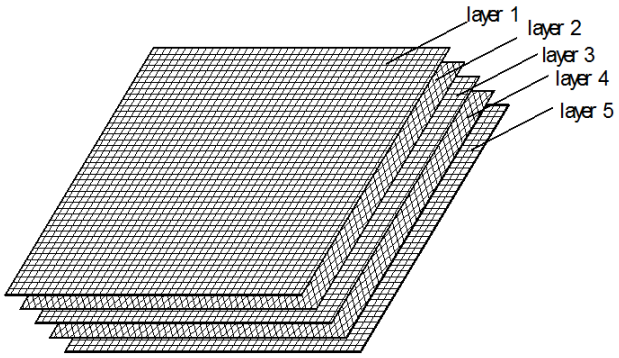

Figure 1 Multiaxial layers of Abaca and Agave

After composite ingredients dried totally, undesirable surfaces are to be evacuated utilizing optional tasks and furthermore cut the ingredients according to the required ASTM models [25-27].

C. Characterization

Malleable example

Elasticity of the example is dictated via conveying tractable test on UTM pursued by ASTM Standards. The standard utilized for elasticity id ASTM D3039. It has been manufactured by the ASTM Standards [28-29].

Sort of test: Tensile quality

Standard: ASTM D3039



Figure 2: Specimens for Tensile Test

Flexural specimen

Flexural quality of the example is dictated via conveying elastic test on UTM pursued by ASTM Standards. Threepoint twisting trial of composite example is done in ASTM D 790 test standard. A uniaxial burden was connected through both the end [30]. Sort of test: 3-point Flexural Test

Standard:ASTMD 790



Figure 3: Specimens for Flexural Test

Effect example

The vitality consumed by the material is found by charpy testing pursued by ASTM Standard of ASTM E23-15b [31] as appeared in figure.



Figure 4: Specimen for Impact Test compounds

III. RESULTS AND DISCUSSION

Pliable test

It is discovered that rigidity of woven Abaca/Agave fortified with Epoxy/Flyash Resin are given horrible outcomes.

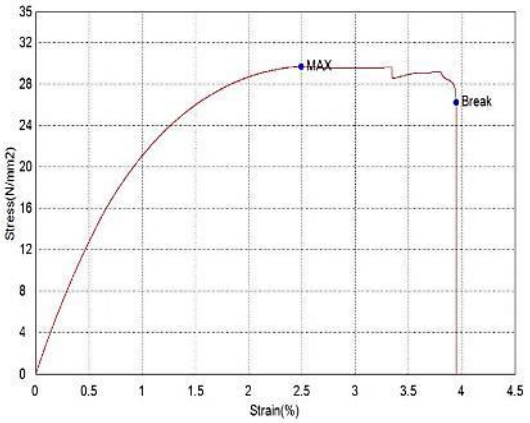

Fig 5 : Stress Vs strain diagrams for Tensile test (Specimen 1)

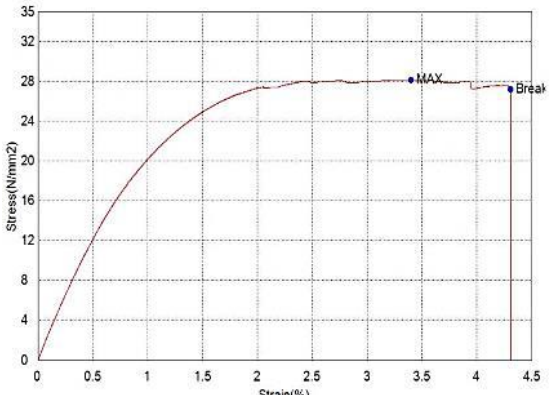

Fig 6: Stress Vs strain diagrams for Tensile test (Specimen 2)

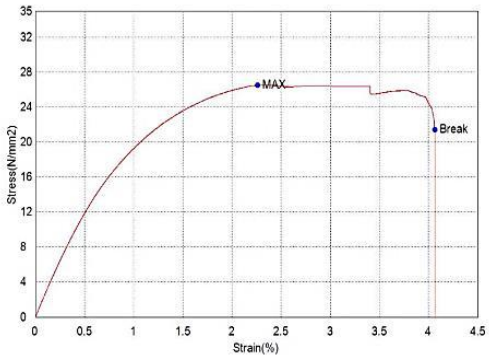

Fig 7 : Stress Vs strain diagrams for Tensile test (Specimen 3)

Flexural test

Figure demonstrates the subtleties of flexural results for three number of examples. From the beneath diagram of pressure versus strain it is seen that normal flexural worry of material is 64 N/mm2.

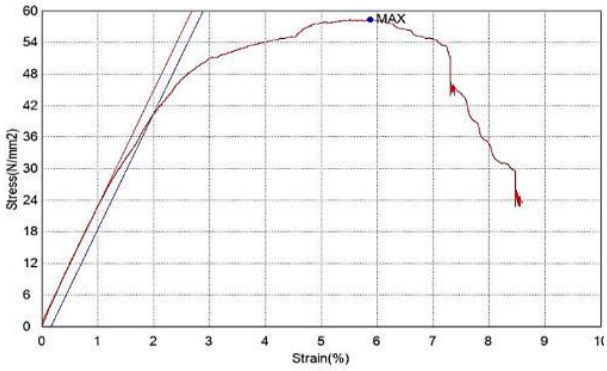

Fig 8 : Stress Vs strain diagrams for Flexural test (Specimen 1)

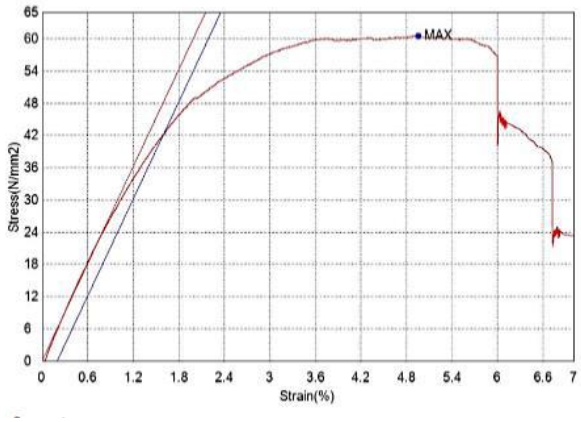

Fig 9 : Stress Vs strain diagrams for Flexural test (Specimen 2)

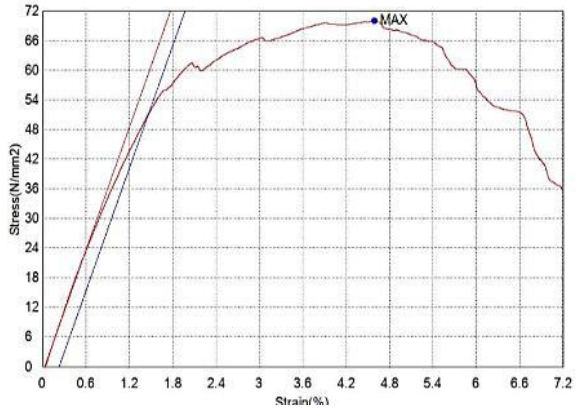

Fig 10 : Stress Vs strain diagrams for Flexural test (Specimen 3)

Effect test Effect test is led to investigations the vitality consumed by the example for unexpected connected burden. The effect test is finished by charpy effect test machine. From the table 1 it is seen that normal effect quality of composite material is 136.44 KJ/m2.

Table 1 Impact Strength of compounds

Specimen	Impact strength(KJ/m^2)
1	141.23
2	98.47
3	171.32

5.6. SEM Analysis

The accompanying Figure 11. demonstrates test's surface geography of Abaca/Agave strengthened with Flyash nanopowder/epoxy tar after creation. The SEM test demonstrates the different of mechanical properties through stage dissemination data. Figure demonstrates that period of Abaca/Agave/Flyash nanopowder/epoxy fortified epoxy composite. It is seen that because of hand layup process, Flyash and epoxy pitch are taken uneven surfaces which may diminish elastic and flexural properties similarly however it is demonstrated that this uneven surfaces of Flyash and sap may build sway quality of material.

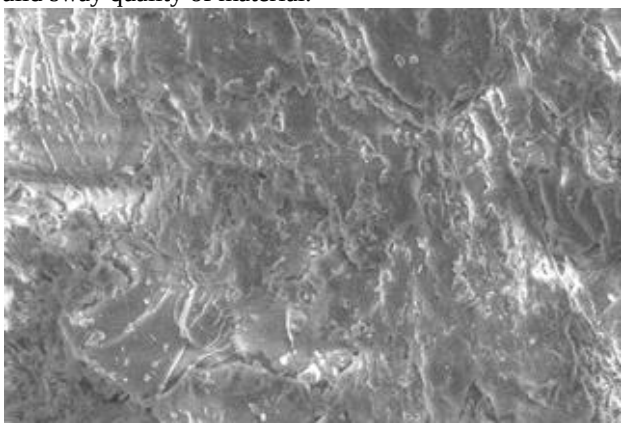

Figure 11: SEM Images of Abaca/Agave/Flyash Nano Powder Reinforced Hybrid Compounds

IV. CONCLUSION

Common grit strengthened compounds structure one such class of ingredients which gangs predominant mechanical properties as well as bio-degradable in nature. Normal grit fortified compounds can be a potential applicant where they can supplant the convential material arrangement of wind industry. Be that as it may, it is absurd to totally supplant the engineered strands by common filaments just, so as to show signs of improvement properties, it is fundamental to utilize some measure of Nanopowder, for example, Flyash to improve its mechanical properties with low thickness. From this exploration it is discovered that including 6% of Flyash Nanopowder in Epoxy which improves the effect quality of material upto 137.66 KJ/m^2, Tensile quality upto 28 N/mm^2, and flexural quality 63 N/mm^2 with keeping up low material thickness.

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Experimental Research of Silane Treatment on Bamboo and Aramid Hybrid Composites

T. Naresh Kumar, D. Logendran, P. Karthick, A Arun Raja, A. Abraham Eben Andrews

Abstract*: The first and most significant target was to make composite exploiting aramid grit alongside common grit by surface change and acquire combination that has aggressive possessions by diminishing its aramid content as it is costly and its utilization causes carcinogenic though characteristic strands are eco-accommodating just as copiously accessible and its least expensive as well.

Keywords*: Bio-degradable, Nano-Bio Interface, Bio compounds.

I. INTRODUCTION

Bio compounds are compound materials, that is, materials shaped by a network (tar) and a support of common strands (normally got from plants or cellulose) [1-3]. Bio compounds are the blend of regular strands (bio grits, for example, wood filaments (hardwood and softwood) or non - wood strands with polymer frameworks from both of the inexhaustible and nonrenewable assets [4-6].

Bio compounds regularly impersonate the structures of the living materials associated with the procedure, notwithstanding the reinforcing properties of the framework that was utilized, yet at the same time giving biocompatibility, for example in making frameworks in bone tissue building [7-10]. The level of biodegradability in bio - put together polymers depends with respect to their structure and their administration condition [11-13].

Compounds are those materials that contain at least two unmistakable constituent stages, on a scale bigger than the nuclear [14-17]. The term 'Bio compounds' alludes to those compounds that can be utilized in bioengineering. The constituents of the compound hold their personalities in the compound [18-21]. Specifically, they don't break down or generally consolidate totally into one another in spite of the fact that they demonstration in show. In compounds, properties, for example, the versatile modulus can be altogether not quite the same as those of the constituents alone, yet are extensively adjusted by the constituent structures and substance [22-25].

From a basic perspective, compounds are anisotropic in nature. Further, investigation into organic inorganic interfaces centers around the plan, blend, and portrayal of novel amalgams that circuit natural and inorganic materials [26-29]. The combination of "delicate" natural and natural atomic congregations with "hard" inorganic nano-structures is of uncommon intrigue as a result of the chance to join typically dissimilar substance and physical properties inside a solitary framework [30-33].

Soluble base treated alongside Silane preserved and unprocessed filaments crossover compound was readied and every one of the kinds of physical and concoction properties examined [44-50]. Compound change utilizing Silane as a coupling operator shows better improvement in properties of both Bamboo/Aramid Hybrid compound just as in Aramid Compound moreover. All the Silane treated compound demonstrated preferred execution over untreated compound [34].

Execution properties of compound having different application in substantial and non material. Silane has an additional bit of leeway both physical and synthetic properties improvement.Diverse grit adjustment procedures can be exploited to recover its mechanical just as synthetic possessions [35] Different regular strands which are bio degradable and plentifully accessible can be make use of as fortification material with man made filaments with diverse breeds of thermoset and thermoplastic saps [51-54]. Composite framed can be used for basic applications, for making guard of vehicles and internal framing of vehicles and dashboards [36-38].

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II. EXPERIMENTAL METHODS

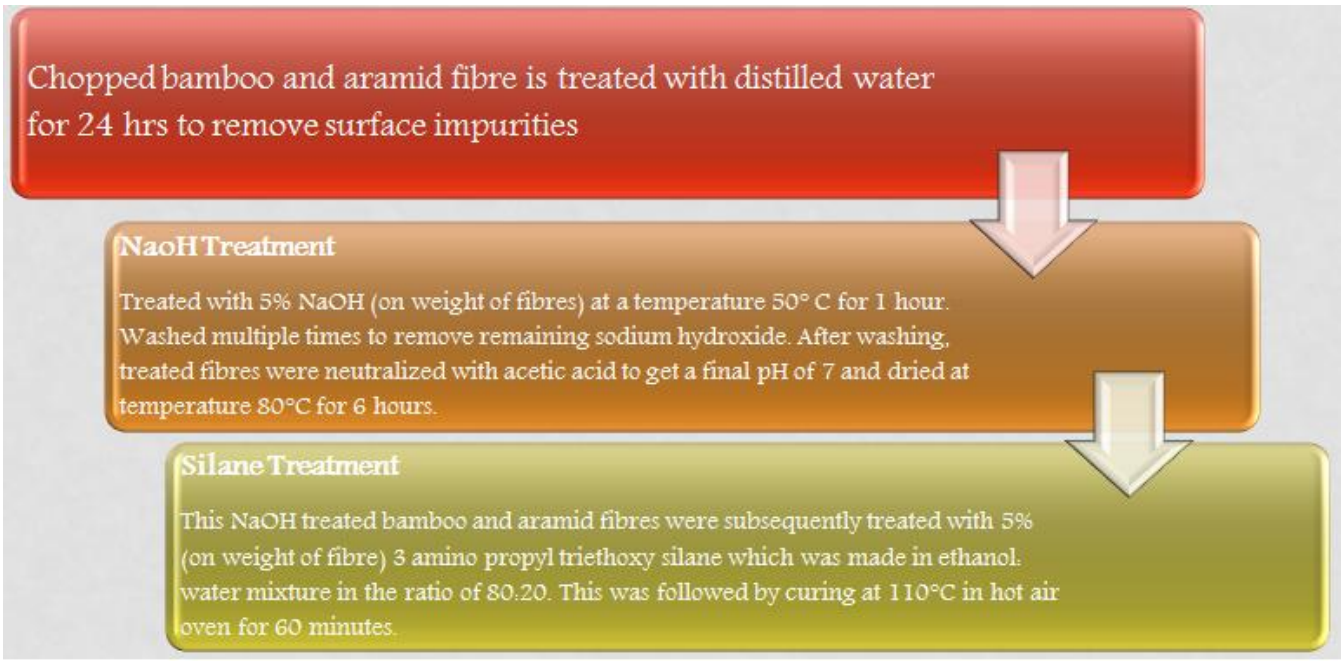


Fig 1 Surface modification of Bamboo and Aramid Fibre [39-41]

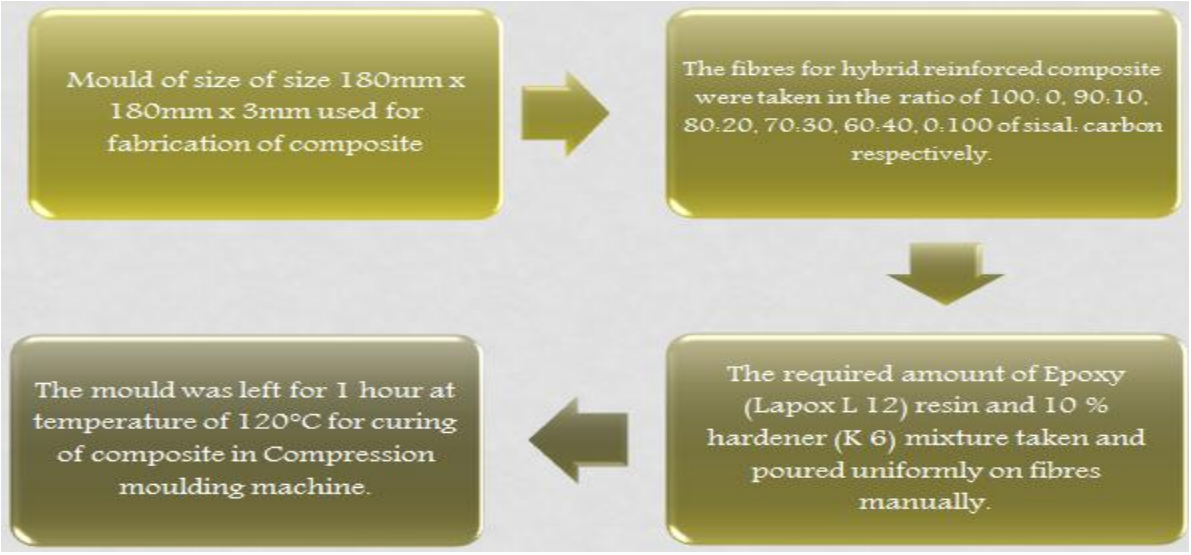


Fig 2 Mould and compound specimen preparation[42-44]

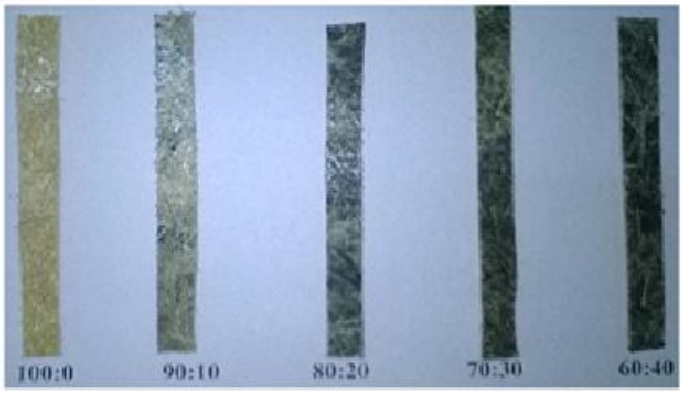


Fig 3 Silane Preserved of Bamboo&Aramid hybrid Compounds.

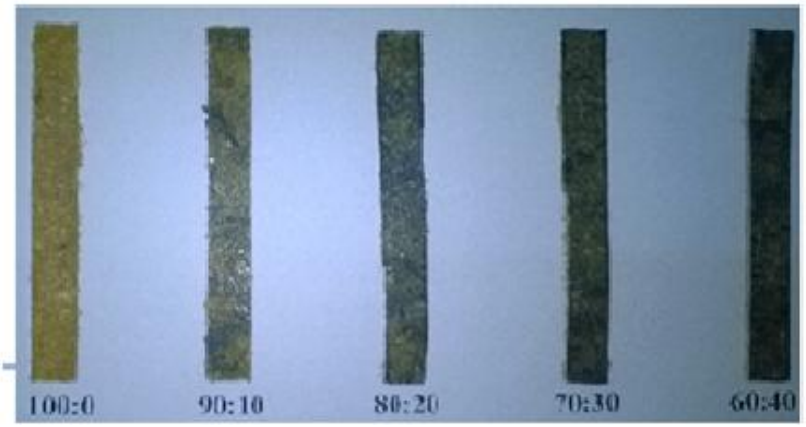
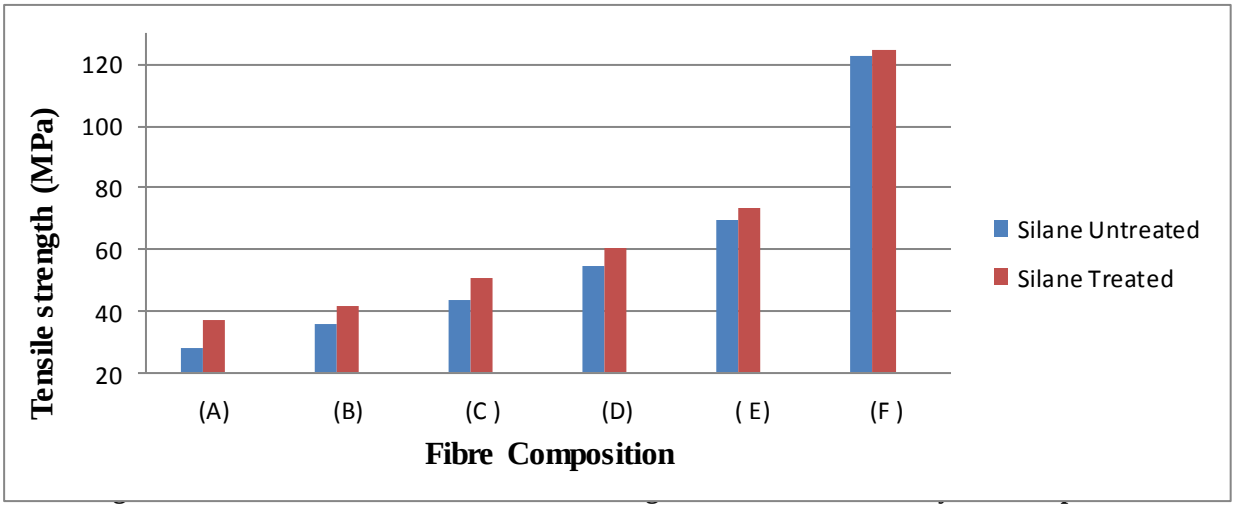


Fig 4 Silane Un Preserved of Bamboo&Aramid hybrid Compounds.

III. RESULT AND DISCUSSION



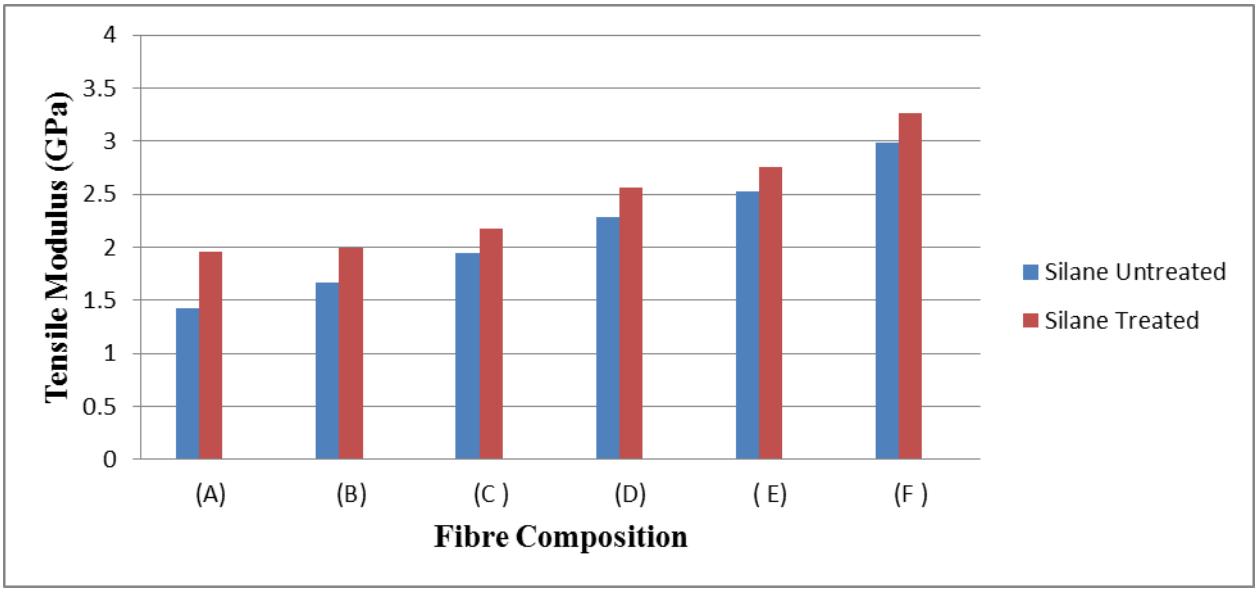


Fig 4 Effect of Silane Treatment on Tensile modulus of Bamboo: Aramid hybrid Compounds.

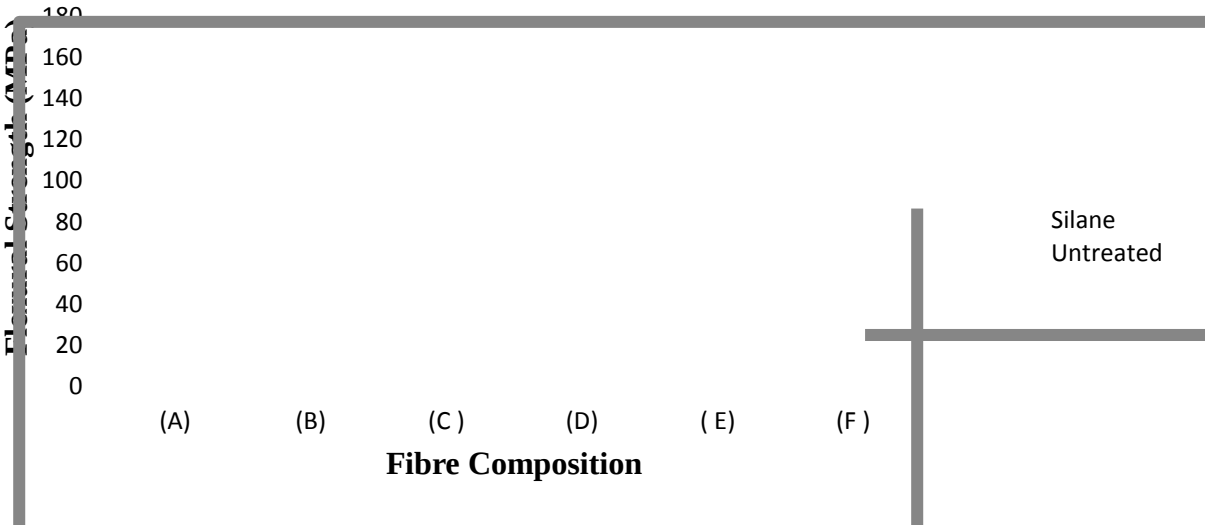


Fig 5 Effect of Silane Treatment on Flexural Strength of Bamboo: Aramid hybrid Compounds

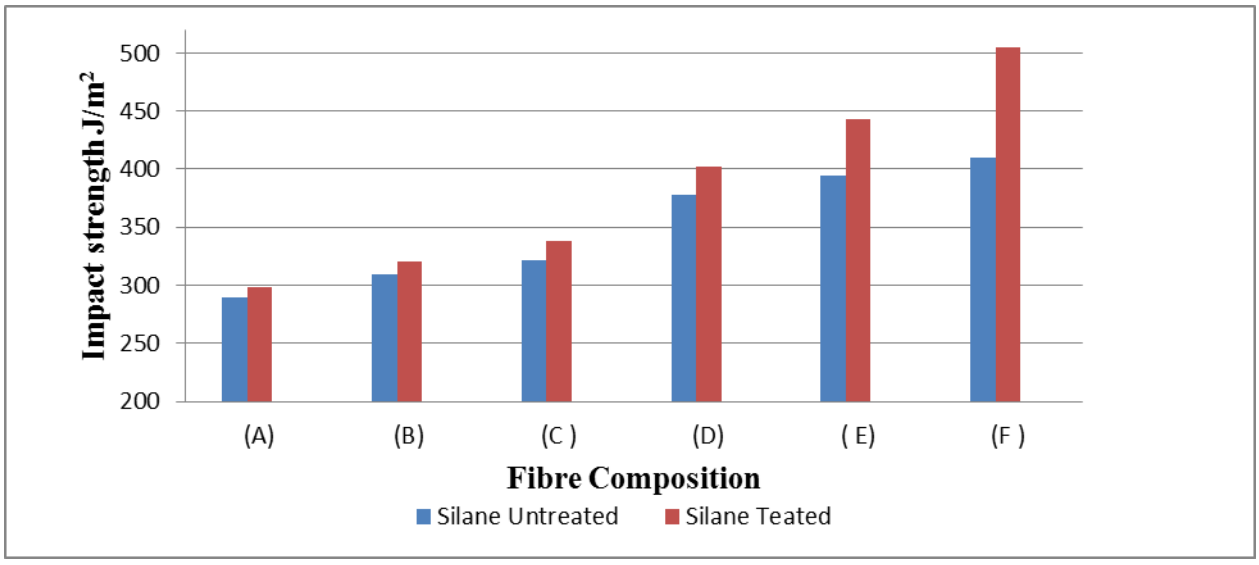


Fig 6 Effect of Silane Treatment on Izod Impact Strength of Bamboo: Aramid hybrid Compounds

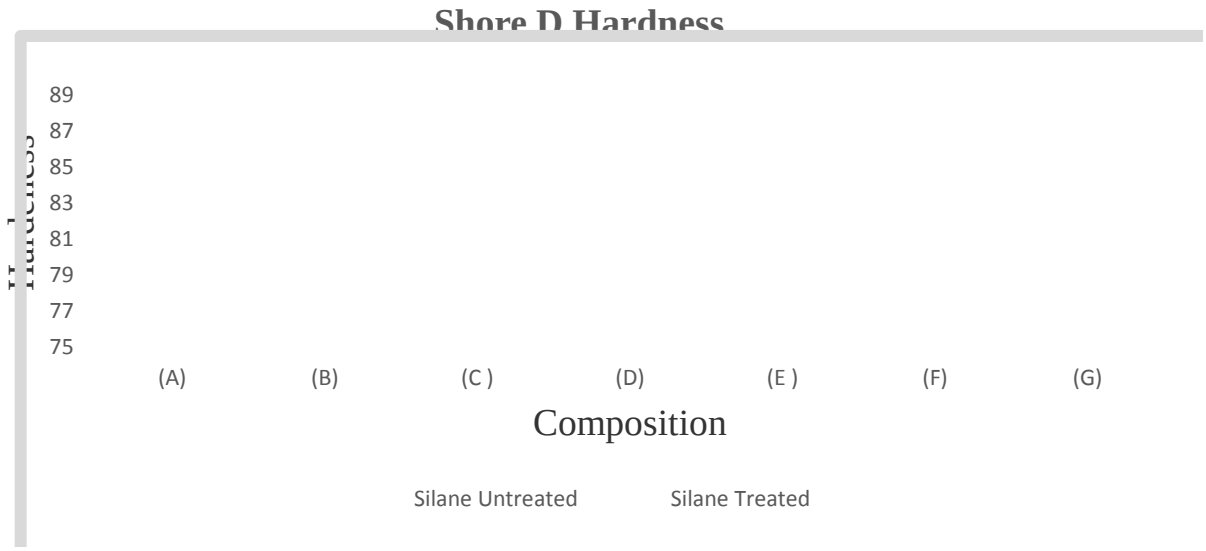


Fig 7 Effect of Silane Treatment on Hardness of Treated and Untreated Bamboo: Aramid hybrid Compounds

IV. CONCLUSION

Biocompounds offer open doors for ecological increases, diminished vitality utilization, protection and sound retention properties. These days, Use of Biocompounds in structure ingredients offers a few points of interest, for example, shabby, lightweight, natural neighborly, bio - inexhaustible, and increasingly solid. In any case, they have a few weaknesses also, for example, dampness ingestion and photochemical corruption in view of the UV contaminations. Moreover, biocompounds offer open doors for natural additions, decreased vitality utilization, protection and sound ingestion possessions biocompounds, their focal points, restrictions, their worldwide generation, and their monetary. Moreover, this paper displayed at this juncture is extremely valuable accumulation of the cutting edge papers comprises a precious springboard to making biocompound advancements of tomorrow.

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Effect of Chemical Treatment on Alpaca Fleece Reinforced Polymer Composites

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Abstract*: Fiber which is a fortification reinforced additionally manufactured characteristic investigations demonstrate solitary counterfeit strands like glass, carbon and so on., are utilized in fiber supported plastics. despite the fact that have extraordinary explicit quality, their grounds of utilization are self-same constrained inferable from their characteristic more expensive rate of creation. In this association, partner degree examination has been distributed to frame utilization of Alpaca fleece a fiber plentifully available in Bharat. Regular filaments don't appear to be just strong and lightweight however moreover generally the most reduced. Alpaca fleece compounds are created and their mechanical possessions remain assessed. Mechanical properties of Alpaca fleece /polymer and contrasted and glass fiber/amino..

***Keywords*: Alpaca fleece ; Polymer; Chemical treatment.**

I. INTRODUCTION

Compound ingredients are generally grouped by kind of support, for example, concrete and framework mixtures are for the most part economically delivered composites in which gum is utilized as grid with various strengthening materials [1-4]. The distinctive sort of fiber is characteristic (plant, creature) aimed at various application [5-8]. Bond framework composites are comprised of concrete and with total and essentially utilized in structure applications [9]. Characteristic strands have numerous striking favorable circumstances over engineered filaments [10-12]. Regular filaments are to a great extent partitioned into three classes relying upon their beginning: for example, simple accessibility, sustainability of crude materials, minimal effort, light weight and high explicit quality, and solidness. It is normal that sooner rather than later supplant manufactured any rate particular existence [13-15].

II. EXPERIMENTAL

Basic Treatment

A beaker measuring utencil is taken and 2% KmNO4 is included and 98% of refined aquatic is included and an answer is ended. After sufficient drying of the strands in ordinary concealing for 180 min, the filaments are taken and absorbed the readied KmNO4 arrangement [16-18].

Test arrangement

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The examples remained readied utilizing the strands and amino, which are dealt with distinctively in the preparing. The molds are gutted and dehydrated earlier smearing amino [19-23]. Beeswax remained utilized as the discharging operator [45,46]. On account of glass fiber/amino manufacture, the amino blend is laid consistently over the shape utilizing a brush [22-24]. At that point a coating of the slashed element tangle is connected ended the coating of amino [25-28]. Presently the shape is shut and compacted for a relieving time of 24 h. For ALPACA FLEECE /amino creation, the ALPACA FLEECE strands were laid consistently over the shape before applying any discharging specialist or amino. At that point the packed type of ALPACA FLEECE is expelled from the form [29-32].

Mechanical Testing

Afterward manufacture the assessment examples remained exposed to different mechanical assessments according to ASTM benchmarks [47]. The mechanical assessments that are ductile test, sway test, flexural test, wear test [33-35]

Flexural Test

Flexural test was led to ponder the conduct and capacity of substantial below bowing burden [48]. The heap was connected to the example until it is absolutely break. The flexural assessment was directed for three distinct sorts of external medicines of grit compounds [36-38].

Effect Test (Izod Method)

Effect is a solitary opinion assessment that estimates a materials protection from effect from a fluctuation weight [39-41]. Effect is characterized as the active vitality expected to start break and proceed with the crack up to the example is wrecked [49-51]. This test can be utilized as a snappy and simple superiority control check to decide whether a material meets explicit effect properties or to look at materials for general strength [42-44].

III. RESULT AND DISSUSSION

The created ALPACA FLEECE grit fortified combinations was exposed to different tests to assess their mechanical possessions. All examples were set up under the determinations of ASTM standard.

Ductile Property

Rigidity of the compound was determined via greatest burden to which the factual can endure.

It is generally an all inclusive testing machine stacked with an example amongst two grasps that remain moreover balanced physically or consequently to spread over power to the example. Substantial to be tried must be sliced to a particular shape in order to fit the grasps, most normally as a canine bone shape when level sheet is being tried. When the fiber surface was altered with a fluid KmNO4 arrangement elasticity of the compound seemed to improve observably. The rigidity increments coming about because of the pre-impregnation procedure brought about an improvement of the mechanical interlocking be that as it may an expansion in the elasticity was watched.

Table 2. Load Vs fiber length

TREATMENT	LENGTH OF FIBER IN (mm)			
	5	7	9	11
AK	770 N	940 N	710 N	650 N
AC	990 N	660 N	670 N	1044 N
UT	1100 N	750 N	650 N	1040 N
BZ	830 N	940 N	590 N	950 N

Flexural Property

The flexural quality of the ALPACA FLEECE /amino fiber compounds contrived an element of the diverse fortitude outward medications are appeared in Table. 3

Table 3. Load Vs Fiber length

TREATMENT	FIBER IN LENGTH (mm)			
	5	7	9	11
AK	71 N	31 N	69 N	33 N
AC	57 N	53 N	34 N	44 N
UT	63 N	64 N	65 N	44 N

Effect Property

Effect is a solitary point test that estimates a ingredients protection since effect from a undulation weight. Effect is characterized as the dynamic vitality expected to start break and proceed with the crack awaiting the example is wrecked.

Table 4. Impact strength Vs fiber length

TREATMENT	FIBER IN LENGTH (mm)			
	5	7	9	11
AK	20 J	28 J	14 J	14 J
AC	22 J	22 J	17 J	22 J
UT	17 J	18 J	21 J	15 J
BZ	23 J	16 J	15 J	14 J

Scanning electron microscope analysis

Toward get the SEM pictures masterminded models remained cutted and presented to sizzle covering in solicitation to obtain the conductive shallow and besides to keep up a vital good ways from the dashing of electron bars despite the fact that getting the surface nuances. The SEM micrograph of the mutt compound tests presented to tractable stacking are shown in fig.5 from the photos it will in general be seen that split of the fiber and system due to the associated tractable weight are clearly watched and tests presented to flexural stacking are presented in fig.6 demonstrated that the fiber take out and voids on the sap in the model.

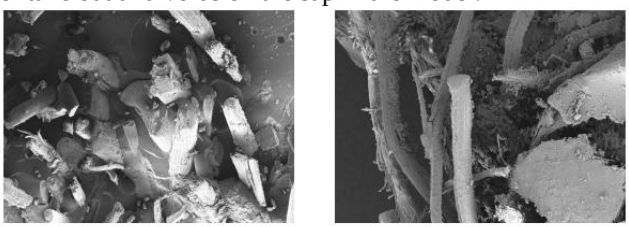

Fig.1 SEM micrographs of the composite samples subjected to tensile loading

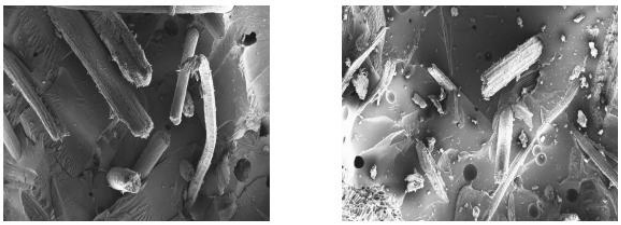

Fig. 2 SEM micrographs of the composite samples subjected to flexural loading

IV. CONCLUSION

Trials were led to portray the surfaces of preserved and unprocessed strands and to explore malleable possessions, flexural possessions and effect possessions in characteristic fiber compounds.Flexural quality of the soluble treated 9 mm fiber length was acquired great outcome because of better mechanical interlocking among fiber and grid. Effect quality of the antacid treated (7, 9 mm) fiber length was acquired same outcomes because of better mechanical dovetailing among grit and lattice.

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Experimental Research on Natural Fiber Reinforced Polymer Composite Material Composites

D. Logendran, T. Naresh Kumar and A. Abraham Eben Andrews

Abstract: ***In this examination, common strands like Abaca, Coir and Flax , Abaca and Coir (half breed) , Flax and Coir (cross breed) and Flax and Abaca (crossover) are manufactured with bio epoxy tar utilizing forming technique. In this paper the ideal blending of fortitude and sap is accomplished by utilizing Taguchi strategy. In this effort, flexural unbending nature and rigidity of Abaca besides Coir (half and half), Flax and Coir (hybridand Flax and Abaca (cross breed) composite at dry and wet conditions were considered. Hardness test remained directed utilizing rigidity testing machine. In this effort small scale edifice of the examples are examined by the Skim through Electron Hand-held microscope.***

Key words: Natural strands, Bio epoxy tar, Experimental Research, Taguchi technique.

I. INTRODUCTION

These days, the common strands, for example, Abaca, Coir and Flax can possibly be utilized by means of a substitution for glass or other conventional fortification ingredients in aggregates [33-35]. Different focal points incorporate low thickness, high durability, tantamount explicit quality properties, decrease in apparatus wear, simplicity of partition, diminished vitality of manufacture [1-3]. Composites are materials that involve solid burden conveying physical drive in more fragile substantial. Walls gives quality and inflexibility, supporting basic burden [4-6]. The lattice, or cover (natural or in-natural) keeps up the position and direction of the fortification for example, firmness, sway opposition, adaptability, and modulus [7-9]. What's more, they are accessible in huge sums, and are inexhaustible and biodegradable [32,36]. Other attractive properties incorporate minimal effort, low thickness. Employments of these filaments fulfill both financial and natural interests. The outcomes demonstrated that the most elevated mechanical properties were seen when Flax and Abaca (half breed) strands were fused [10-12]. It is surely known currently that in cooperation the quality and firmness of fortitude amalgams rely upon fiber focus, fiber viewpoint proportions, fiber-network grip, just as powdered particles of fiber direction and scattering [37]. The present commitment reports use of untreated Abaca, Coir and Flax filaments as strengthening fillers for bio epoxy tar as framework just because [12-14]. The Flax and Abaca (cross breed) Abaca and Coir (half and half) and Flax and Coir (crossover) fiber-strengthened polymer composites were readied utilizing hand shaping technique. The impacts of filaments gratified on mechanical properties.

II. EXPERIMENTAL

The network quantifiable utilized cutting-edge this examination remained bio epoxy sap Provided by Lab synthetic concoctions, Chennai. Flax, Coir & Abaca strands must remained utilized customarily in great superiority riggings in India [15-17].

A. Manufacturing process

1) Compound Treatment

The strands are pulverized. At that point the strands are scrubbed ordinarily in unsoiled consecutively river and dehydrated. A schooner measuring utencil is reserved and 6% NaOH is included and 80% of refined aquatic is included and an answer is ended. After satisfactory dehydrating of the filaments in ordinary concealing for 180 min, the strands are engaged and absorbed the readied NaOH arrangement [18]. Splashing is completed for various time interims relying on the quality of fiber required. In this investigation, the filaments are absorbed the answer for 180 min.

2) Favorable circumstances of compound behavior

Compound action by NaOH expels dampness gratified beginning the filaments along these lines expanding its quality. Additionally, synthetic treatment improves the flexural inflexibility of the strands [19-21].



Fig. 1 Specimens For Tensile test

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E. Symmetrical cluster of analyses

By assessing the exhibition of the item in a few natural conditions, there would be a reasonable information to ascertain this present reality difference. The old style trial structure technique are excessively mind boggling, tedious and difficult to utilize. An enormous number of examinations must be completed when the quantity of procedure parameters are more. To tackle this issue, taguchi technique utilizes an uncommon structure of symmetrical clusters to ponder the whole parameter space with the base number of examinations [29].

TABLE 1 Abaca and Flax (With Dampness

S.no	Load N	ΔL Avg.(A+B)/2	σ (N/mm²)	ε	E (N/mm²)
1	98.1	0.00175	0.3122712	1.75E-05	17844.069
2	196.2	0.00365	0.6245424	3.65E-05	17110.7511
3	294.3	0.00545	0.9368136	5.45E-05	17189.2408
4	392.4	0.00675	1.2490848	6.75E-05	18504.9605
5	490.5	0.00865	1.561356	8.65E-05	18050.3588
6	588.6	0.0103	1.8736272	0.000103	18190.5558
7	686.7	0.012	2.1858985	0.00012	18215.8205
8	784.8	0.01365	2.4981697	0.000137	18301.6093
9	882.9	0.01505	2.8104409	0.000151	18674.0257
10	981	0.0175	3.1227121	0.000175	17844.069
11	1079.1	0.0189	3.4349833	0.000189	18174.5148
12	1177.2	0.02075	3.7472545	0.000208	18059.0578
13	1275.3	0.022	4.0595257	0.00022	18452.3896
14	1373.4	0.02365	4.3717969	0.000237	18485.3992
15	1471.5	0.0254	4.6840681	0.000254	18441.2131
16	1569.6	0.027	4.9963393	0.00027	18504.9605
17	1667.7	0.0291	5.3086105	0.000291	18242.6479
18	1765.8	0.0303	5.6208817	0.000303	18550.7648
19	1863.9	0.032	5.933153	0.00032	18541.103
20	1962	0.0355	6.2454242	0.000355	17592.7441
21	2060.1	0.03595	6.5576954	0.00036	18241.1554
22	2158.2	0.03725	6.8699666	0.000373	18442.8633
23	2256.3	0.03895	7.1822378	0.00039	18439.6349
24	2354.4	0.04115	7.494509	0.000412	18212.6585
25	2452.5	0.04225	7.8067802	0.000423	18477.5863

B. Dampness Fascination Test Process

Flexural examples according to ASTM gauges remained censored after the manufactured plate. The compound examples toward remain utilized on behalf of dampness ingestion trial stood paramount dried in an airborne. At that point these adapted complex examples were drenched in refined aquatic at 30 ◦C for around 120 hrs. Next to normal interims, the examples were expelled from aquatic and cleaned with channel tabloid to evacuate shallow aquatic and pondered by means of advanced parity of 0.01mg goals. The examples remained inundated in aquatic to allow the prolongation of sorption until immersion farthest point stood come to. The assessing be located thru inside 30 s, so as to keep away from the mistake because of dissipation. The test was completed by ASTM D570 to discover the puffiness of example [22-24]. Following 120 hrs, the test examples stayed over again removed from the water shower and gauged..

TABLE 2 Abaca and Flax (Without Dampness)

S.no	Load N	ΔL Avg.(A+B)/2	σ (N/mm²)	ε	E (N/mm²)
1	98.1	0.0017	0.31227121	1.7E-05	18368.89459
2	196.2	0.0037	0.62454242	3.7E-05	16879.52476
3	294.3	0.0054	0.93681362	5.4E-05	17348.40045
4	392.4	0.0067	1.24908483	6.7E-05	18643.0572
5	490.5	0.0086	1.56135604	8.6E-05	18155.30279
6	588.6	0.0103	1.87362725	0.0001	18190.55581
7	686.7	0.01195	2.18589846	0.00012	18292.03729
8	784.8	0.01365	2.49816966	0.00014	18301.60926
9	882.9	0.01505	2.81044087	0.00015	18674.02573
10	981	0.017	3.12271208	0.00017	18368.89459
11	1079	0.0189	3.43498329	0.00019	18174.51475
12	1177	0.0207	3.7472545	0.00021	18102.67873
13	1275	0.022	4.0595257	0.00022	18452.38956
14	1373	0.02365	4.37179691	0.00024	18485.39921
15	1472	0.0253	4.68406812	0.00025	18514.10324
16	1570	0.027	4.99633933	0.00027	18504.96048
17	1668	0.029	5.30861054	0.00029	18305.55357
18	1766	0.0303	5.62088174	0.0003	18550.76483
19	1864	0.032	5.93315295	0.00032	18541.10298
20	1962	0.0345	6.24542416	0.00035	18102.67873
21	2060	0.03595	6.55769537	0.00036	18241.15541
22	2158	0.03725	6.86996658	0.00037	18442.86329
23	2256	0.0389	7.18223778	0.00039	18463.33621
24	2354	0.04115	7.49450899	0.00041	18212.65855
25	2453	0.042	7.8067802	0.00042	18587.57191

C. Tensile Test

Eelasticity of the mixtures (with and without dampness) was estimated with a general testing apparatus as per the ASTM D638 strategy [25-27].

D. Taguchi Quality Loss Function

An alternate technique for estimating quality is key to Taguchi's way to deal with structure. Misfortune capacity estimates quality. The misfortune capacity builds up a monetary proportion of the client disappointment with the items execution as it strays from the objective worth. In this way, both normal execution and variety are basic proportions of value [28]. Choosing an item plan or an assembling procedure that is inhumane toward uncontrolled wellsprings of variety improves quality.

TABLE 3 Factors and levels

No. of	Factors	Level	Level
A	F.F in	85	90
B	A.F in	85	90
C	Epoxy	50	55
D	A.	10	15
E	A.	10	15
F	A. T	YES	NO

F. Abaca And Flax (Tensile test)

A characteristic strands cross breed polymer composite material is manufactured utilizing shaping technique.

TABLE 4 Factors and levels

Trial	FACTORS						In(KN/mm2)
	A	B	C	D	E	F	
	1	2	3	4	5	6	
	F.F gms	A.F gms	Epoxy gms	A. Ratio of F.F	A. Ratio of A.F	Chemical treatment	
1	85	85	50	10	10	YES	18368.89459
2	85	85	50	15	15	NO	17348.40045
3	85	90	55	10	10	NO	18643.0572
4	85	90	55	15	15	YES	16879.52476
5	90	85	55	10	15	YES	18292.03729
6	90	85	55	15	10	NO	18368.894595
7	90	90	50	10	15	NO	18102.67873
8	90	90	50	15	10	YES	18174.51475

To get a superior gauge of the general significance of every one of the huge factor, non-huge variables are expelled On the off chance that the F-measurements for any factor is short of what one, at that point pool the 'SS' of that factor into the mistake term.

In the event that the quantity of elements isn't around one-half or less the quantity of sections in the table, pool the variables with the littlest F – Statistic until the no of components remaining is roughly one-portion of the no of segments [30].

particularly when more factors are included. This is known as pooling.

TABLE 5 Factors and levels Factors and mean

FACTOR	LEVEL	TOTAL	MEAN
A	1	71239.877/4	17809.96925
	2	72938.12536/4	18234.53134
B	1	72378.22692/4	18094.55673
	2	71799.77544/4	17949.94386
C	1	71994.48313/4	17998.62078
	2	72183.51355/4	18045.87839
D	1	73406.66722/4	18351.66681
	2	70771.33464	17682.83366
E	1	73555.36054/4	18388.84014
	2	70622.64123/4	17655.66031
F	1	71714.97139/4	17928.74285
	2	72463.03097/4	18115.75774
TOTAL		144178.0018/8	18022.25023

Pooling Rules Applied In Taguchi Designed Experiments

H. Filtering Electron Microscopy

A filtering electron microscopy (SEM) machine Model Hitachi S-3000N was utilized to examine the impact of the microstructure of composites examples with dampness and without dampness [31].

SEM Micrograph Of Fibers Under Tensile Loading

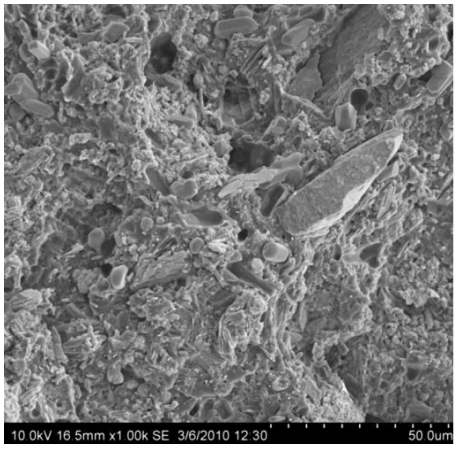

Figure1 SEM of Abaca and Coir (hybrid) with Dampness

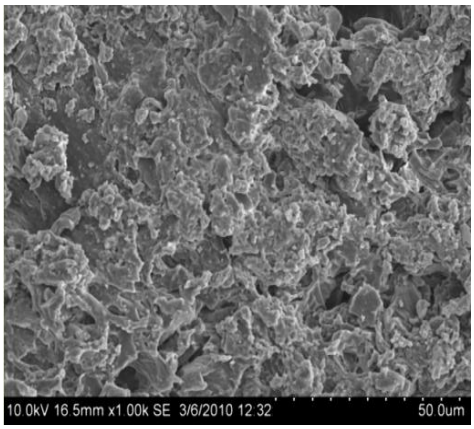

Figure 2 SEM of Flax and Coir (hybrid) with Dampness



Figure 3 SEM of Flax and Abaca (hybrid) with Dampness

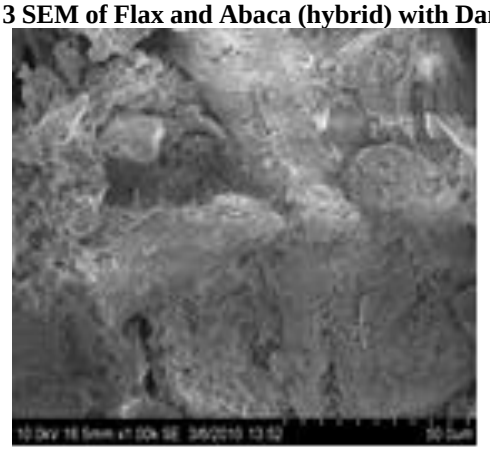

Figure 4 SEM of Abaca and Coir (hybrid) without Dampness

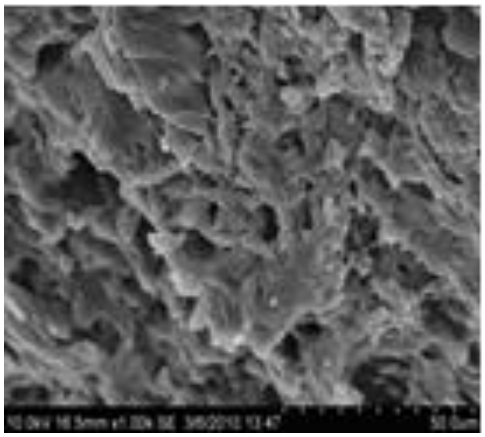

Figure 5 SEM of Flax and Coir (hybrid) without Dampness

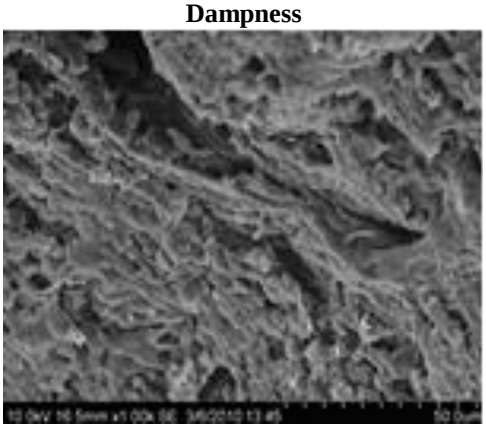

Figure 6 SEM of Flax and Abaca (hybrid) without Dampness

III. RESULTS AND DISCUSSION

The half and half composites indicated relatively better execution, the micrographs taken for the cracked Abaca, Coir, Flax and crossover composites. Abaca and Coir (crossover) and Flax and Coir (half and half) fiber composites, on tractable stacking condition, demonstrated a weak like disappointment (less in % of stretching, fig 7 and 8). Curved splits and their quick spread could be watched. Less fiber haul out is watched and this could be purpose behind the decrease in the elasticity. The nature is legitimized, where more rate prolongation could be watched for the Abaca and Flax (half and half) (high in % of lengthening, Fig 9) fiber composites which display malleable nature of break because of the nearness of Abaca filaments. The half and half composites indicated nearly better execution, the micrographs taken for the broke Abaca, Coir, Flax and cross breed composites. Abaca fiber composites, on tractable stacking condition, demonstrated a weak like disappointment. Curved splits and their quick engendering could be watched. Less fiber haul out is watched and this could be explanation behind the decrease in the elasticity. The tractable break micrograph for the fiber based composites. Plastic misshapening and more fiber haul out could be watched. This nature is legitimized, where more rate lengthening could be watched for the half breed fiber composites. Half breed fiber composites show incomplete weak nature of break because of the nearness of Abaca filaments.

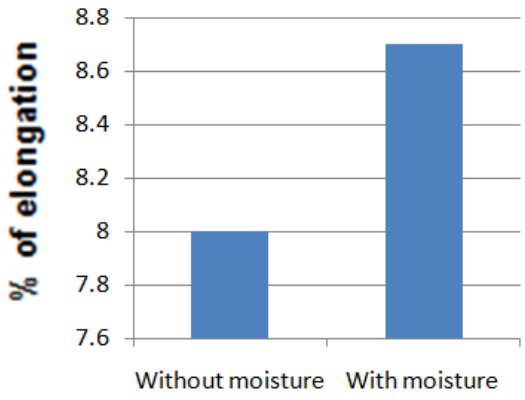

Figure 7. Comparison of Abaca and Coir (hybrid) In with &without dampness

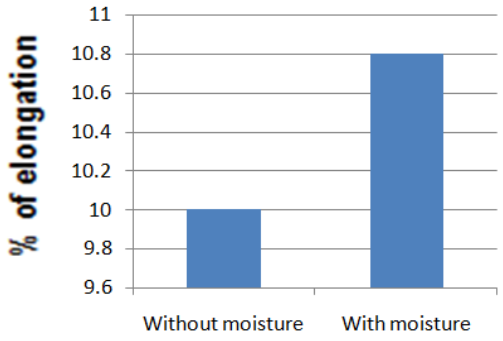

Figure 8. Comparison of Flax and Coir (hybrid) In with &without dampness

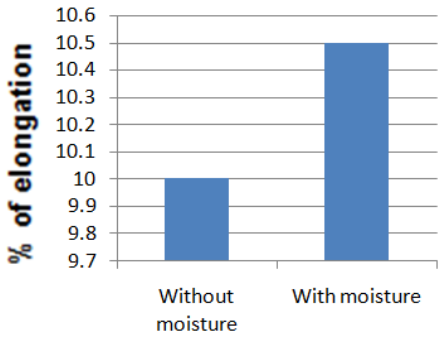

Figure 9. Comparison of Abaca and Flax (hybrid) In with &without dampness

IV. CONCLUSION

In the wake of deciding the material properties of regular fiber fortified epoxy composite utilizing six distinctive device materials and geometrics by utilizing tractable test and hardness test can be drawn:

The half breed composites indicated similarly better execution, the micrographs taken for the broke Abaca, Coir, Flax and mixture composites. Abaca fiber composites, on elastic stacking condition, demonstrated a weak like disappointment. Curved splits and their quick spread could be

watched. Less fiber haul out is watched and this could be purpose behind the decrease in the rigidity. The tractable break micrograph for the fiber based composites. Plastic misshapening and more fiber haul out could be watched. This nature is supported, where more rate stretching could be watched for the half and half fiber composites. Half and half fiber composites show halfway fragile nature of break because of the nearness of Abaca strands. At last this paper presumed that a standout amongst the best materials is Abaca and Flax (half breed) can be utilized for both interior obsession and outer obsession for break bone on human body contrasted with different materials.

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Effect of Chemical Treatment on Ramie / Rattan /Silicone Polymer Composites

T. Naresh Kumar, D. Logendran, A Arun Raja, P. Karthick, A. Abraham Eben Andrews

Abstract*: During the most recent couple of years, regular strands have gotten considerably more consideration than any time in recent memory from the examination network everywhere throughout the world. These characteristic filaments offer various favorable circumstances over conventional engineered strands. Stagnant mechanical possessions of arbitrarily situated personally blended Ramie (Boehmeria nivea) and Rattan (Malay rotan) fiber fortified polymer composites, for example, flexural, Impact, hardness quality, water retention properties and so on, were examined as an element of fiber stacking according to ASTM measures. At first Silicone gum arranged was exposed to assessment of its ideal mechanical properties. At that point strengthening of the tar with Ramie (Boehmeria nivea) and Rattan (Malay rotan) fiber was practiced in three unique structures: molecule measure by utilizing advanced gum. Contemporary effort uncovers that mechanical possessions, for example, flexural, solidity, aquatic retention and so on of the Silicone pitch increments to significant degree when strengthened by the fortitude.

***Keywords*: Ramie (Boehmeria nivea); Rattan (Malay rotan) ; Silicone resin.**

I. INTRODUCTION

One part is frequently a solid fiber, while another segment (regularly called a grid) is regularly a pitch, for example, polyester or Silicone that ties the strands composed & condenses the material hardened and unbending [45,466]. These days, Bio compounds must remained the topic of broad exploration, explicitly in development and building industry because of their numerous favorable circumstances, for example, lower weight, and lower assembling costs[47-51]. Green Building is a development that has increased worldwide consideration in the course of recent years. Green structures are intended to be ecologically mindful, financially reasonable, and solid spots to live and effort. Solitary of the principle materials that are right now utilized in green structures is Bio compound [52]. Bio compounds might be ordered, as for their solicitations in structure manufacturing into two fundamental gatherings: basic and non-structural bio compounds. An auxiliary Bio compound can be characterized as unique that is expected to convey a heap being used [53, 54]. Basic bio compounds can go comprehensively in execution, from superior to low execution materials.

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II. MATERIALS AND METHODS

1. Ramie (Boehmeria nivea)
2. Rattan (Malay rotan)
3. Silicone reinforment

Fiber treatment

Basic Treatment

Antacid treatment utilized substance action of regular filaments after rummage-sale to fortify thermoplastics and thermosets. A glass measuring glass is occupied and NaOH is included and refined aquatic is included and an answer is ended. Splashing is done for various time interims relying on the quality of fiber required. In this examination, the strands are absorbed the answer for 180 min.

Form plan for example arrangement

The element of the mixture fiber strengthened compound had 3 mm thickness. The form remained comprised of strengthen. The obligatory supplies aimed at the shape that remained utilized to the straightforwardness plastic aimed at the base coating and insertion outline.

2.5% Ramie and 2.5% Rattan

5% Ramie and 5% Rattan

7.5% Ramie and 7.5% Rattan

Mechanical testing

Subsequently manufacture the assessment examples remained exposed to different mechanical tests according to ASTM gauges. The mechanical assessments are ductile test, sway test, flexural test, attire test.

III. RESULTS AND DISCUSSION

Flexural test

Flexural test was directed to think about the conduct and capacity of substantial under twisting burden. The heap was connected to the example while waiting for it is thoroughly interruption.

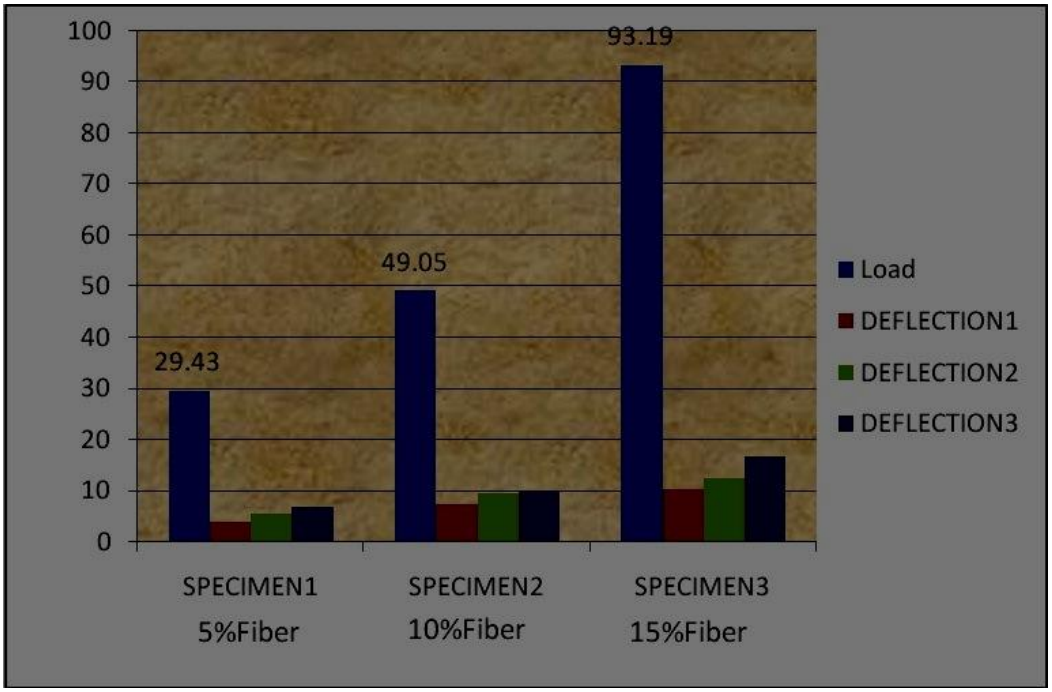

Figure 1 Flexural Load Vs Deflection Graph

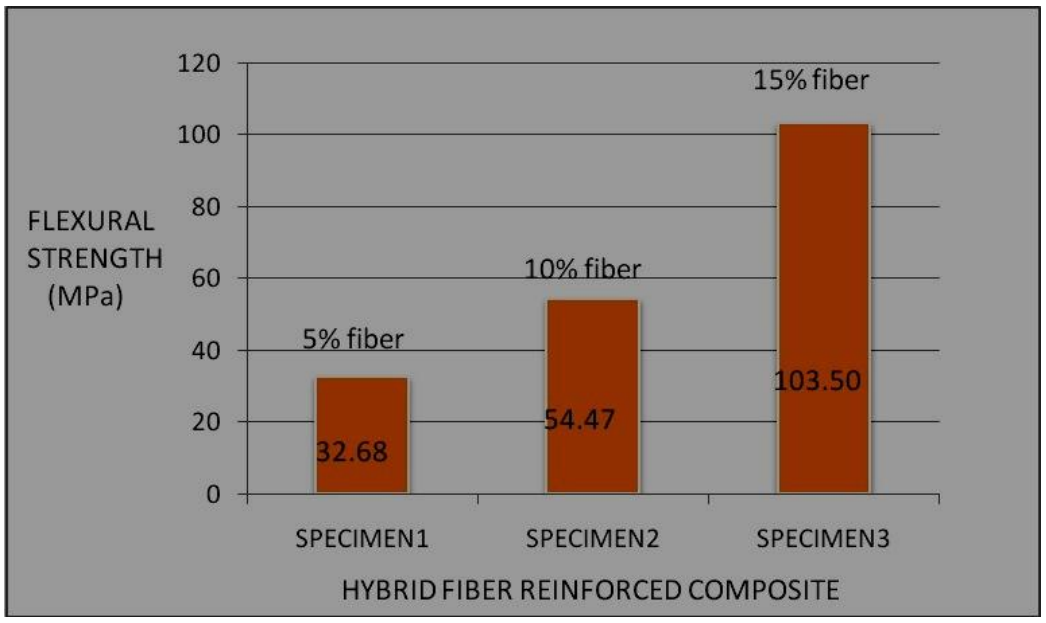

Figure 2 Flexural Strength Graph

Impact Test

Effect is a solitary argument assessment that estimates a ingredients protection effect from a fluctuation weight. This test can be exploited as snappy and simple check to decide whether a substantial sees explicit effect possessions or to think about ingredients for all-purpose durability.

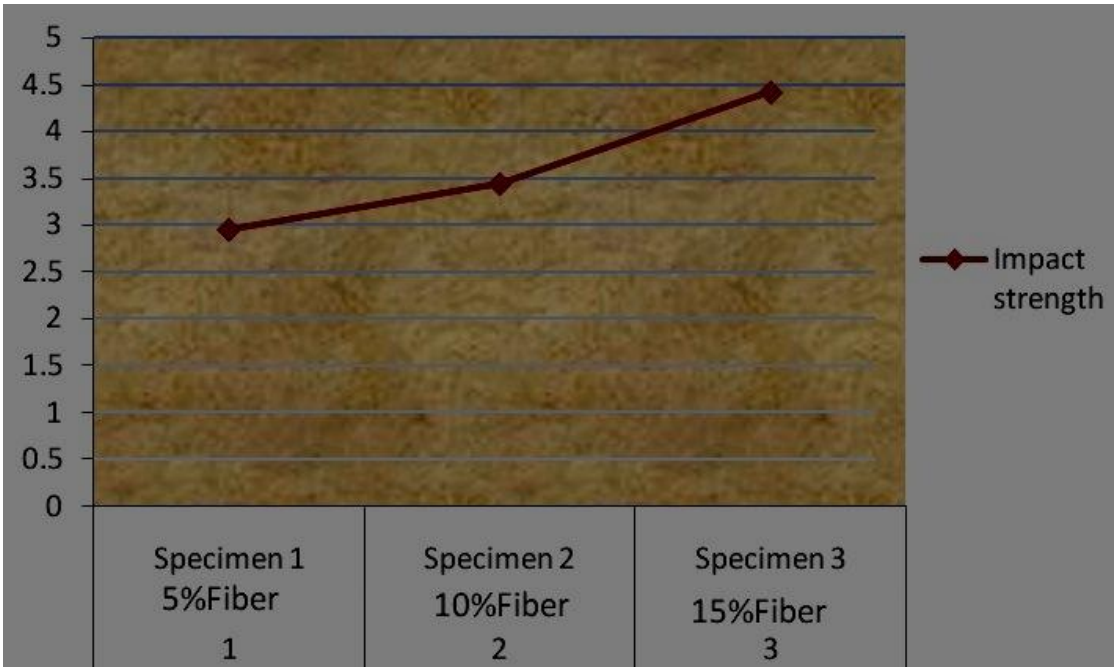

Figure 3 Impact Strength Graph

Aquatic absorption test

Aquatic retention test the compound example is exposed towards the estimation of in what way ample aquatic, the example will ingest.

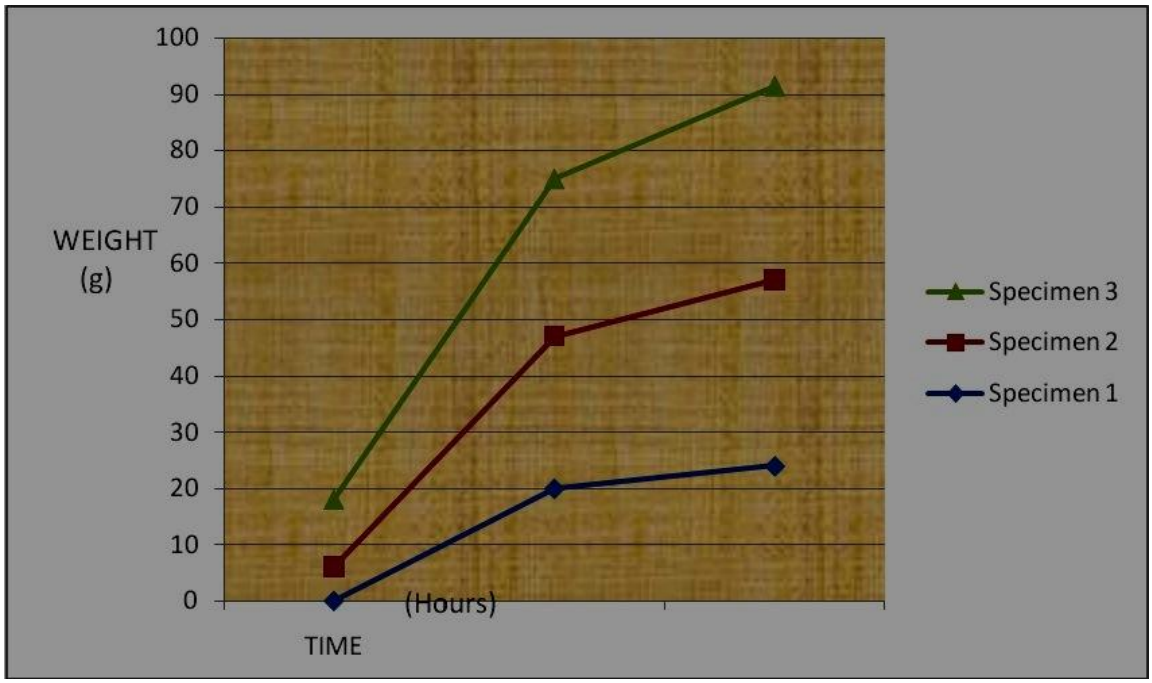

Figure 4 Time Vs Weight Graph

Rigidity test

In this stone well rigidity test the compound example is exposed to decide the stability number.

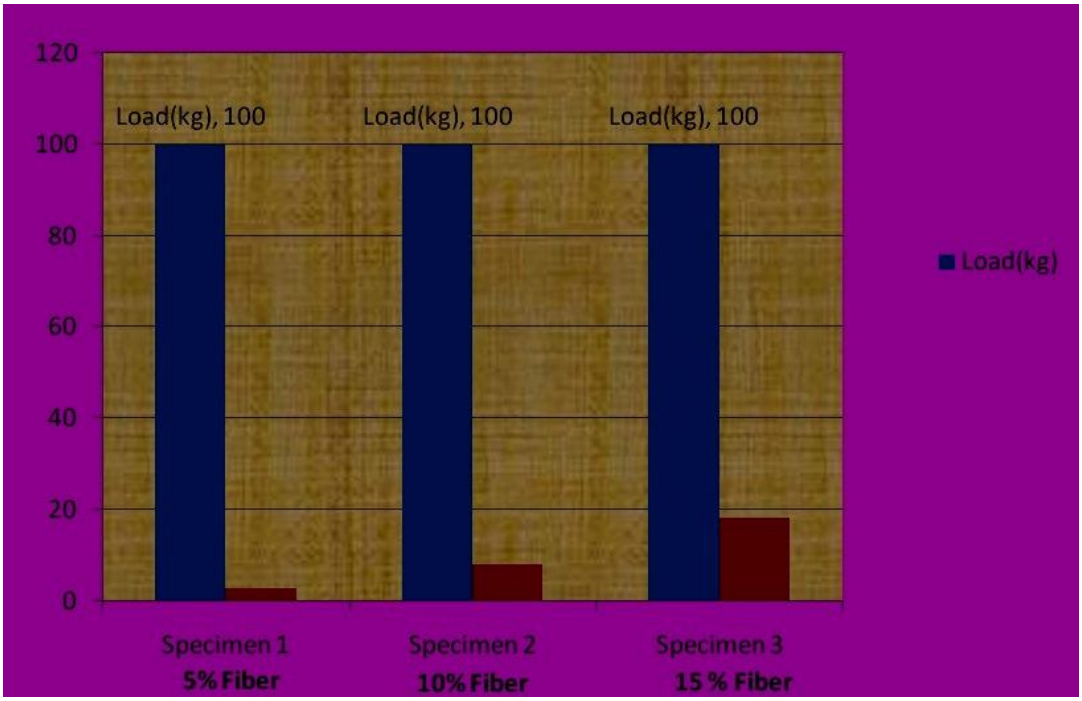

Figure 5 Load Vs Hardness Number

IV. CONCLUSION

In this effort, half breed filaments Ramie (Boehmeria nivea) Rattan (Malay rotan) have been portrayed for their properties. Half and half filaments have great length, quality, consistency, fineness, and brilliant dampness ingestion. In this examination the plausibility of applying half and half filaments, to be specific Hemp strands as an elective crude material for fiber-fortified composite (FRC) is researched. Crossover fiber stretches healthier outcome in flexural quality although looking at than other fiber. Trial examination of mechanical conduct of Hybrid fiber fortified Silicone fusions prompts the accompanying ends: This work demonstrates that effective creation of a half and half fiber strengthened Silicone composites with various extents is conceivable by straightforward hand lay-up strategy. It is noted that the mechanical assets of the mixtures, intended for example, aquatic ingestion, flexural quality, solidity quality and so forth of the amalgams are additionally incredibly impacted designed for various dimensions part of grit and irregular fiber fortified compound quantifiable.

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Machining Characteristics of Natural Fiber Particle Reinforced Polymer Composite Material using Artificial Neural Network

T. Naresh Kumar, B. Murali and J. Arulmani

Abstract*: *The point of research is improvement of biocomposite materials dependent on biopolymers and characteristic filaments has been made through creation of Natural fiber powdered material (Abaca, Mudar and Hemp strengthened polymer composite material by utilizing bio epoxy tar. The present work centers around the forecast of push power and torque of the normal fiber fortified polymer composite materials and the qualities, contrasted and the Artificial Neural Network.

Key words*: *Abaca, Mudar, Hemp, Bio Resin, ANN, Machining Parameters

I. INTRODUCTION

As of late, the characteristic filaments have pulled in generous significance as potential basic material. The appealing in addition to purpose of normal fiber is regarding modern use which has made its accessibility all the more requesting [1]. Keeping this in view the present work has been embraced to build up a polymer network composite (epoxy tar) utilizing regular strands as fortification and to ponder its mechanical properties and execution [2]. India is a nation which to a great extent relies upon farming. Homestead items comprise the different joints and bones of the foundation of the nation's economy out of which regular fiber has been a waste item which remains to a great extent undiscovered [3]. As of late the regular fiber epoxy composites has pulled in generous significance as a potential basic material [4]. The alluring highlights of regular strands like jute, sisal, coir and banana have been their minimal effort, light loads, high explicit modulus, recharge capacity and biodegradability [5]. Fiber fortified composites are being utilized broadly today, owing their utilization to better mechanical properties like high quality than weight proportion, high solidness to weight proportion and plan adaptability [6-7]. Expanded utilization of composites has implied there is interest for joining of a portion of the parts together [8]. Cement holding is the strategy utilized frequently for joining most composites, yet it has its detriments. Glue holding requires surface readiness of the materials before they can be joined [9]. Warmth and weight might be required for relieving purposes during cement holding. Glues are synthetic compounds used to consolidate composites [10-11]. Contingent upon the glue picked, the fix time of composites may be low or high [12]. Because of the synthetics utilized, security and wellbeing may be in danger. Reinforced joints are hard to assess for deficiencies or as a rule [13-14].

II. MATERIALS AND METHODS

The example utilized in this examination is a round and hollow bar of 60×40 mm made of regular fiber fortified composite material. The composite is made of common filaments.

The materials utilized in this undertaking are:

- Abaca and Hemp (half and half) molecule fiber strengthened composite
- Mudar and Abaca (half and half) molecule fiber strengthened composite
- Mudar and Hemp (half and half) molecule fiber strengthened composite.

A. Preparation of Composite Cylindrical Rod

A form of sixty metric straight unit length and forty metric direct unit distance across was made misuse GI sheet shape. partner OHP Sheet was taken and a purifying operator was connected over it and fitted with the inward part of the form and permitted to dry [15]. A glass measuring utencil and a glass pole or a stirrer were taken and clean well with running water and a short time later with warmth water. At that point, determined measure of bio manufactured pitch and hardner was superimposed and in this way the blend was mixed for almost 10-15 min. Mixing was done to shape an unvaried blend of natural compound and quickening agent particles. a while later, determined measure of filaments was superimposed and in this way the blending strategy was proceeding [16]. At that point, the blend was filled the shape and smashed tenderly for uniform settlement. The form was permitted to cement for almost 24 h [17].

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B. Machining of Composite Specimens

In the wake of acquiring the composite tube shaped pole with required measurements, the machining (boring procedure) of composite examples is appropriated abuse MAXMILL CNC machining focus misuse High Speed Steel (HSS) bit bits. The boring technique was circulated misuse HSS bend drills with consistent unadulterated arithmetic. The level of the machining parameters used in this examination zone unit given as Table 1. Drill device estimating instrument was wont to live pushed power and torsion severally all through the penetrating procedures [18]. the consequences of machining parameters on push power, torsion and delamination of composite materials were comprehended by sizable sum (27) of machining tests [19].

Table 1. Assignment of the levels to the factors

Drill Level	size, d (mm)	Velocity, N (m/min)	Feed rate, f (mm/rev)
1	3	600	0.1
2	4	900	0.2
3	5	1200	0.3

C. Factorial Design

A 3^3 full factorial structure with an aggregate of 27 exploratory runs were done. The push power and torque were the reaction factors recorded for each run. The impact of the machining parameters is another significant angle to be considered. It very well may be seen that the slicing speeds from 20 to 60 m/min are typically utilized, while feed rate esteems lower than 0.3 mm/rev are visit. Cutting rate is definitely not a restricting component when boring polymeric composites, especially with hard metals and in this way, the utilization of cutting velocities underneath 60 m/min might be clarified by the most extreme rotational speed of customary machining devices, since drill distances across over 10 mm are infrequently detailed [20]. Another explanation behind continuing cutting rates underneath 60 m/min may live in the way that higher slicing rate esteems lead to higher cutting temperature, which thusly may cause the conditioning of the framework [21-22]. The utilization of feed rates beneath 0.3 mm/rev might be related with the delamination harm caused when this parameter is expanded.

D. Experimental Setup

Various boring examinations were completed on a CNC machining focus (Maxmill) utilizing HSS contort drills for the machining of NFRP composites. A two-part drill apparatus dynamometer was utilized to record the push power and torque. Traditional fast steel bend drills were utilized as much as established tungsten carbide drills. Device geometry is a significant angle to be considered in penetrating of fiber-fortified plastics, especially when the nature of the machined gap is basic.

III. Discussion

In this examination work ANN has been utilized as a device to anticipate the test results. In ANN, feed forward back propogation was utilized to anticipate the qualities. The information parameters are speed, feed and instrument distance across. By methods for utilizing these parameters the yield parameters, for example, push power and torque has been anticipated. The system has been prepared by differing the neurons and the layers. Two-third of the exploratory qualities are utilized for 33% of the qualities are anticipated dependent on the preparation and both the outcomes from trial and Artificial Neural Network are great in understanding as appeared Table. 2-7. Factual qualities and of mixture of Abaca and Hemp, half and half of Abaca and Mudar and cross breed of Hemp and Mudar are appeared Table 8-10 and Scatter Index of above said crossover materials appeared from this correlation of exploratory and ANN results cross breed of Abaca and Mudar machining properties is superior to other two mixture materials.

Table 2. Trained values of hybrid of Abaca and Hemp thrust force and torque using ANN

Sl. No.	Drill diameter (mm)	Speed (rpm)	Feed (mm/rev)	Thrust (EXP) (N)	Torque (EXP) (N-m)	(ANN) Thrust (N)	(ANN) Torque (N-m)
1	3	300	0.1	3	0.93	3.008	0.932
3	3	900	0.1	4.48	0.98	4.488	0.980
5	3	600	0.2	6.27	1.77	6.270	1.776
7	3	300	0.3	6.45	2.45	6.450	2.452
8	3	600	0.3	8.31	2.54	8.310	2.545
10	4	300	0.1	5.04	1.2	5.040	1.199
11	4	600	0.1	6.5	1.24	6.488	1.240
13	4	300	0.2	8.18	2.21	8.170	2.190
14	4	600	0.2	10.55	2.28	10.542	2.277
15	4	900	0.2	12.23	2.32	12.230	2.322
17	4	600	0.3	13.99	3.26	13.980	3.260
18	4	900	0.3	16.23	3.32	16.230	3.322
20	5	600	0.1	9.74	1.5	9.722	1.522
21	5	900	0.1	11.3	1.53	11.322	1.520
22	5	300	0.2	12.25	2.68	12.442	2.677
24	5	900	0.2	18.32	2.82	18.322	2.810
25	5	300	0.3	16.25	3.83	16.252	3.832
27	5	900	0.3	24.31	4.04	24.322	4.041

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Table 3. Predicted values of hybrid of Abaca and Hemp thrust force and torque using ANN

Sl. No.	Drill diameter (mm)	Speed (rpm)	Feed (mm/rev)	Thrust (EXP) (N)	Torque (EXP) (N-m)	(ANN) Thrust (N)	(ANN) Torque (N-m)	% of Error in Thrust	% of Error in Torque
2	3	600	0.1	3.86	0.96	3.82	0.96	1.04	0.00
4	3	300	0.2	4.86	1.72	4.86	1.72	0.00	0.00
6	3	900	0.2	7.27	1.81	7.27	1.81	0.00	0.00
9	3	900	0.3	9.65	2.59	9.65	2.59	0.00	0.00
12	4	900	0.1	7.54	1.26	7.54	1.27	0.00	0.79
16	4	300	0.3	10.85	3.15	10.84	3.14	0.09	0.32
19	5	300	0.1	7.55	1.46	7.54	1.46	0.13	0.00
23	5	600	0.2	15.79	2.77	15.78	2.77	0.06	0.00
26	5	600	0.3	20.95	3.96	20.95	3.96	0.00	0.00

Table 4. Trained values of hybrid of Abaca and Mudar thrust force and torque using ANN

Sl. No.	Drill diameter (mm)	Speed (rpm)	Feed (mm/rev)	Thrust (EXP) (N)	Torque (EXP) (N-m)	(ANN) Thrust (N)	(ANN) Torque (N-m)
1	3	300	0.1	6.93	0.85	6.868	0.844
3	3	900	0.1	10.98	0.8	10.990	0.799
5	3	600	0.2	24.05	1.5	24.052	1.522
7	3	300	0.3	31.43	2.22	31.442	2.220
8	3	600	0.3	42.02	2.14	42.001	2.140
10	4	300	0.1	8.38	1.1	8.421	1.100
11	4	600	0.1	11.2	1.06	11.214	1.062
13	4	300	0.2	21.75	2.02	21.744	2.022
14	4	600	0.2	29.07	1.95	29.061	1.966
15	4	900	0.2	34.45	1.91	34.442	1.910
17	4	600	0.3	50.8	2.77	50.773	2.770
18	4	900	0.3	60.2	2.72	60.114	2.720
20	5	600	0.1	12.98	1.3	12.972	1.292
21	5	900	0.1	15.38	1.28	15.377	1.277
22	5	300	0.2	25.2	2.47	25.220	2.460
24	5	900	0.2	39.92	2.33	39.912	2.332
25	5	300	0.3	44.02	3.52	44.022	3.511
27	5	900	0.3	69.74	3.32	69.722	3.322

Table 5. Predicted values of hybrid of Abaca and Mudar thrust force and torque using ANN

Sl. No.	Drill diameter (mm)	Speed (rpm)	Feed (mm/rev)	Thrust (EXP) (N)	Torque (EXP) (N-m)	(ANN) Thrust (N)	(ANN) Torque (N-m)	% of Error in Thrust	% of Error in Torque
2	3	600	0.1	9.27	0.82	9.34	0.82	0.76	0.00
4	3	300	0.2	17.99	1.56	17.88	1.55	0.61	0.64
6	3	900	0.2	28.5	1.47	28.42	1.47	0.28	0.00
9	3	900	0.3	49.79	2.09	49.7	2.08	0.18	0.48
12	4	900	0.1	13.27	1.04	13.27	1.044	0.00	0.38
16	4	300	0.3	38	2.87	38	2.87	0.00	0.00
19	5	300	0.1	9.71	1.35	9.72	1.35	0.10	0.00
23	5	600	0.2	33.68	2.38	33.67	2.37	0.03	0.42
26	5	600	0.3	58.85	3.39	58.85	3.39	0.00	0.00

Table 6. Trained values of hybrid of Hemp and Mudar thrust force and torque using ANN

Sl. No.	Drill diameter (mm)	Speed (rpm)	Feed (mm/rev)	Thrust (EXP) (N)	Torque (EXP) (N-m)	(ANN) Thrust (N)	(ANN) Torque (N-m)
1	3	300	0.1	6.93	0.85	6.922	0.851
3	3	900	0.1	10.98	0.8	10.966	0.810
5	3	600	0.2	24.05	1.5	24.011	1.499
7	3	300	0.3	31.43	2.22	31.432	2.220
8	3	600	0.3	42.02	2.14	42.021	2.140
10	4	300	0.1	8.38	1.1	8.382	1.122
11	4	600	0.1	11.2	1.06	11.200	1.066
13	4	300	0.2	21.75	2.02	21.744	2.022
14	4	600	0.2	29.07	1.95	29.070	1.954
15	4	900	0.2	34.45	1.91	34.442	1.910
17	4	600	0.3	50.8	2.77	50.778	2.770
18	4	900	0.3	60.2	2.72	60.110	2.722

20	5	600	0.1	12.98	1.3	12.99	1.322
21	5	900	0.1	15.38	1.28	15.380	1.288
22	5	300	0.2	25.2	2.47	25.200	2.470
24	5	900	0.2	39.92	2.33	39.900	2.332
25	5	300	0.3	44.02	3.52	44.011	3.522
27	5	900	0.3	69.74	3.32	69.744	3.322

Table 7. Predicted values of hybrid of Hemp and Mudar thrust force and torque using ANN

Sl. No.	Drill diameter (mm)	Speed (rpm)	Feed (mm/rev)	Thrust (EXP) (N)	Torque (EXP) (N-m)	(ANN) Thrust (N)	(ANN) Torque (N-m)	% of Error in Thrust	% of Error in Torque
2	3	600	0.1	9.27	0.82	9.26	0.82	0.11	0.00
4	3	300	0.2	17.99	1.56	17.82	1.57	0.94	0.64
6	3	900	0.2	28.5	1.47	27.37	1.46	3.96	0.68
9	3	900	0.3	49.79	2.09	49.79	2.09	0.00	0.00
12	4	900	0.1	13.27	1.04	13.27	1.04	0.00	0.00
16	4	300	0.3	38	2.87	38	2.87	0.00	0.00
19	5	300	0.1	9.71	1.35	9.69	1.35	0.21	0.00
23	5	600	0.2	33.68	2.38	33.67	2.38	0.03	0.00
26	5	600	0.3	58.85	3.39	58.85	3.39	0.00	0.00

Conclusion

When all is said in done, the push and torque parameters will for the most part rely upon the assembling conditions utilized, for example, feed, cutting pace, apparatus geometry, machine instrument and cutting device unbending nature. A bigger push power happens for bigger width drills and higher feed rates. As it were, feed rate and drill distance across are perceived as the most noteworthy elements influencing the push power. Destroyed drill might be one of the significant explanations behind the intense increment in the push power just as for the presence of bigger push powers when utilizing multifacet drill than those when utilizing turn drill at high cutting velocity. In any case, we found that the expansion in torque was a lot littler than that in push power, with the expanding cutting rate. The normal torque showing up when utilizing a multifacet drill was bigger than that utilizing the wind drill at low penetrating velocity and the normal torque when utilizing a multifacet drill was littler than that when utilizing turn drill at high boring pace.

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Characterization of Roselle & Kevlar hybrid Composites

A. Raveendra, Raghuram Pradhan, Ashok M R, D. Muruganandam, J.Jayapriya

Abstract: ***This paper center essentially around the ongoing patterns and advancements in Bio compounds as connected to the therapeutic and building industry, refering to certain models. Present research is Alkali treated along with Silane treated and untreated fibres hybrid composite was prepared and all the types of physical and chemical properties studied. All the Silane treated composite shown enhanced concert than untreated composite. Performance possessions of composite devising various tenders in textile& non textile. Silane has an added advantage both physical and chemical properties enhancement.***

Keywords: Silane Treatment; Roselle; Kevlar; Hybrid Composites; Structural Bio compounds.

I. INTRODUCTION

customary polymer compounds are non-biodegradable and dirty the earth [1-3]. There is an expanding development of researchers and architects who are committed to limiting the ecological effect of polymer compound creation [4-6]. Natural impressions must be lessened at each phase of the existence cycle of the polymer compound [7-9]. Utilizing common filaments with polymers dependent on sustainable assets will enable numerous natural issues to be unraveled [10-15]. In this day and age, there is an expanding request towards part materials that are sturdy, dependable, lightweight, and with mechanical properties that are fundamentally superior to those of the customary materials. In the meantime it is best if these materials are eco-accommodating and bio-degradable [16-18]. Bio compound substantial has seemed of rewarding the vast common of the above environments. At last, the welfares of employing bio compound substantial, its eco-accommodating wildlife and its imminent in the trade have been demonstrated with lucidity [19-21]. Fig 1 and 2 explain the composites preparation and characterization with treated and untreated fibers.

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II. SPECIMEN AND EXPERIMENTAL

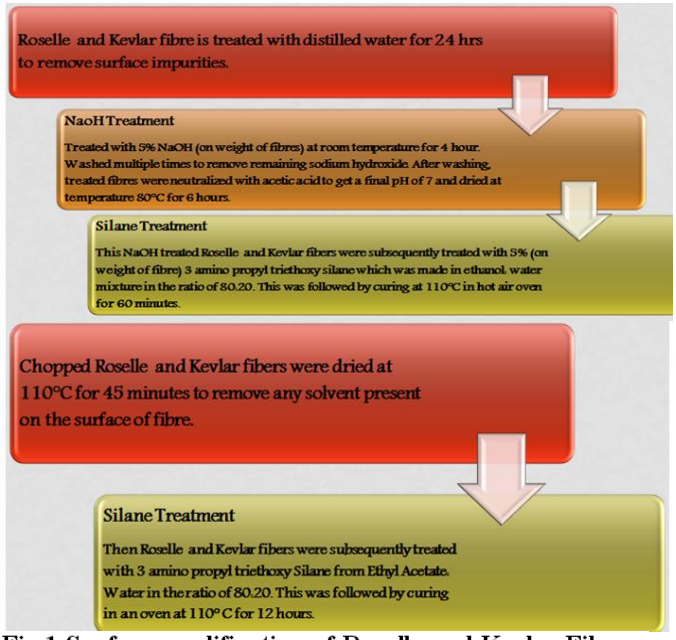

Fig 1 Surface modification of Roselle and Kevlar Fibre

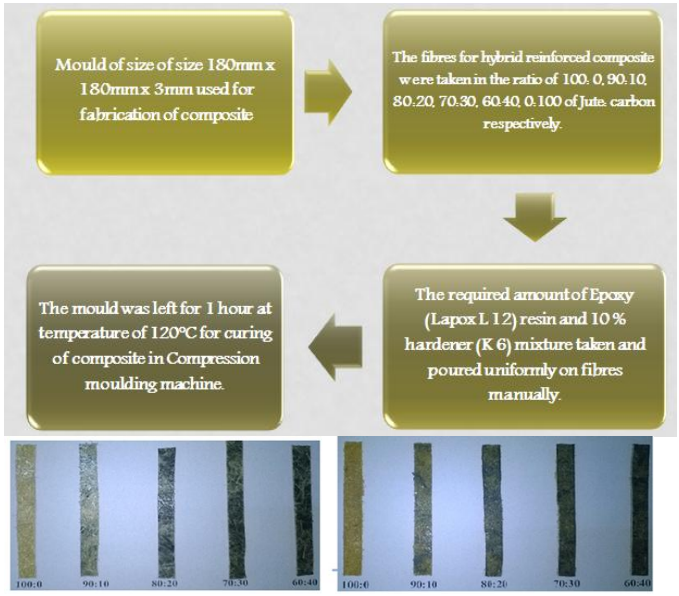

Fig 2 Mould and compound specimen preparation

III. TEST RESULTS

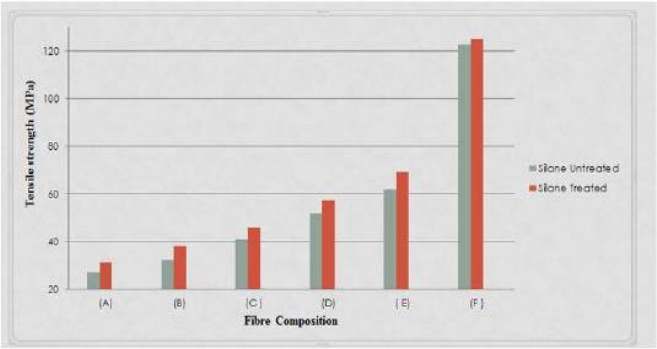

Fig 3 Effect of Silane Treatment on Tensile Strength of Roselle: Kevlar hybrid Compounds.

Fig 3 shows that Tensile strength of composite specimen and it could be observed that silane treated composite posses good mechanical properties than untreated

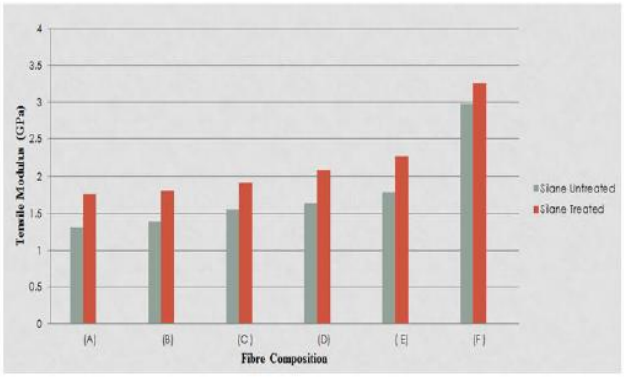

Fig 4 Effect of Silane Treatment on Tensile modulus of Roselle: Kevlar hybrid Compounds.

Fig 4 shows that Tensile modulus of composite specimen and it could be observed that silane treated composite posses good mechanical properties than untreated

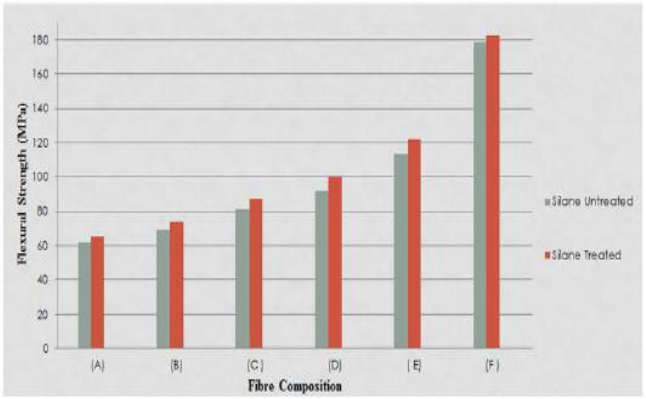

Fig 5 Effect of Silane Treatment on Flexural Strength of Roselle: Kevlar hybrid Compounds

Fig 5 shows that flexural strength of composite specimen and it could be observed that silane treated composite posses good mechanical properties than untreated

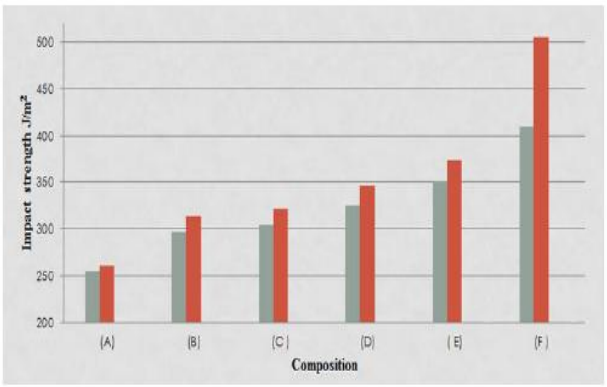

Fig 6 Effect of Silane Treatment on Izod Impact Strength of Roselle: Kevlar hybrid Compounds

Fig 6 shows Impact strength of composite specimen and it could be observed that silane treated composite posses good mechanical properties than untreated

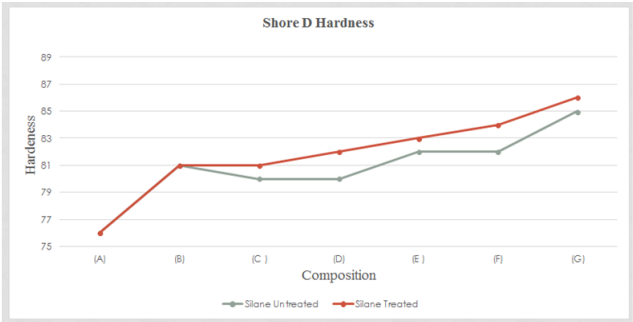

Fig 7 Effect of Silane Treatment on Hardness of Treated and Untreated Roselle: Kevlar hybrid Compounds.

Fig 7 shows that hardness values of composite specimen and it could be observed that silane treated composite posses good mechanical properties than

IV. CONCLUSION

From the Experimental Research of Silane Treatment on said Composites and the results shown in Fig 3 to 7 the following conclusion has been drawn:

- Alkali treated along with Silane treated and untreated fibres hybrid composite was prepared and all the types of physical and chemical properties studied.
- All the Silane treated composite shown enhanced concert than untreated composite.
- Performance possessions of composite devising various tenders in textile& non textile.
- Silane has an added advantage both physical and chemical properties enhancement.

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Experimental Research of Wire Cut EDM for SR & MRR using Taguchi Method

A. Raveendra

Abstract: ***The present research work is to examine & advance the latent procedure factors affecting the MRR, SR and Electrode Attire despite the fact machining of Nickel composites utilizing WEDM progression. This exertion includes investigation of the connection amid the different information route considerations like Pulse-on time(Ton), Pulse off time(Toff), Pulse Peak Current(IP), Wire substantial, Work piece material & procedure factors. In light of the picked information parameters and execution estimates L-16 symmetrical exhibit is chosen to streamline the most appropriate qualities for machining for nickel amalgams by WEDM…***

Keywords: Surface Quality; EDM; Taguchi Method;MRR.

I. INTRODUCTION

Wire Cut Electric Discharge Machining process with a slight wire as a cathode changes electrical vitality to warm vitality for cutting materials, WEDM is considered as an interesting reception of the customary EDM process, which utilizes a cathode to instate the starting procedure [1]. The assortments of crop rejoinders with route strictures were numerically confirmed by utilizing non-direct deterioration examination [2]. The models were checked for their ampleness. Consequence of affirmation tests demonstrated that the set up scientific models can foresee the yield reactions with sensible exactness [3]. Be that as it may, WEDM uses a constantly voyaging wire anode made of slender copper, metal or tungsten of breadth 0.05-0.30 mm, which is equipped for accomplishing extremely little corner radii [4-6]. The wire is kept in strain utilizing a mechanical tensioning gadget diminishing the inclination of creating wrong parts [5-7]. During the WEDM procedure, the material is dissolved in front of the wire and there is no immediate contact between the work piece and the wire, wiping out the mechanical worries during machining [8, 9].

II. EXPERIMENTAL PROCEDURE

Examinations have been performed so as to explore the impacts of at least one elements of the procedure parameters superficially finish of the wire cut machined surface. Fig 1 to 8 shows the EDM machine which comprises the input variables and taguchi design and analysis and their process parameters.



Fig 1 Control panel of EDM.

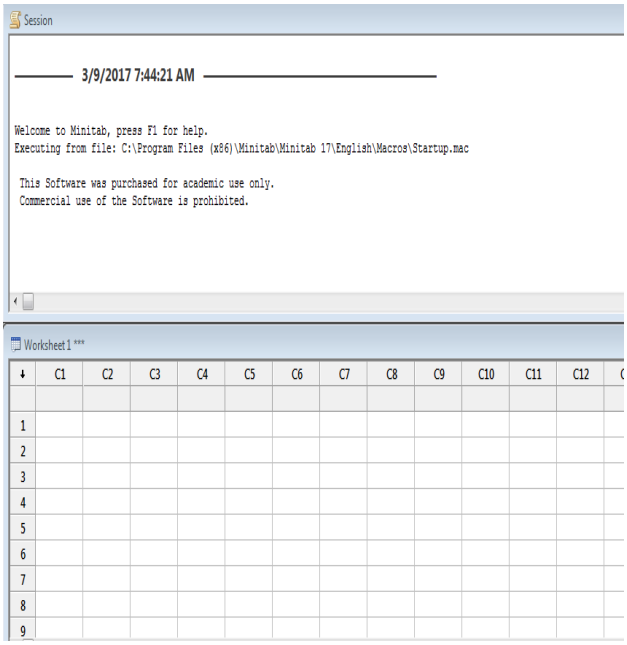

Fig 2 Input screen of EDM.

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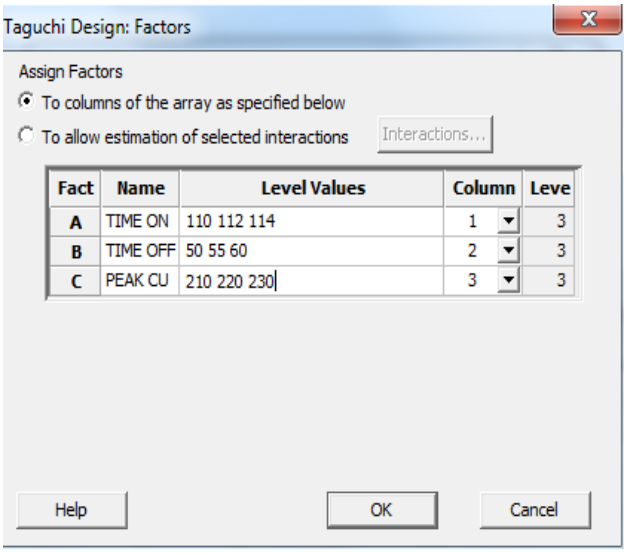


Fig 3 Display Available Designs Select – L9 (2-4)

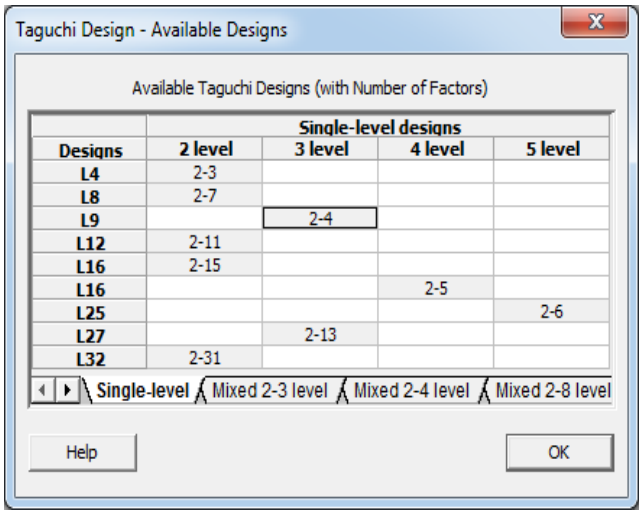
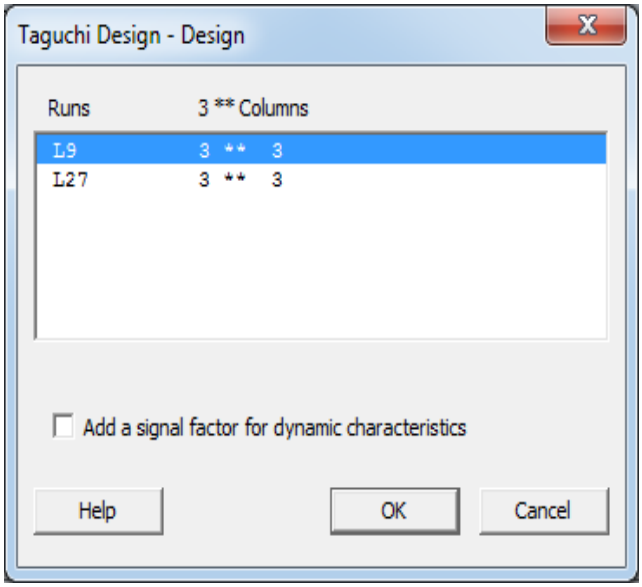


Fig 4 Select Designs Select – L9



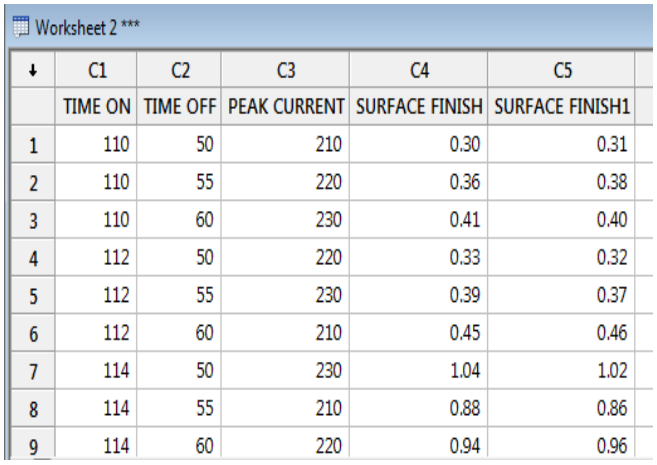
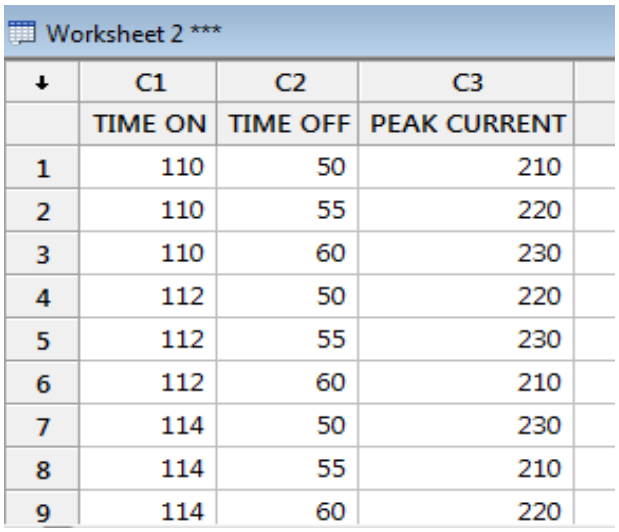


Fig 5 Taguchi – Analyze Taguchi Design – Select Responses



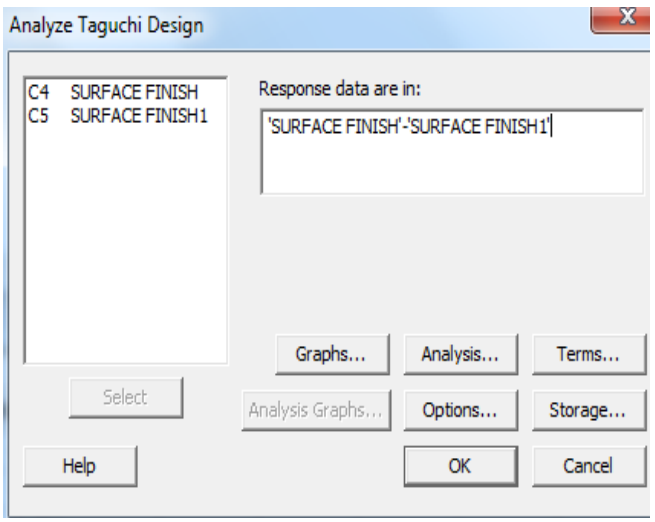


Fig 6 Taguchi Design

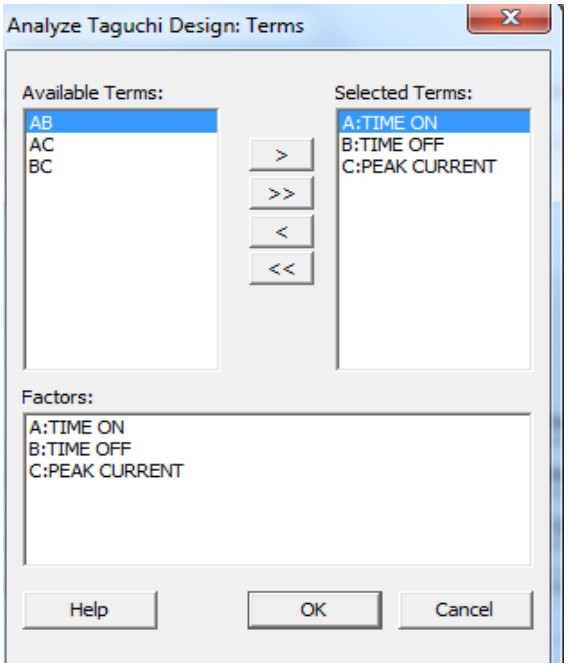


Fig 7 Taguchi Design

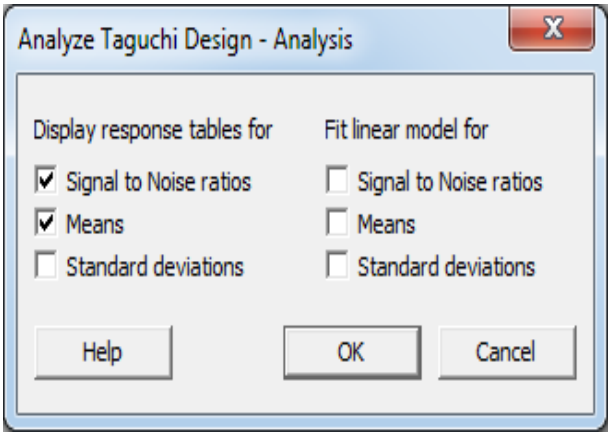


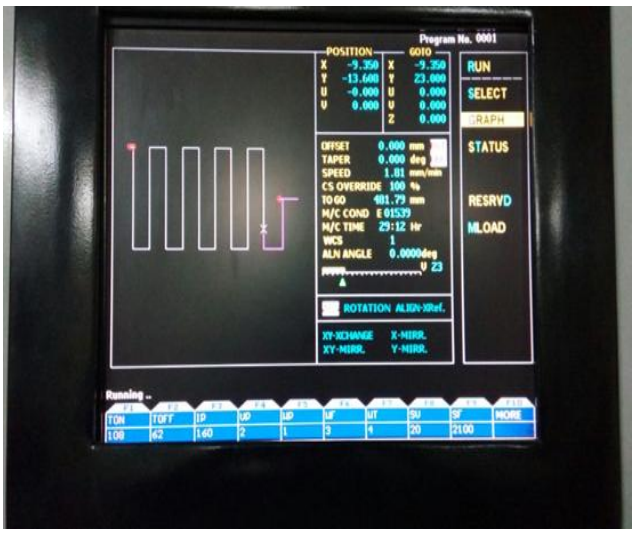
Fig 8 Taguchi Analysis

Table 1. Input Factor

Experiments	Time		Peak current (IP)	Voltage (V)
	On	Off		
1	108	62	160	23
2	109	61	170	23
3	110	60	180	23
4	111	59	190	23
5	112	58	200	25
6	113	57	210	26
7	114	56	220	27
8	115	55	230	28
9	116	54	230	30

Table 2 . The l9 Orthogonal Array For Input Parameters Pulse On Time, Pulse Off Time And Peak Current

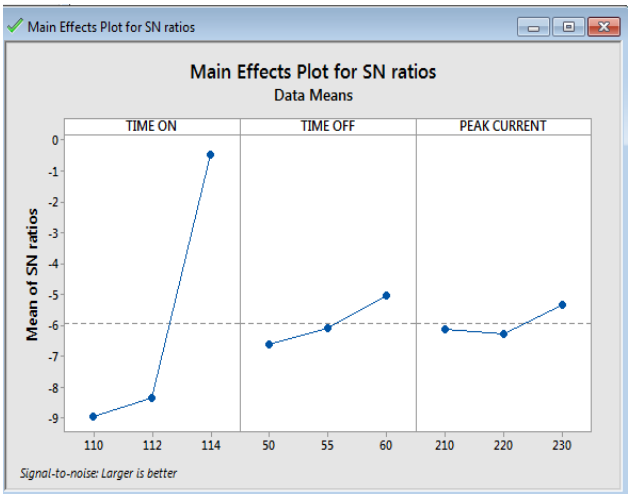
Experiments	Time		Peak current (IP)
	On	Off	
1	110	50	210
2	110	55	220
3	110	60	230
4	112	50	210
5	112	55	220
6	112	60	230
7	114	50	210
8	114	55	220
9	114	60	230





III. RESULTS

Taguchi technique focuses on the significance of examining the reaction variety utilizing the sign to–commotion (S/N) proportion, bringing about minimization of value trademark variety because of wild consideration.



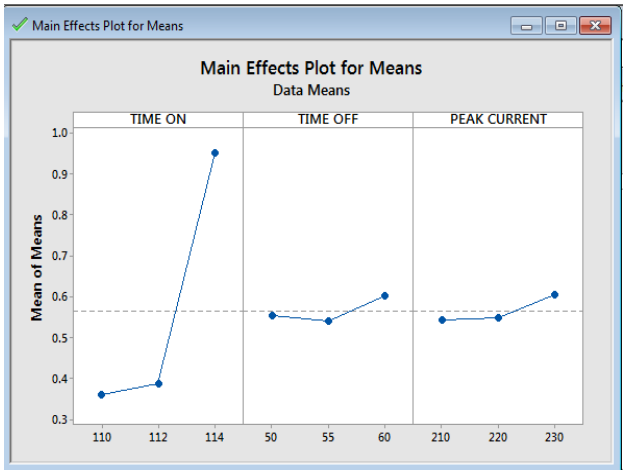


Table 3 Surface Finish Results

Experiments	Time		Peak current (IP)	Surface Finish Values R_a
	On	Off		
1	110	50	210	0.3
2	110	55	220	0.36
3	110	60	230	0.41
4	112	50	210	0.33
5	112	55	220	0.39
6	112	60	230	0.45
7	114	50	210	1.04
8	114	55	220	0.88
9	114	60	230	0.94

IV. CONCLUSION

The target of the contemporary effort is to research the impacts of the different Wirecut EDM progression factors on the machining eminence & the ideal arrangements of procedure factors consequently the nature of machined fragments can be enhanced. Analyses are led on the pieces changing restrictions. The materials utilized for machining are Aluminum combination. Streamlining is finished utilizing Minitab programming..

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Studies on friction stir welding of Aluminum plates 2014-T6 and 6061-T6

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Abstract: *The joining of dissimilar 6 mm thick aluminum plates for 2014-T6 and 6061-T6 was performed using the technique of friction stir welding(FSW).By using statistical approach optimized parameters for weld process have been obtained for joints. The process aimed at studying the effects of welding parameters on microstructure, tensile-strength and plate hardness. The concept of hexagonal tools was used to examine the effect of rotational speed and weld speed on micro structure and tensile property. The effect of welding speed on microstructures, the distribution of hardness and the tensile properties of weld joints are studied. By changing the process parameters more efficient and low defective weld joints are formed. The most prevalent factor is the fraction between both the shoulder of the tool and the diameter of the pin. It is evident from micro structural study that nugget region was dominated by advancing side material. At 6061 HAZ the hardness is found to be minimal, where weld joints are failed during the tensile studies at the ends of the HAZ.*

Keywords: **Friction stir welding, Dissimilar alloys, Al alloy 2014T6 and 6061T6, taguchi optimization method**

1. Introduction

1.1 Basic introduction regarding FSW

"Friction Stir Welding is a technique invented by Thomas for joining of novel material, in 1991, the welding center, TWI"[1]. "FSW has become one of the most important solid-state joining processes in recent years, and it consumes considerably less energy. Especially given the advantages they offer in design and manufacture over existing mechanical joining methods. Although a number of welding methods for airframe structures have been established, friction stir welding is an important candidate technique that is distinctive in being a low-energy, solid-state process"[2]. "FSW is a method of hot-shear joining in which a non-consumable, rotating device plunges through a rigidly clamped piece of work and travels along the joint to be welded" [3]. "The rotating tool is a cylindrical shape consisting of a shoulder and a pin; the profiled pin may be threaded or unthreaded while the length may be lower than the shoulder-extruding weld depth. The FSW process starts by plunging the tool into the joint until the shoulder is in contact with the work piece surface. The rubbing motion of the tool shoulder produces heat as the tool is moving along the joint. Shoulder is responsible for heat generation and the containment of the plasticized material in the weld region, while pin combines the material of the components to be welded, forming a joint" [4].

1.2. Working theory

The FSW mainly have four essential stages: The rotating tool reaches the surface of the metal work piece during the penetration or plunging process and pierce into the metal producing the primary heat. The residential method involves achieving the operating temperature needed to start the welding before a steady downward force between the tool and the work piece is achieved, which generates the energy of friction between them. This cycle goes on till the pressure force between both the FSW instrument and the surface of the metal working component slowly decreases, indicating that the temperature required to start welding has been reached. Complex thermo-mechanical operation includes the welding point. The constant frictional energy produces high temperatures at the joining of the plates which soften the material. As the tool goes forward in the direction of welding the material of both the joining work pieces are combines with each other with the help of the pin. The last step is the returning process. When rotating tool gets to the end of the joining line of the work pieces it retracts vertically. "The friction

stir welding process is very effective method for mechanical improvement of semi solid metal Al alloy"[10]. The operational principles of the FSW process are shown in below figure

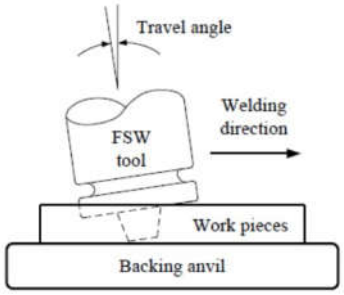


Figure 1.

2. Literature Review

- "Liu Hui performed 2219 aluminum alloy underwater friction stir welding to improve the weld properties. During normal friction stir welding, which is significantly involved in reducing the hardness, coarsened grain was achieved. Due to the precipitates dissolved in the matrix, high-density dislocations and refined grain structures were formed in submersed friction stir joint. This leads to improved welding properties, such as hardness and tensile strength"[6].
- "Basil Darras addressed AZ31 magnesium alloy friction stir processing under natural and submerged conditions and its inherence to tensile properties, grain structure, power consumption and thermal fields. For FSP in the air, average grain size of 18.9 μm, 15.9 μm, and 13.3 μm was achieved, submerged respectively in hot water and cold water. In cold water conditions more grain refining was achieved"[7].
- "Huijie Zhang demonstrated that 2219-T6 aluminum alloys had a submerged friction stir welding. In this, the most important parameters are rotational and welding speeds which affect the tensile strength of the welded sample. The ultimate tensile strength of 360 MPa in optimized condition was obtained via SFSW. This value of SFSW tensile strength is 6 per cent higher than the normal FSW"[6].

3. Experiment Materials And Methods

3.1. Materials

The friction stir welding technique can be successfully welded to a range of materials, including low - melting metals and higher melting metals. A broad variety of materials are able to weld by using FSW, including Al, Al alloys, Fe alloys, Cu alloys, brass, Mg alloys, Ti alloys, Ni alloys, Ag and Au. FSW does not only combine related metals but also dissimilar metals.

Al-2014-T6: 2014 can be used as a high-strength casting material for different uses. It contains a fairly high volume of copper, and is thus less resistant to corrosion. Adequate anti-corrosion treatment when exposed in a corrosive environment is required.

Al-6061-T6: This type of alloy has outstanding strength and resistance to corrosion, and is used as a material of the structures. 6061 has improved strength by adding small amounts of Cu. Although its corrosion resistance is somewhat lower, it has an excellent casting property and is therefore used for rivet materials and small car components. If the hardness is 254N / mm2 or higher and deflection is not a issue in design, the advantage of the allowable stress equal to that of SS400 steel is. 6063 is low in strength but has an excellent extrusion property. So it is used as a material of structure that does not have to be as strong as 6061.

Table-1 Mechanical Properties about AA2014-T6 alloy

Young's Modulus (GPa)	Yield stress (MPa)	Ultimate stress (MPa)	Elongation (%)	Toughness (MPa/m²)
73	414	190-480	13	19

Table- 2 Physical Properties about AA2014-T6 alloy

Density	Hardness	Melting Range	Thermal Conductivity	Sp.Heat
Kg/mm³	BHN	°C	W/m-k	J/Kg-°C
2.8	135	507-638	154	0.88

Table-3 Chemical Composition about AA2014-T6 alloy

Al	Cr	Cu	Fe	Mg	Mn	Si	Ti	Zn
90.4-95	Max 0.1	3.9- 5	Max 0.7	0.2- 0.8	0.4-1.2	0.5-1.2	Max 0.15	Max 0.25

Table-4 Mechanical Properties about AA2014-T6 alloy

Young modulus (GPa)	Yield stress (MPa)	Ultimate stress (MPa)	Elongation (%)	Toughness (J/mm3)
68.9	276	310	17	80.7

Table-5 Physical Properties about AA2014-T6 alloy

Density	Hardness	Melting Range	Thermal Conductivity	Sp.hea t
Kg/mm3	BHN	°C	W/m-k	J/Kg- °C
68.9	107	582- 652	167	0.896

Table-6 Chemical Composition about AA6061-T6 alloy

Al	Cr	Cu	Fe	Mg	Mn	Si	Ti	Zn
95.8-98.6	0.04-0.35	0.15-0.4	Max 0.7	0.8- 1.2	Max 0.15	0.4- 0.8	Max 0.15	Max 0.25

3.2. Tool design:

During the improvement of the FSW process it was realized that the tool design is crucial to the production of sound welds. The working tool is one of the most critical components of FSW operation. The tool consists of different design specifications according to work types, which material to be plate or sheet thickness. The tool contains shoulder and profile pin. The shoulder takes place at the base of the pin profile and pin pace penetrates only through the working materials. The tool shoulder purpose is to monitor the material flow and during operation the pin deforms the grain size of the working material.

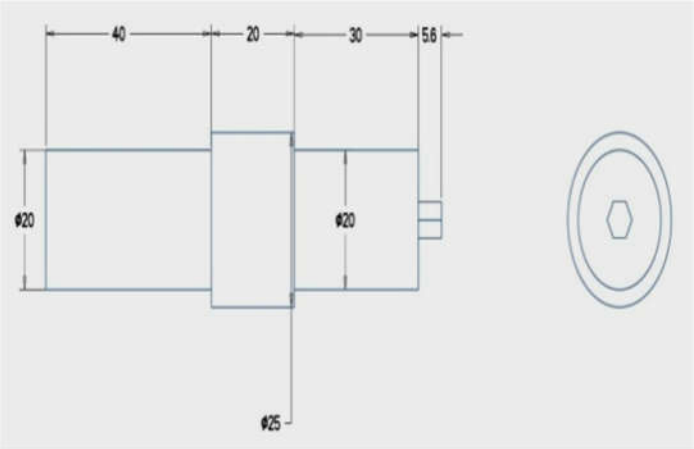


Figure 2 fsw tool design

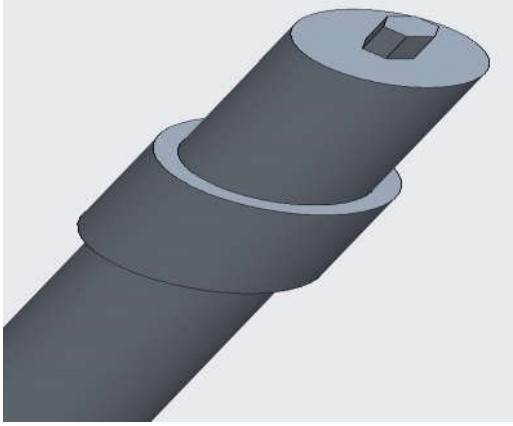


Figure 3 fsw tool design

3.3. Taguchi methodology

"Genichi Taguchi developed mathematical methods known as taguchi methods, and these methods are one among very effective DOE methods of experimental research. The quality of manufactured products can be used to enhance by using these technique and also these methods are recently applied to biotechnology, marketing and advertisement engineering. He first applied his methods was Toyoto. Robustness of the product, pioneered by Taguchi, uses experimental design to study the response surfaces associated with both the product means and variances to select suitable factor settings so that variance and bias are both small at the same time. Designing a quality product requires knowledge in making the response variable immune to unmanageable variation in the production system or client's requirements of using the item"[5]. In this study, there are 18 DOF's due to three independent parameters around three points, so that A L9 orthogonal array is used

4. Experimental Procedure

4.1. Workpieces

The FSW study is important in order to incorporate the welding of Al material into a broad range of industrial applications and to improve the use of environmentally sustainable production processes. Two dissimilar AA6061T6 and AA2014T6 Al plates with thickness about 6mm was butt weld by FSW along the joint line shown in Figure for the following experiments. The samples were cut lengthwise to 140 mm and width to 100 mm.

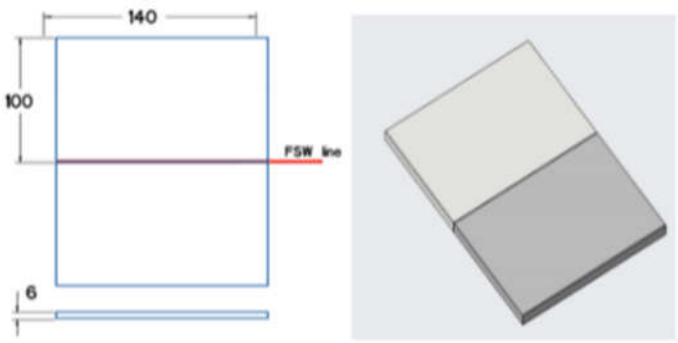


Figure: 4 butt-weld along line

The physical and mechanical property of the work pieces plays a major part in most areas like weldability and selection of the tool materials. Tables 1-6 outline the physical and mechanical properties of the aluminum sheets used in experiments. Table 3,6 shows the chemical compositions of 2014 and 6061 Al alloys. Vertical milling machine is used to do the welding process.

In this study HSS material is used for welding tool, because HSS has high resistance thermal fatigue. The shoulder surface is flat with diameter is 20mm and the shape of the pin is -hexagonal with height of 5.7mm. The complete toll design is shown in the fig



Figure:5 hexagonal tool design as shown in figure 2,3

Table 7 outlines the weld parameters of this study. Due to its higher mechanical strength AA2014 plates were kept on the tool forwarding side and positioned the tool pin at centre of the weld line.The aluminum plate sets are fixed to machine firmly, using the parameters shown in the table 7 tests are made using different weld speed and tool rotation speed.

TABLE-7 below table shows Weld parameters used

Trail no.	Tool Rotation speed(rpm)	Tilt angle (°)	Weld Speed mm/min
1	900	0	20
2	900	1	25
3	900	2	30
4	1120	0	25
5	1120	1	30
6	1120	2	20
7	1400	0	30
8	1400	1	20
9	1400	2	25

For the study of micro-structure of the welded samples of different aluminum alloys they undergo series of grinding process and finally to a disk polishing machine where specimens finished their final stage of grinding, then on grinding surface Keller's reagent was used and cleaned with water for microstructure study. Optical microscopeused to evaluate the microstructure characterization.

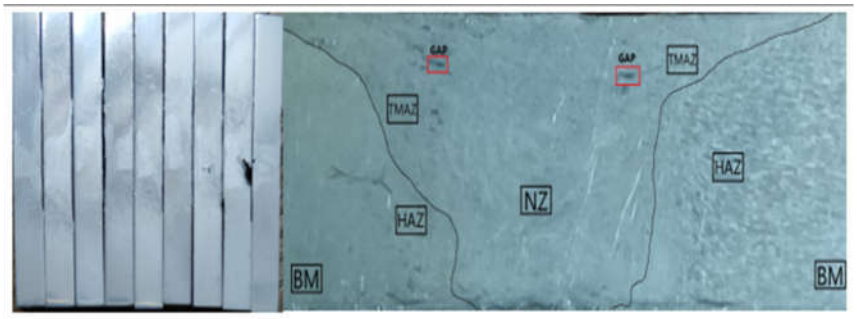


Figure:6 figure shows different zones in weld joint

The weld samples are made as per the ASTM E8 standards for tensile studies, and tensile tests are performed at a strain rate of 0.5mm/min. Micro hardness was performed at a load of 100gf with a dwelling time of 10secs and a distance of 0.25 mm through the weld.

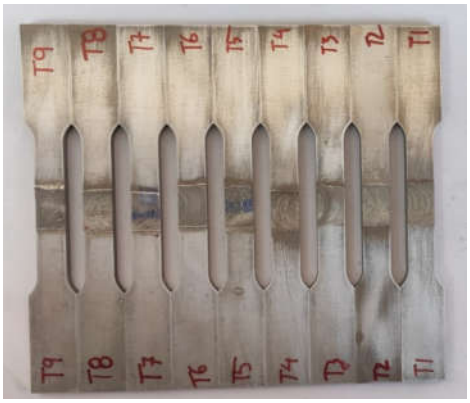


Figure:7 figure shows samples for tensile test

5. Result and Discussion

5.1. Microstructure

Below fig.6 shows the welded different material microstructure of various areas. Even if the weld passes through significant number of heat cycle, the main materials microstructure does not change significantly. The thermal cycle, on the other hand, HAZ is significantly influenced, that is visible from the microstructure. But, plastic deformation does not happen in the HAZ. Because of less heat produced and the plastic deformation in the process there is considerable growth in grain boundaries in the TMAZ area. It is also evident in the microstructure that the recrystallized zone (welded nugget) is separated by a distinct grain boundary from the deformed TMAZ areas. "The stirred zone is the dynamically recrystallized area, in which the material has undergone severe plastic deformation resulting in fine equiaxed grains"[8]. The word stirred zone is widely used in friction stir processing where the material is processed in appropriate volume. "Further to the weld nugget microstructure (Figure 6), it is obvious that the grains are highly refined, that may boost welding strength" [9]

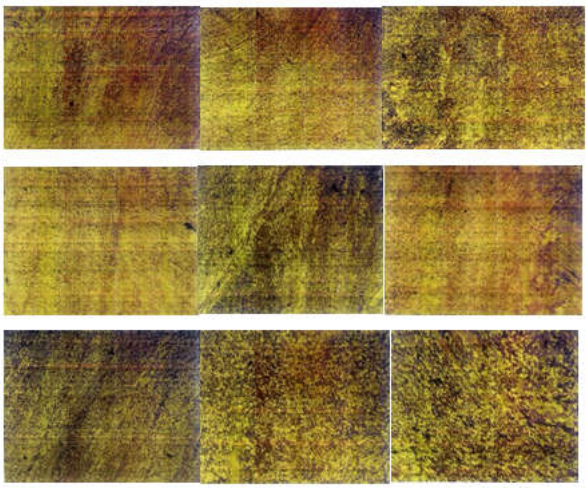


Figure:8 figure shows the microstructure results of the 9 test specimens

5.2. Tensile test

Using hexagonal pin, the highest weld strength was 184N / mm2 and 187 N / mm2. The fracture occurred at 6061 HAZ side as shown in fig 9. The welded specimen displays lower force as the tool rotating at low speed. Joint efficiency has been achieved by 80%. The welded specimens exhibit high strength when the weld speed with lower tool tilt angle is high.

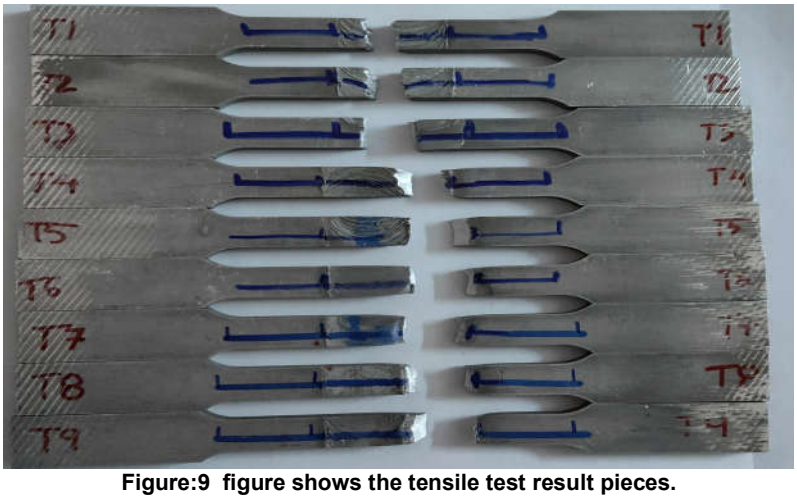


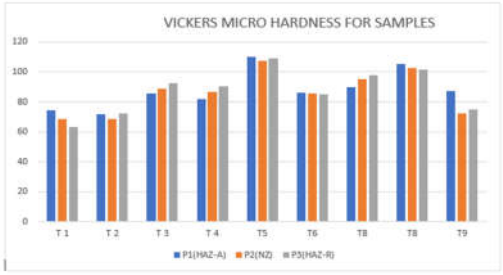
Figure:9 figure shows the tensile test result pieces.

Table:8 table noted the tensile test values

Test specimen number	Tensile strength values (N/mm^2)
1	166.605
2	145.095
3	155.983
4	187.934
5	164.137
6	179.392
7	184.612
8	179..274
9	174.460

5.3. Hardness

Tests are conducted for Vickers hardness around diverse weld spacing zones of (1 mm). Hardness aggregate of 105.15 HV is obtained by this welding for hexagonal pin. At weld nugget area the durability is slightly lesser than AA2014; while, the durability is significantly greater than AA6061 material and thermo mechanically affected zone.



Graph: 1graph represents the hardness values in bar chart

Table: 9 hardness values of the table

Sample-no.	Hardness Values
T1	63.0, 74.5, 68.3 HV0.2
T2	72.2, 71.5, 68.8 HV0.2
T3	92.3, 85.4, 88.9 HV0.2
T4	90.3, 82.1, 86.8 HV0.2
T5	109.1, 110.3, 107.4 HV0.2
T6	85.1, 86.2, 85.4 HV0.2
T7	98.1, 89.7, 95.4 HV0.2
T8	101.7, 105.4, 102.8 HV0.2
T9	74.8, 51.3, 66.1 HV0.2

6. Conclusion

The Taguchi approach was used in this analysis to obtain optimized process parameters of AA2014T6 and AA6061T6 for FSW. In 2014T6 and 6061T6 aluminium alloys, the influence of rotating tool speed, speed at which welding is carried out and inclination angle of tool on the joint excellence was established. The tensile strength was found to be raised with the raise in speed from 900 - 1400 rpm. The raise in tool forwarding speed from 20mm / min to 30mm / min has also been found to increase the hardness. Visual inspection was understood from the trial and error methods that rotation speed of 900 rpm and below surface defects were extremely prominent and poor welding joints were developed. The FSW joint, manufactured with optimized parameter of 1120 rpm rotational speed, 0 tilt angle and 25mm / min weld speed, exhibited a higher tensile strength of 187.9 N / mm2. Rotation speed of the tool was the main contributing factor to the tensile strength.

7. References

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Manufacturing of Foot step power generation by using rack and pinion motion with suspension spring.

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ABSTRACT:

In this project we are generating electrical power as non-conventional method by simply walking or running on the foot step by using rack pinion methods. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step is converting mechanical energy into the electrical energy. This project using simple drive mechanism such as rack and pinion assemble and chain drive mechanism.For this project the conversion of the force energy in to electrical energy. The control mechanism carries the rack & pinion, D.C generator, battery and inverter control. We have discussed the various applications and further extension also. The D.C generator used in this project is Permanente Magnet D.C generator. The Generator is coupled to the fly wheel Shaft with the help of Spur Gear Mechanism.

Keywords: Footstep, Conventional Energy,Non-conventional Energy system.

1.INTRODUCTION

In this project the weight which acts on the foot step is used to generate electrical energy. When a person walks over the foot step, a force acts on the step. One can simply be amazed by knowing how much energy a person can have just by walking on the floor with normal speed. Whenever a person walks, manages to lose energy towards the floor by means excess weight to the floor. That energy may be used and converted into electrical energy. The Mechanical energy(weight)is converted into electrical energy using drive mechanism, in this case rack and pinion. Generated energy can be stored in batteries. Then the output of the battery is used to lighten the lamps in the room.

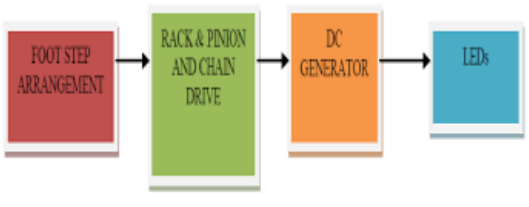
2. PROBLEM STATEMENT

Design and fabrication the model of foot step power generation. Also to fabricate the model of the same which would able to show the characteristics of the systems and working according to need.

3. OBJECTIVES

To design and develop the model of Stair case power generation. o fabricate the model which will work on the systems for required application

4. METHODOLOGY



5. LITERATURE REVIEW

[1] "PowerGeneration in Automobile Suspension System" by C.NithiyeshKumar,K.Gowtham, M.Manikandan, P.Bharathkanna, T.Manoj Kumar In this research paper author studied three methods of foot step power generation namely piezoelectric method, rack and pinion method and fuel piston method comparatively and found that the rack and pinion mechanism is more efficient with moderate cost of operation and maintenance

2] "Generation of Electrical Energy from Foot Step Using Rack and Pinion Mechanism" by Md.Azhar, ZitenderRajpurohit, Abdul Saif, NallaAbhinay, P.Sai Chandu In this research paper authors used regulated 5V power, 500mA power supply. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer. A rack and pinion is a type of linear actuator including a pair of gears which convert rotational motion into linear motion. The "pinion" engages teeth on the rack. In this paper, since the power generation using foot step get its energy requirements from Non-renewable source of energy. There is no need of power from external sources (mains) and there is less pollution in this source of energy. It is very useful to the places like all roads and as well as all kind of foot step which is used to generate the non-conventional energy like electricity.

[3] "Electrical Power Generation Using Foot Step for Urban Area Energy Applications" by Joydev Ghosh, Amit Saha, Samir Basak, Supratim Sen. In this research paper authors used 80 volts and 40 mA from one coil have been generated from a prototype model as first invention. The second invention provides 95 volts and 50 mA from one coil and this generated power can be used to light LED array and to run DC fan after rectifying the AC or can charge batteries. For high efficiency in the axel of the second gear, they fitted a strong magnet vertically, so that when the gear will rotate due to human body weight the magnet also rotate. The magnet is placed in a loop type copper coil. When the magnet start rotating according to the Faraday's law of electromagnetic induction, there will be induced emf in the coil.

[4] "Power generation through step" by Vipin Kumar Yadav1, Vivek Kumar Yadav1, Rajat Kumar1, Ajay Yadav In these research paper authors used equipments with following specification: Motor Voltage:10 volt Type: D.C. Generator, RPM:1000 rpm, Gear 1-Mild Steel,No. of teeth:59(big gear),No. of teeth:36(small gear),Type: Spur Gear, No. of gear used:2 Spring 1-Load bearing capacity:60-90 kg, Mild Steel,Total displacement:5 inch, Bearing 1- Type: Ball bearing, Bearing no.N35,Shaft 1-Diameter: 15 mm- Material: Mild steel author concluded that with these method energy conversion is simple efficient and pollution free.

[5] "Power Generation Footstep" by Shiraz Afzal, Farrukh hafeez This paper is all about generating electricity when people walk on the Floor if we are able to design a power generating floor that can produce 100W on just 12 steps, then for 120 steps we can

produce 1000 Watt and if weinstall such type of 100 floors with this system then it can produce 1MegaWattAs a fact only 11% of renewable energy contributes to our primary energy. If this project is deployed, then not only we can overcome the energy crises problem but this also contributes to create a healthy global environmental change. In this project a gear system is attached with flywheel which causes to rotate the dynamo as the tile on the deck is pressed The power that is created is saved in the batteries in addition we will be able to monitor and control the amount of electricity generated When an individual passes it push the tile on the ground surface which turn the shaft beneath the tile, turn is limited by clutch bearing which is underpinned by holders. Primary shaft is rotate approx. twice by a single tile push. The movement of the prevailing shaft turn the gearbox shaft which builds it 15 times (1:15) then its movement is smoothen by the help of fly wheel which temporary store the movement, which is convey to the DC generator (it generates 12V 40 amp at 1000 rpm).

[6] “POWER GENERATION FROM STEPS” by Ramesh Raja R, Sherin Mathew This research paper attempts to show how energy can be tapped and used at a commonly used floor steps. The usage of steps in every building is increasing day by day, since even every small building has some floors. A large amount of energy is wasted when we are stepping on the floors by the dissipation of heat and friction, every time a man steps up using stairs. There is great possibility of tapping this energy and generating power by making every staircase as a power generation unit. The generated power can be stored by batteries, and it will be used for slighting the building.

[7] "Electricity Generation from Footsteps; A Regenerative Energy Resource” by Tom Jose V*, BinoyBoban*, Sijo M T* In these research paper author manufactured a model made from stainless steel, recycled car tires and recycled aluminium, also includes a lamp embedded in the pavement that lights up every time a step is converted into energy (using only 5 percent of the generated energy). The average square of pavement produces about 2.1 watts of electricity. And according to author, any one square of pavement in a high-foot traffic area can see 50,000 steps a day. Based on this data, only five units of Pavegen pavement can be enough to keep the lights on at a bus stop all night.

6. WORKING

The complete diagram of the power generation using foot step is given below. The pushing power is converted into electrical energy by proper driving arrangement. The rack & pinion, spring arrangement is fixed at the upper plate and lower plate. The spring is used to return the plate in same position by releasing the load. The gear wheel is coupled to the smaller motor shaft. The generator is used here, is permanent magnet D.C generator. This arrangement is fitted in FOOT STEPs; the complete arrangement is kept inside the floor level except the pushing arrangement. Basic Components: It consists of the following main parts:

1. MS plate

2. MS Pipes

3. Rack and pinion

4. DC motor

5. FRAME

6. LED lights Etc

7. ADVANTAGES

1. Power is generated simply by walking on the step.

2. Power also generated by running or exercising on the step and implementing this mechanism on treadmills.

3. No need input fuel for power generation.

4. This is a Non-conventional system.

5. Battery is used to store the generated power else we can use directly this generated power for conventional purposes.

8. DISADVANTAGES

1. High Initial Cost

9. APPLICATIONS

1. This can be implemented on railway stations, bus stops, air ports to generate electric power by human physical activity.

2. Also can be implemented in parking lots, electric escalators.

3. This mechanism can be implemented on gymming instruments like cardio machine for power generation and the power generation rate is high.

4. We can use this mechanism in automobile suspension system.

5. In rural areas etc.High Initial Cost

10. CONCLUSION

In concluding the words of our project, since the power generation using foot step gets its energy requirements from the non-renewable sources of energy. There is no need of power from the mains and there is less pollution in this source of energy. It is very useful to the places like all roads and as well as all kind of stair case which is used to generate the nonconventional energy like electricity. It is able to extend this project by using same arrangement and construct in the footsteps/speed breakers so as to increase the rate of power production rate.

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[2] “Generation of Electrical Energy from Foot Step Using Rack and Pinion Mechanism” by Md.Azhar ,ZitenderRajpurohit ,Abdul Saif ,NallaAbhinay ,P.Sai Chandu

[3] “Electrical Power Generation Using Foot Step for Urban Area Energy Applications” by Joydev Ghosh, Amit Saha, Samir Basak, Supratim Sen.

[4] “Power generation through step” by Vipin Kumar Yadav1, Vivek Kumar Yadav1, Rajat Kumar1, Ajay Yadav

[5] “Power Generation Footstep” by Shiraz Afzal, Farrukh hafeez

[6] “POWER GENERATION FROM STEPS” by Ramesh Raja R, Sherin Mathew

[7] "Electricity Generation from Footsteps; A Regenerative Energy Resource”by Tom Jose V*, BinoyBoban*, Sijo M T*

Pneumatic based bike gear changing

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ABSTRACT

In this paper, a gear shifting mechanism was designed and applied to make the shifting process more expeditious and less destructible for the driver. The incipient contrivance must be reliable, has a diminutive dimensions, low construction and maintenance cost. This paper aims to gear shifting process utilizing contrivances as: a manual four speed gear box, two pneumatic double acting cylinders, , an electrical motor , limit switches, buttons, , a table (holder) and power supply. According to suggested gear shifting mechanism the control unit select optimum gear shifting ratio for an automobile without operating it manually (utilizing relays). Utilizing this method leaves to the driver the exhilaration of selecting the shifting moment.

Key Words: pneumatic cylinders, Solenoid valves, gear box, gear shifting mechanism, electric motor.

INTRODUCTION

In this project, a gear shifting mechanism is designed and applied to make the shifting process more expeditious and less destructible for the driver. The incipient contrivance must be reliable, with minute dimensions, low construction and maintenance cost. This project aims to ameliorate gear shifting process utilizing contrivances as: a manual four speed gear box, two pneumatic double acting cylinders, two pneumatic two position five ways directional control valves, , an electrical motor, a belt, two pulleys, limit switches, push buttons, bulbs, a table (holder) and power supply. According to suggested gear shifting mechanism the driver can cull the transmission gear ratio without moving his hands from the steering wheel by putting the gear shifting push buttons on the steering wheel. Utilizing this method leaves to the driver the exhilaration of culling the shifting moment. This study describes in detail in an simple way to how to convert the traditional manually gear shifting mechanism to a semi-automated gear shifting mechanism. The development has concluded withal the gearbox, which became much smoother and engenders less noise. Gear shifting mechanism must be facile to utilize and workable, these authoritative ordinances are very paramount especially for minute cars utilized by special needs people. For some drivers, the gear shifting can cause some perplexing at driving specially at critical situations. A crowded road on a hill or a sudden detour makes an abundance of tension on the driver. One of the difficulties in this situation is to operate the right reduction ratio and engaging it at the

right time. This design avails the driver to increment his fixating on the road. Withal reduces the time needed to engage the required. Reduction ratio, which increases the conveyances replication, this design may be considered as an inculcative model for gear shifting mechanism. So, we pointed to the following: 1. The opportune dimensions for the main components holder keeping in mind the integration of other part for enhancement and development. 2. A manual, 4-frontal speed gear box is utilized automobile drive is culled for this design because it is more facile to modify. 3. An electrical motor is utilized to engender mechanical power in lieu of an internal combustion engine, which is arduous to be placed there. It is additionally used to make the engagement process more facile .Motor is variable speed (0 to 9000 rpm) 4. A couple of pulleys and a belt are acclimated to transmit power from the electrical motor to the gear box. 5. To eschew binding in the input shaft caused by the radial force, we utilized a bearing fine-tuned on the holder. 6. We used two pneumatic, double acting cylinders, per pair of gear shifting. 7. Two (five ways, two positions) directional control valves are habituated to transmute the compressed air direction. Every directional valve has 230V ac solenoid that converts electrical power to magnetic puissance, which magnetizes the spool inside the valve; this action transmutes the compressed air direction.

2. OBJECTIVE

The main objective of this system is to minimize the human errors in operating the gears with the avail of automatic technology. Other objectives include optimum gear ratios, reducing wear and tear of the gears, shifting the gear efficaciously, optimum performance of the gear box, optimum force exerted by the cylinders to move the shifting levers (pedals).

3. MODEL COMPONENTS

3.1 Base Frame

The base frame is a structural element that fortifies the entire gear box system. The frame carries the drive system at its lower end which comprises of the LH and RH rear bearing housings. The drive motor is mounted on the base frame.

3.2 Drive system

Drive system comprises of the single phase AC commutator motor with following designations

• Single phase AC moto

r • Commutator motor

• Power = 1/15hp=50 watt

• Speed= 0-6000 rpm (variable)

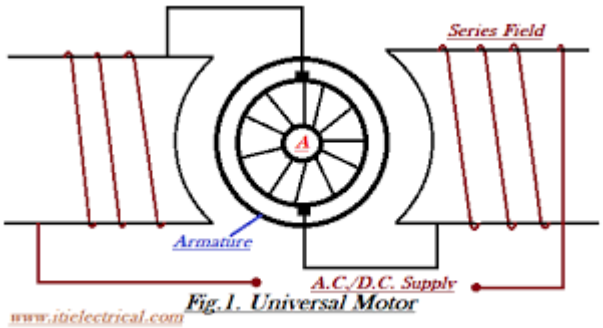


Fig -1: AC commutator Motor

3.3 Pneumatic linear actuator

The pneumatic linear actuator is an Standard cylinder SDA 20 x 15.This cylinder is an double acting cylinder that is operated by an pneumatic valve5/2 way. The valve is supplied compressed air from the compressor by

denotes of an a AGB operates filter-regulator-lubricator (FRL) unit. This linear actuator is utilized in the following positions, a. 1st gear b. 2nd gear c. 3rd gear d. 4th gear

3.4 Shifter mechanism

The shifter mechanism is an assemblage of levers actuated by the linear actuator as mentioned above. This shifter is mundanely in neutral condition; it shifts the gears at commencement of cycle and releases it at cessation of cycle

. 3.5 Position control system

The position system comprises of the following components; a. 5/2 ways, Solenoid operated, center off, and detent type b. Pneumatic cylinder DPNC connectors The details of this relay system are given in the circuit diagram of the pneumatic system

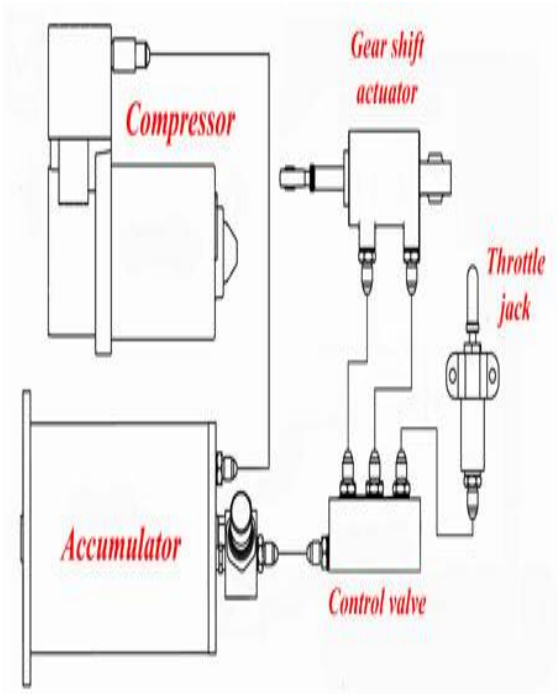
4. CONSTRUCTION DETAILS

The two solenoid valves are connected to a compressor with the avail of hoses of Ø6mm from which pressurized air is extracted. The solenoid valves are followed by two pneumatic cylinders with the avail of air hoses. The cylinders are followed by a clutch pedal. Contiguous to the clutch pedal gear box and a motor arrangement is present. The construction withal includes a proximity sensor which senses the haste of the wheel. The precise signals are sent tothe solenoid valves by the control unit through the relays. Ergo the input is speed of the wheel sensed by a sensor and the output is shifting of gearaccordingly. The puissance to the control unit is supplied from the 12V battery as well the shifting of gear monitored on an LCD. It withal consists of DC motor, ATMEGA Development board, speed regulator (expeditor), transformer etc.

5. WORKING PROCEDURE

The pneumatic circuit is as shown in fig.2,the motor is started to drive the main shaft by means of belt and pulley arrangement, initially the gear box is in neutral i.e., the output shaft is stationary condition. When the 5/2 way direction control valve -1 is operated the cylinder -1 operates the piston to move in the right hand direction thereby bringing the 3rd gear into engagement, and thus the output shaft starts to rotate thereby transmitting power from the input (motor/engine) to the output (differential). Fig -2: Electro-Pneumatic gear shifting mechanism The flow control valve in the circuit governs the pressure which is of the order of 1.5 to 2 bars, hence the governed pressure causes the gradual push provided to the piston rod which brings about gradual engagement of the gears hence, (effect of gradual clutch release for smooth engagement is not required). When the 5/2 way direction control valve -2 is operated the cylinder -2 operates towards left as the piston rod is locked for movement left , hence first the fork shifter moves towards left bringing on the neutral position and then slides further left to bring the 1st gear into engagement. Similarly the circuit works for the 2nd and 4th gear. Note: If both the valves i.e., 5/2 way direction control valve - 1&2 are operated simultaneously, the system is arranged such that neutral position will be

achieved, hence the system becomes fool proof.



6. CONCLUSION

The pneumatic gear changer was designed and checked for successful working. It was found to be running successfully under all the conditions. By the results, the suggested mechanism is realizable and workable. Using the simplest and required hardware enables to convert the old traditional gear shifting mechanism to semiautomatic one. Using of this mechanism in vehicles leads to make the driving process easier, reduces the risk of destabilizing the car, the lap/stage time, and the chance of miss shifting.

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[9] Material selection for output/counter shaft from PSG (1.10 & 1.12) + (1.17) [10] V.B. Bhandari., "Design of Machine Elements" Tata McGraw Hill Pvt Ltd. Gear design procedure for Spur Gear (chap. Spur Gear)

Rack and pinion motion-based Head light tilting system

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Abstract

A regulation system of one or more supports of the domes of the headlights in a vehicle having a chassis a rear wheel at least one front steering wheel and a roll and steering mechanism operatively connected with the chassis is described. The regulation system comprises articulated connection means between the roll and steering mechanism and the supports for controlling the domes of such headlights so that they rotate such to compensate the roll rotation of the vehicle while driving.

Keyword: -Rack & pinion, Head light, front wheel steering with Ackerman's principle.

INTRODUCTION

Car safety is the avoidance of automobile accidents or the minimization of harmful effects of accidents, in particular as pertaining to human life and health. Special safety features have been built into cars for years, some for the safety of car's occupants only, and some of the safety of others. One of the choices available is Design and fabrication of steering controlled head light system. This device relates to a headlight arrangement for vehicles, and, more particularly, to a head light arrangement operably connected to the steering mechanism of the vehicle for illuminating the proposed path of travel including support brackets operable to support head light members thereon connectable to a frame portion of the vehicle, linkage means interconnecting the brackets for conjoint movement thereof, and means interconnecting one of the brackets to the connector rod of the vehicle whereupon the brackets and headlight members are moved in relation to the direction of vehicle travel. Still, more specifically, this device relates to a headlight arrangement operably connected to the steering and front wheel assembly of an automobile operable to maintain headlight members and front wheels pointed in the same direction at all times.

Objectives

The main objective of this system is to apply automotive vehicle.

- To move the headlight along with steering on sharp turning.
- To keep the headlight beam parallel to road turning as possible as can.
- To change the place of area illuminated by headlight and direct illumination area of headlight in useful direction.
- To improve the visibility area of driver at night so that driver can judge road turning well.
- To prevent road accidents on sharp turning at night specially in hilly areas.
- To increase safety at night.

. **LITERATURE REVIEW**

The present invention relates to a vehicle front lamp light distribution control system and more particularly to a vehicle front lamp light distribution control system capable of raising visibility at the time of cornering by controlling light distribution means of the front lamp. According to1. Japanese Patent Publication No. H5-23216, 2. Japanese Patent Application Laid-Open No. H8-183385, 3. Japanese Patent Application Laid-Open No. H11-78675, and 4. Japanese Patent Application Laid-Open No. H8-192674 Laxmi et al. [1] Design &Fabrication of steering controlled headlights in automobile states, A vehicle head lamp including a fog lamp is provided with a movable reflector and by turning the movable reflector in the steering direction by an amount corresponding to a steering angle of the steering wheel, the light distribution pattern of the front lamp is changed in the direction of vehicle's turn so as to raise visibility at the time of cornering However, according to the aforementioned earlier art, the light distribution pattern of the front lamp is changed in the steering direction of the steering wheel by an amount corresponding to the steering angle when the vehicle turns on an intersection or the like, cornering destination cannot be beamed brightly enough before operating the steering wheel. Therefore, an t capable of beaming the cornering destination prior to operation of the steering wheel has been demanded. Czech Tetra and 1920s Ca dills were early implementer of such a technique, producing in the 1930s a vehicle with a central directional headlamp. The American 1948 Tucker Sera was likewise equipped with a third central headlamp connected mechanically to the steering system. The 1967 French Citroën DS and 1970 Citroën SM were equipped with an elaborate dynamic headlamp positioning system that adjusted positioning in response inputs from vehicle steering and suspension systems, though US regulations required this system to be deleted from those models when sold in the USA. Presently, studied changes are unfolding in automotive lighting technology. Automobile manufacturers - together with suppliers and representatives - currently aspire to develop the headlights of tomorrow. Freeform headlamp is one of the popular design which offers great flexibility and compactness. They suggested that the apparatus for automatically adjusting a direction of a light axis of a vehicle headlight includes a steering angle sensor detecting a steering angle of a steering wheel of a vehicle and a swivel control unit performing swivel control by which the direction of the light axis of the vehicle headlight is adjusted to the target direction in accordance with the steering angle detected by the steering angle sensor. Proposed automatic optical-axis adjusting device for automatically adjusting direction of optical axes of front lights with respect to steering angle of steering wheel An electronic control for automobile headlight utilizing a spherical sensor comprised of a metal ball surrounding by a fluid encapsulated in a spherical sensor which is connected to the spherical sensor system. The automatic optical axis adjusting device for automatically

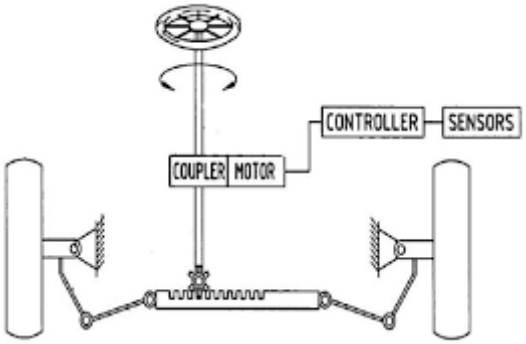
adjusting direction of optical axis of from lights headlight control apparatus and method controls an irradiation direction of a headlight. This apparatus uses a navigation based swivel angle calculated based upon the shape of a road in a navigation based control period and a steering based swivel angle calculated based upon a steering angle in a steering based control period [2] The optical design, fabrication and the measurement of the freeform reflector headlamps are investigated by Shinde G. et al. [3] proposed the new standard for cornering light system allows not only the conventionally approved ONOFF control mode interlocked with the operation of the turn signal switch but also an automatic ON-OFF control according to the steering wheel angle. The active cornering light system (ACL system) on the new DELICA D: 5 have a dedicated ECU to control the operation of the lamps. On-dong line investigated by car light piloting system objective of the present invention is to provide a steering wheel controlled car light pointing system which automatically turns the lights of the motor car to coincide the projection of the lights with the steering direction of the motor car

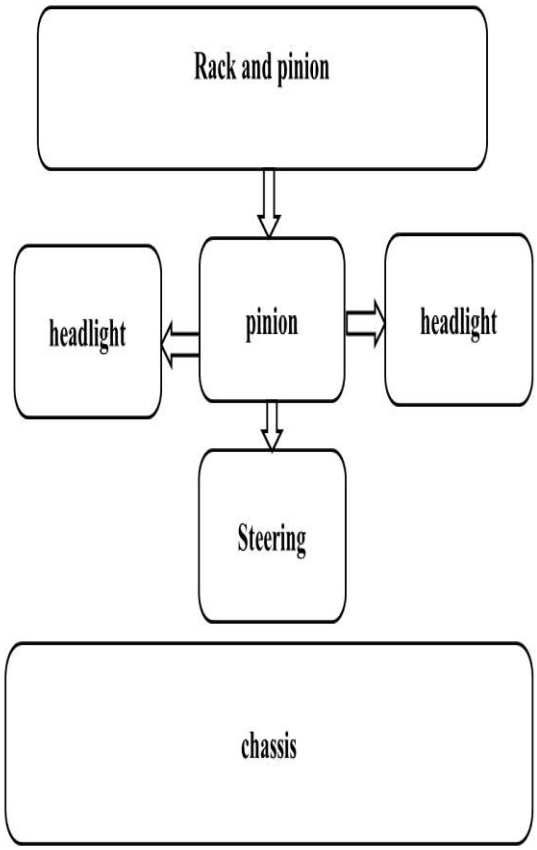
WORKING

Steering system is to achieve angular motion of the front wheels to negotiate a turn. This is done through linkage and steering gear which convert the rotary motion of the steering wheel into angular motion of the front road wheels. The parts of steering system are consisting of Steering linkage and Steering gear. Steering Linkage-it depend upon the type of vehicle, wither it is a car which has independent front suspension. Steering linkage for vehicle is defining two types like as Steering Linkage for Vehicle with Rigid Axle Front Suspension and Steering Linkage for Vehicle with Independent Front System.

1 Rack and Pinion Steering Gear:

The rotary motion of the steering wheel is transmitted to the pinion of the steering gear through universal joints. The pinion is in mesh with a rack. The circular motion of the pinion is transferred into the linear rack movement which is further relayed through the ball joints and tie rods to the stub axles for the wheel to be steered. In the figure shows the schematic and actual modal of steering gear mechanism.





CONCLUSION

In the view of forgoing disadvantages inherent in the known types of road tracking headlamps now present in the prior art, the present invention provides a new movable vehicle head light construction wherein the same can be utilized for automatically aiming the head lamps in the same direction of the travel regardless of the terrain of the road. The further object of the system is, this is susceptible of a low cost of manufacturing with regard to both cost and labor and which accordingly is then susceptible of low prices of sale to the public.So there by making such movable vehicle head lamps which are economically low to available to the public

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Railway track based power generation with rack and pinion mechanism

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Abstract:

This project using simple drive mechanism such as tension spring assemble and link mechanism. For this project the conversion of the force energy in to electrical energy. The control mechanism carries the rack and pinion, Dynamo generator, battery and inverter control. So this project is implemented to all railway track, the power generation is very high. The initial cost of this arrangement is low. Used energy at an increasing rate for his requirement.**The principle** of this project is conversion of mechanical energy in the form of force into electrical energy.

KEYWORDS: Energy, Energy Harvesting, Non-conventional Method, Rail Road

INTRODUCTION

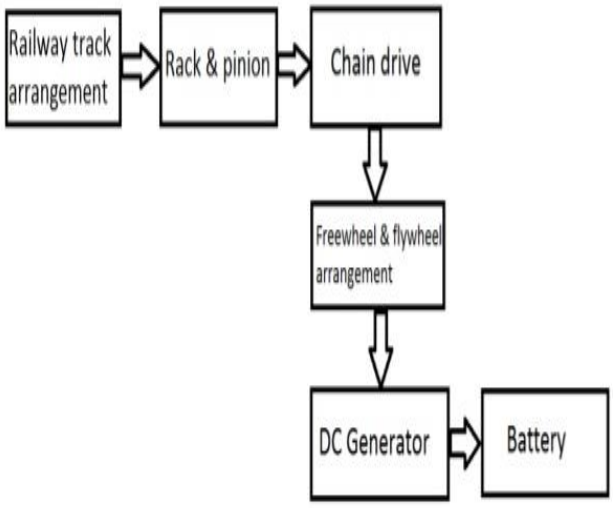
Man has needed and used energy at an increasing rate for his requirement. Man required energy primarily in the form of food. He derived this by eating plants or animals, which they hunted. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling water to turn water for sailing ships and for driving windmills, and the force of falling water to turn water wheels. Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy. World is growing at the faster rate with regards to consumption of fuel and so the scarcity of energy as the sources producing them are depletable in nature. Around the world, there were 8,06,000 cars and light trucks on the road consuming 260 billion US gallons 980000 liters of gasoline yearly. The extensive usage of energy has resulted in an energy crisis and there is a need to develop methods of optimal utilization. Which will not only ease the crisis but also preserve the environment. Commuter rail and subway are including railway transportation which play an important role in the economy and quality everyday life. Researches show that the world has already had its enough shares of its energy resources. Fossil fuels pollute the environment , Nuclear energy requires careful handling of both raw as well as waste material. The focus now is shafting more and more towards the renewable sources of energy. which are essentially nonpolluting. In the present day scenario power has become the major need for human life. Energy is an important input in all the sectors of any countries economy. The

increasing population and decreasing conventional sources for power generation. provides a need to think on non-conventional energy resources. To facilitate policymakers and transportation into making informed decisions on operating transportation systems, it is essential that railway track-side equipment (signal lights, wireless communication monitoring devices, positive train control, etc.) are well maintained and operated. When train moves over the track, the track deflects vertically due to load exerted by the train's bogies. The vertical displacement of the track under the weight of a passing train can connected regenerative devices i.e. a vibration energy harvester. The generated power can be stored into the battery and used to power track side equipments. Railroad energy harvesting is no trivial disturbance.In our project we are using these powers for irrigation system to the near by lands and fields and for lamp lights near the track.

PROPOSED SYSTEM

When a train ease up the track, the track deflects in downward direction attributable to the load exerted by the train's bogies. additionally due the deflection of track there's a deflection of timber that is place below the track and thus the flap is occupation downward direction because the flap is occupation a downward direction the spring that is connected to flap get compress in downward direction and thus rack is additionally move in downward direction and attributable to these pinion get rotates and thus larger freewheel turned as a result of each square measure mounted on same shaft. As there's a rotation of larger freewheel then the smaller freewheel is additionally turned through chain drive. The freewheel and regulator square measure mounted on same shaft thus the regulator additionally turned. The regulator is connected to the shaft of the generator therefore if the regulator can turned then there's a rotation shaft generator and power get generated which power is keep into the battery ADVANTAGES • Power generation is solely running the vehicle on this arrangement • Power additionally generated by running or exercise on the brake. • No want fuel input • This could be a Non-conventional system • Battery is employed to store the generated power

Block diagram



ADVANTAGES

• Power generation is solely running the vehicle on this arrangement

• Power additionally generated by running or exercise on the brake.

• No want fuel input

• This could be a Non-conventional system

• Battery is employed to store the generated power

DISADVANTAGES

• Slight inclination is needed within the railway track

• Mechanical moving elements is high

• Initial value of this arrangement is high.

• Care ought to be taken for batteries

APPLICATIONS

Power generation exploitation railway track system will be employed in most of the places like

All highways road speed breaker

All Railway track

• For Irrigation system:

The battery will be connected to the relay which will work as a switch.This switch will be activated with the current coming from an op-amp.A comparator op-amp will be used which will be work as a sensing device to sense the moisture in soil.A potentiometer will used to set the minimal voltage. Two cross wires will be placed in the soil with a nominal distance.When the soil is dry,resistance in soil will be around 10k.This will trigger the op-amp to give a output with low resistive path,i.e.fromground.This will connect the coil in relay and pump will be on. And on the contrary,when moisture will be enough,conduction will take place and relay will be switched off.

• For Lamp lights near track:

Another application which we are showcasing is lamp lights near track. The energy stored in battery can be used for lights near railway track. As we are searching for of a automatic solution for every problem, hence we are using LDR sensors here to avoid manual switching. The LDR wil allow electricity to flow through it when the photovoltaic cells are inactive and the resistance are low. This happens in the absence of sunlight.So during the day time, the lights connected through the sensors are switched off due to high resistance and evetually will glow in night time. One potentiometer is used for setting a reference value of resistor and a comparator IC to compare the light with the reference and allow the leds to glow.



RESULT

• As our project is Electric power generation using railway track and according to our fabricated model we are glowing LED which indicates the power is generated this is approximately equal to 5 volts. And even we are storing energy in battery by using toggle switch. Which can be utilized to any application.

• In our project we are glowing LED instantly when the train is passing over the roller and some of energy is stored in battery at the same time. And by using toggle switch we are using the pumps for irrigation system. And over all energy generated in our model is 8volts.

• These new design leads to more generation of electricity. And also it is more optimumand reliable in usage. The compact design of the structure leads to its easy and compatible mounting wherever required. Also less number of contact pairs leads to less frictional forces developed. These will lead to non-conventional energy generation which would further be used in the nearby railway infra-structure.

• A train weighing 1,000 kg going up a height of 10 cm on a rumble strip produces approximately 0.98KW power by placing one such speed-track on a busy highway, where about 100 trains pass every minute, about one kilo watt of electricity can be produced every minute.

CONCLUSION

It is ascertained that the electric power is in nice demand, we tend to as applied scientist ought to be in discovered for brand spanking new plan of power generation. As energy will ne'er be created or destroyed, we should always rework it into the shape that we will wont to provide for railroad station instrumentation light-weight, fan, beacon etc. we will implement this method at each entry and going away purpose within the railroad station This arrangement will be employed in completely different application like in foot step or speed breaker in school, faculties and main road for generation ways in which of voltage. so the facility production rate is raised and demand at explicit space will be consummated.

FUTURE SCOPE

This arrangement is slightly changed to construct in foot step and this arrangement is mounted in • colleges, cinema theatres, • searching advanced and • several different buildings

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SOLAR Grass cutting machine

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Abstract

In this project we studied a solar grass cutter. A solar Grass cutter is a machine that uses revolving blades to cut a grass at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Grass cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep land s in gardens, schools, college's part etc. We have made some changes in the existing machine to make its application easier at reduced cost. Our main aim in pollution control is attained through this. Unskilled operation can operate easily and maintain the land very fine and uniform surface look. In our project, "solar economical grass cutter" is used to cut the different grasses or different grass for the different application.

Key Words: Solar panel, battery, Motor, Pulley system, Grass cutter, pollution.

INTRODUCTION

In large size of grass field is cut manually. The farmer used hand scissors used to cut and maintain grass uniformly. It is not easy and also very difficult to maintain uniform size. Hence, we design to make a grass cutter without any power source due to reduce the power consumption. The unskilled gardener is enough to operate the grass cutter. The grass cutter easy to operate and it consists of Rotary Blade, Roller etc. The blade removes the extra growth of the land and roller gives light pressure to the top surface of Land. It gives fine cutting done fast work done on the land and uniform speed throughout the Land. The project work was very great successful one. It is used to maintain land of our college auditorium land maintenance. The operations involved in the grass production cycle include land clearing, land forming/ land levelling, tillage, and grass establishment, harvesting and post-harvest operations. Grass establishment, harvesting and post-harvest operations. Grass establishment is necessary to eliminate the effect of weeds, pests and disease infestation and to provide suitable conditions for optimum yield. More than 3000 species of weeds had been identified all over the world. The cost of weed management is enormous; however, the opportunity cost of weed management is higher. Weed control measures must be put in place to check the growth and propagation of weeds. Chemical and manual weed control methods are viable alternatives; however, whereas environmental impact of herbicides made chemical method unsustainable, drudgery limits the size of farm of an individual in sub-Saharan Africa. Introduction of an effective mechanical weeder is expected to encourage subsistent farmers leading to increased production and hence

reducing poverty. To achieve this objective, a row grass cutter was developed in the Federal University of Technology, Akure in Nigeria. The weeder was designed, fabricated and tested and found to be very efficient. The machine consists of an abrasive nail- brush mounted on a shaft, transmission system, engine, frame and wheels. The height of cut of the machine is set above the ground level, but works effectively as a weeder. The machine is simple, cost effective and useful for small to medium scale farm holders. A Crop cutter is a machine that uses revolving blades to cut a crop at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Crop cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep land s in gardens, schools, college's part etc. We have made some changes in the existing machine to make its application easier at reduced cost. Our main aim in pollution control is attained through this. Unskilled operation can operate easily and maintain the land very fine and uniform surface look. In our project, "crop cutter" is used to cut the different grasses or different crops for the different application.

2. LITERATURE REVIEW

Automated Solar Grass Cutter (February 2017) Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil, Prof. V .A. Mane According to the author a daily purpose robot which is able to cut the grass in the lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem. Automated solar grass cutter are increasingly sophisticated, are self –docking and some contain rain sensors if necessary, nearly eliminating human interaction. The system is switched to automatic mode in which the robot's infrared sensors make a compason between, cut and uncut the grass. The mower continues this process until it completes the job. The system uses 12v batteries to power the vehicle movement motors as well as the grass cutter motor. They also use a solar panel to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to an 8051 family microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection. The microcontroller moves the vehicle motors in the forward direction in case no obstacle is detected. If in case obstacle is detected by the sensor then the microcontroller stops the grass cutter motor so as to avoid any damage to the object/human/animal coming. [2] Solar Based Grass Cutting (January-June 2017) Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil According to the author, human enlargement in many countries there are studies and trials going on the solar energy and the wind energy, so they made their new concept solar power grass cutting machine. In this concept they cut the grass on the agricultural land or small plants in lawns and gardens. The design of solar powered agricultural equipment will include direct current (DC) motor, a rechargeable battery, solar panel, a stainless-steel blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is essential. The purpose of the project here is to

design and build a remote-controlled grass cutter. The device consists of linear blades and it does not affected by climatic conditions. They have used many components for preparing grass cutter like DC Motor (3) for rotating the wheels and blade, wheels (4), battery, Solar panel, IR sensor, Collapsible blade. There are two main components such as transmitter and receiver. Transmitter continuously transmits the rays if any obstacle come in front of grass cutter then the rays are reflected back towards the receiver. The receiver receives the signal in the serial form from encoder but microcontroller requires parallel data for communication so receiver sends data to decoder to convert data in the parallel form and then it is passed to microcontroller.[4] Solar bases wireless grass cutter (IJSTE - International Journal of Science Technology & Engineering, May 2016) According to the author, The idea of autonomous machine used to reduce man power with efficient work has given. Mainly this project explains application of green energy. This knowledge can be used in agricultural field as a future scope. According to the author, it gives description multipurpose grass cutter which is sensor based for special purposes like in grass trimming, hedge trimming etc. utilization of sensor and design calculation are used in proposed system. According to the author, A robot was designed that operates on an on-board, solar charged battery has been designed by the French manufacturer SN Eno. The RoboMower4 the capability of steering itself across a person's lawn. This robot called the Atawa A34, uses built-in infrared sensors to avoid obstacles. This system uses wires buried beneath the surface of the ground [4]

3. BLOCK DIAGRAM DESCRIPTION

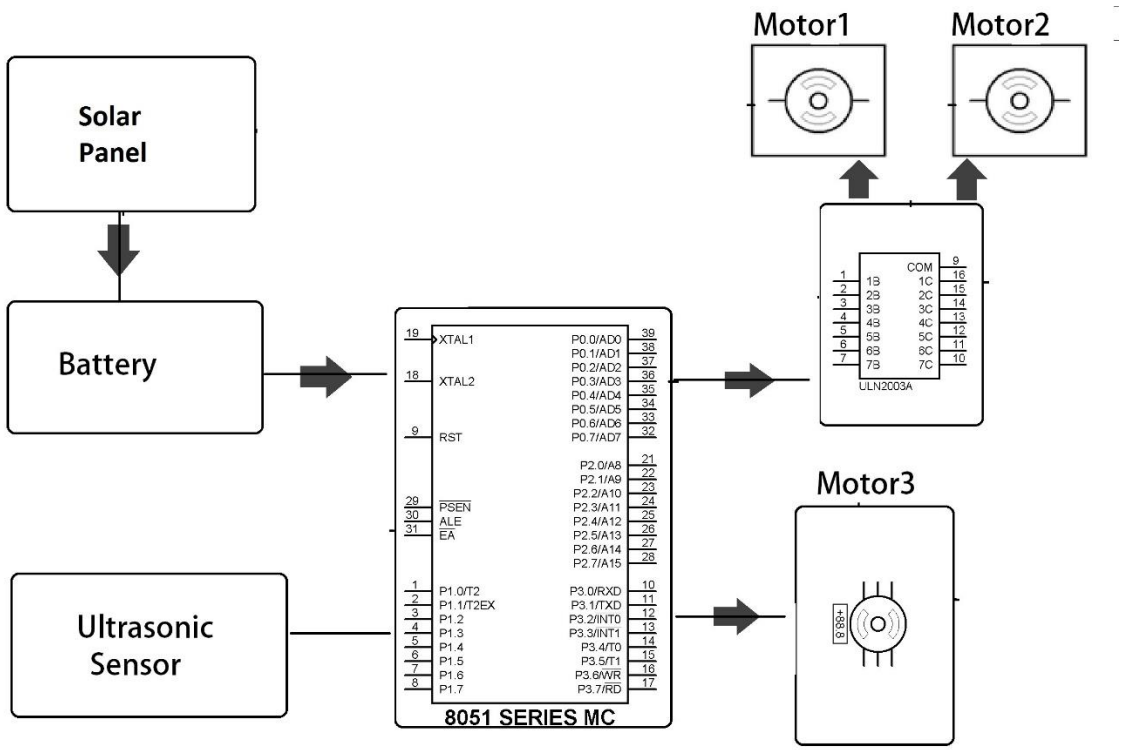

Fig-2: block diagram

3. Mechanism and working layout

The work layout shows the arrangement of3various parts of project. to the end of 3rd shaft and which is power transmit to the cutter mechanism



Fig -3: front view of grass cutter

3.1. WORKING PRINCIPLE

Coming to the working of solar powered grass cutter, it has panels mounted in a particular arrangement at an angle of 45 degree in such way that it can receive solar radiation with high intensity easily from the sun. These solar panels convert solar energy into electrical energy is stored in batteries by using a solar panel. The main function of the solar charger is to increase the current from the panels while batteries are charging, it also disconnects the solar panel from the batteries when they are fully charged and also connects to the panels when the charging in batteries is low. The motor is connected to the batteries through connecting wires. Between these two mechanical circuit breaker switches is provided. It starts and stops the working of the motor. From this motor, the power transmits ton the mechanism and this makes the blade to slide on the fixed blade and this makes to cut the grass.

3.2. SOLAR ENERGY

Solar radiation is format among the promising new source of energy. India receives annually over 60 x 1000 MWH of solar insulation with a span of 3000 – 3200 hrs in Rajasthan, Gujarat, West of Madhya Pradesh and North of Maharashtra; and 2600 – 2800 hours in the rest of the country excepting Kerala, Assam and Kashmir. Energy from the sun can be utilized in multi various ways. It can be tapped directly from solar radiation in the form of thermal, thermodynamic and photovoltaic energy and indirectly through the production of Phyto man and other related energy sources such as wind, hydropower and ocean energy all of which are the result of solar radiation on the planet Earth. The contribution of these sources in the total consumption of energy in the world is about 15%. The scope for the application of solar energy now stands greatly enhanced through intensive research and

development carried out all over world. The major areas that manifest great potential out all over world. The major areas that manifest great potential for immediate.

3.3ADVANTAGES

¬ Compact size and portable

¬ Easy to move from one place to another place

¬ Operating principle is simple.

¬ Non-skilled person also operates this machine

3.4 LIMATATIONS

¬ Large time required to remove the grass

¬ Manually operated

¬ Difficult to operate in rainy season

3.5APPLICATION

¬ For cricket ground

¬ College campus

¬ All playground

4. COST BENEFITS & ANALYSIS:

In our market, the approximate cost of an electric grass cutter is 25000/- coming to our project, we are modelling a solar powered grass cutter.

5. CONCLUSIONS

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries. We are proud that we have completed the work with the limited time successfully. The Crop Cutter is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus, we have developed an “solar

economical grass cutter" which helps to know how to achieve low cost automation. By using more techniques, they can be modified and developed according to the applications.

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Solar Powered refrigeration system

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Abstract

In this paper, a review has been conducted on various types of methods which are available for utilizing solar energy for refrigeration purposes. Solar refrigeration methods such as Solar Electric Method, Solar Mechanical Method and Solar Thermal Methods have been discussed. In solar thermal methods, various methods like Desiccant Refrigeration, Absorption Refrigeration and Adsorption Refrigeration has been discussed. All the methods have been assesed economically and environmentally and their operating characteristics have been compared to establish the best possible method for solar refrigeration. Also, the various available technologies for Cooling Thermal Energy Storage (CTES) have been discussed in this paper. Methods like Chilled Water Storage (CWS) and Ice Thermal Storage (ITS) have been compared and their advantages and disadvantages have been discussed. The results of the review reveal Solar Electric Method as the most promising method for solar refrigeration over the other methods. As far as CTES systems are concerned, ITS has advantage over other methods based on storage volume capability, but it has a comparatively lower COP than other available techniques. Keywords: Solar powered refrigeration, Solar Electric Method, Solar Mechanical Method, Solar Thermal Method, CTES system, Chilled Water Storage (CWS) system, ice TES systems, etc.

Introduction

A solar-powered refrigerator is a refrigerator which runs on electricity provided by solar energy. Solar-powered refrigerator are able to keep perishable goods such as meat and dairy cool in hot climates, and are used to keep much needed vaccines at their appropriate temperature to avoid spoilage. Solar-powered refrigerators may be most commonly used in the developing world to help mitigate poverty and climate change. In developed countries, plug-in refrigerators with backup generators store vaccines safely, but in developing countries, where electricity supplies can be unreliable, alternative refrigeration technologies are required. Solar fridges were introduced in the developing world to cut down on the use of kerosene or gas-poweredabsorption refrigerated coolers which are the most common alternatives. They are used for both vaccine storage and household applications in areas without reliable electrical supply because they have poor or no grid electricity at all. They burn a liter of kerosene per day therefore requiring a constant supply of fuel which is costly and smelly, and are responsible for the production of large amounts of carbon dioxide. They can also be difficult to adjust which can result in the freezing of medicine. The use of Kerosene as a fuel is

now widely discouraged for three reasons: Recurrent cost of fuel, difficulty of maintaining accurate temperature and risk of causing fires. There are three methods by which solar energy can be utilized for refrigeration purposes. They are as follows- Solar Electric Method, Solar Mechanical Method and Solar Thermal Method.

Solar Electric Method

In Solar Electric Method, the solar energy is directly converted to DC current by an array of solar cells known as Photovoltaic (PV) panel. Photovoltaic Cells are nothing but semiconductors which allow direct conversion of solar energy to direct current. A part of this current is stored by lead acid battery while the rest is utilized in driving the compressor of the refrigerator. This DC current can be either used to run a DC motor coupled to compressor or an inverter can be used to convert this DC current to AC current for running the compressor. A solar charge controller consisting of capacitor, sensors etc. may be required to stabilize and smoothen the current.

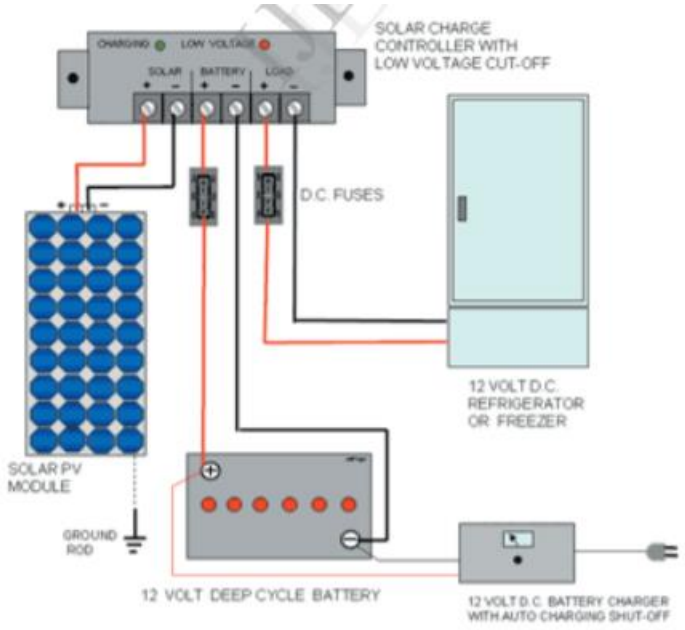


Fig. 1- A typical Solar PV system

A normal Solar PV system includes different components that should be selected according to the system type, site location and applications. The major components for solar PV system are solar charge controller, inverter, battery bank, auxiliary energy sources and loads (appliances).

• PV module – converts sunlight into DC electricity.

• Solar charge controller – regulates the voltage and current coming from the PV panels going to battery and prevents battery overcharging and prolongs the battery life.

• Inverter – converts DC output of PV panels or wind turbine into a clean AC current for AC appliances or fed back into grid line.

• Battery – stores energy for supplying to electrical appliances when there is a demand.

• Load – is electrical appliances that connected to solar PV system such as lights, radio, TV, computer, refrigerator, etc.

• Auxiliary energy sources - is diesel generator or other renewable energy sources.

Solar Mechanical Method

In Solar Mechanical Method, the mechanical power required to drive the compressor is generated by solar driven heat power cycle. Rankine cycle is the heat power cycle considered for this process. In Rankine cycle, fluid is vaporized at an elevated pressure by heat exchange with a fluid heated by solar collectors. A storage tank can be included in this process to provide some high temperature thermal storage. The vapor flows through a turbine or piston expander to produce mechanical power. The fluid exiting the expander is condensed and pumped back to the boiler pressure where it is again vaporized. The efficiency of the Rankine cycle increases with increasing temperature of the vaporized fluid entering the expander. Whereas, the efficiency of a solar collector decreases with increasing temperature of the delivered energy. High temperatures can be obtained by employing concentrating solar collectors that track the sun's position in one or two dimensions.

The disadvantages of using solar trackers are cost, weight and complexity of the system. If tracking is to be avoided, evacuated tubular, compound parabolic or advanced multi-cover flat plate collectors can be used to produce fluid temperatures ranging between 100°C – 200°C. Both intensity of solar radiation as well as difference of temperature between entering fluid and ambient govern the efficiency of solar collector. The efficiency of such a system is lower than solar electric method using non-concentrating PV modules. Solar Mechanical is advantageous only when solar trackers are used but, the use of such systems is limited to large refrigeration systems only i.e.atleast 1000 tons. (refer fig. 2)

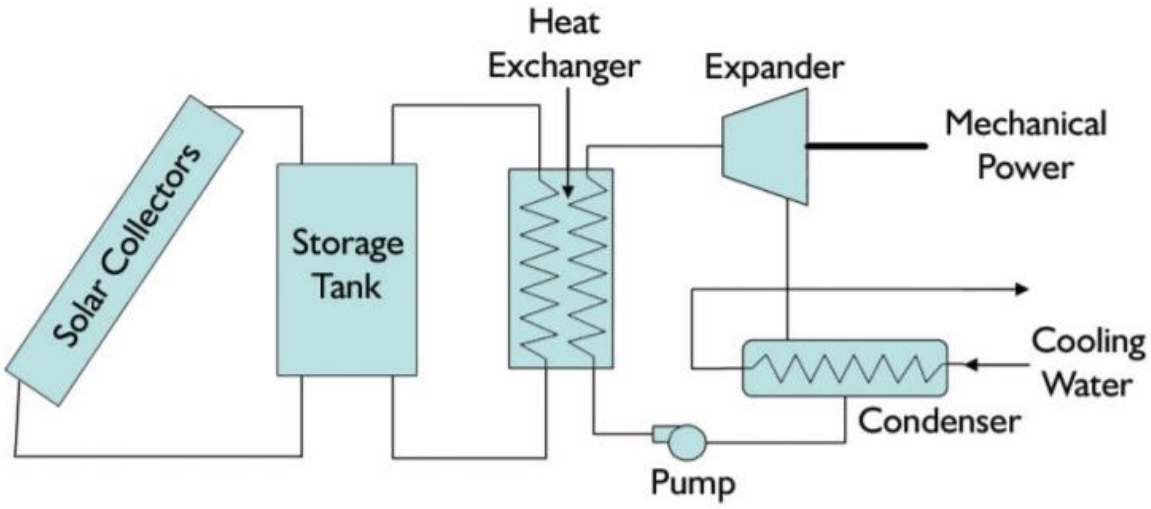


Fig.2- Solar Mechanical Method

Solar Thermal Method

The main advantage of using Solar Thermal Method is that they can utilize more of the incoming sunlight than photovoltaic systems. In a conventional PV collector, 65% of the incident solar radiation is lost as heat whereas in solar collectors over 95% of the incoming solar radiation is absorbed. But all of this is absorbed energy is not converted to useful energy due to inefficiencies and losses. Collection efficiencies for commercial solar thermal collectors are generally more than double that of crystalline photovoltaic solar collectors. A typical solar thermal refrigeration system consists of four basic components - a solar collector array, a thermal storage tank, a thermal refrigeration unit and a heat exchange system to transfer energy between components and the refrigerated space. Selection of the solar array depends upon the temperature needed for refrigeration system. Generally for temperature range 60-100C, flat plate collectors, evacuated tube collectors and concentrating collectors of low concentration can be used. Concentrating collectors are avoided for residential purposes due to high cost of solar trackers. Selection of the thermal storage tank depends upon the type of storage medium and the temperatures desired. Water is mainly selected for its low environmental impact and high specific heat.

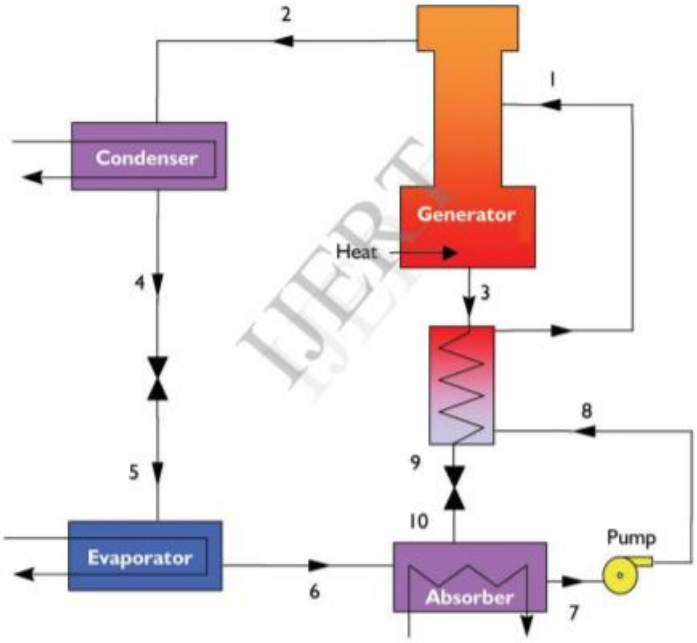
Desiccant

A desiccant system is usually an open cycle where two wheels turn in tandem – a desiccant wheel containing a material which can effectively absorb water, and a thermal wheel which heats and cools inward and outward flows. Warm, humid, outside air enters the desiccant wheel where it is dried by the desiccant material. Next, it goes to the thermal wheel which pre-cools this dry, warm air. Next, the air is cooled further by being re-humidified. When leaving, cool, conditioned air is humidified to saturation and is used to cool off the thermal wheel. After the thermal wheel, the now warm humid air

is heated further by solar heat in the regenerator. Lastly, this hot air passes through the desiccant wheel so that it can dry the desiccant material on its way out of the cycle. Pre-packaged desiccant is most commonly used to remove excessive humidity that would normally degrade or even destroy products sensitive to moisture. Some commonly used desiccants are silica gel, activated charcoal, calcium sulfate, calcium chloride, montmorillonite clay, and molecular sieves.

Absorption

An absorption refrigerator is a refrigerator that uses a heat source (e.g., solar, kerosene-fueled flame, waste heat from factories or district heating systems) to provide the energy needed to drive the cooling system. Absorption refrigerators are a popular alternative to regular compressor refrigerators where electricity is unreliable, costly, or unavailable, where noise from thecompressor is problematic, or where surplus heat is available (e.g., from turbine exhausts or industrial processes, or from solar plants). In absorption, two mainly used cycles are- LiBr (Lithium Bromide) and NH3 (Ammonia Hydrogen). The main difference between them is which substances are used as the refrigerant and absorbent. In a LiBr system, LiBr is the absorbent and water is the refrigerant. In an NH3 absorption system, water is now the absorbent and NH3 is the refrigerant. In both cases, the job of the compressor (in a conventional vapour compression system) is replaced by an absorber and a generator. Concentrated absorbent enters the absorber, which is connected to the evaporator. When refrigerant is boiled off in the evaporator (removing heat from the refrigerated space), vapour (of relatively high pressure) then moves to the LiBr/water absorber where it is absorbed. Next, the mixture moves to the generator where solar heat is supplied to boil off the refrigerant. High-pressure refrigerant vapour then travels to the condenser where heat is rejected to the surroundings to condense the refrigerant back to liquid. Liquid refrigerant goes back into the evaporator, where it can be used again to take in heat from the refrigerated space, which completes the loop.



Adsorption

In this cycle, solar heat is directed to a sealed container containing solid adsorbent saturated with refrigerant. Once this reaches the proper temperature/pressure the refrigerant desorbs and leaves this container as pressurized vapour. That is, the vapour has been compressed with thermal energy. This vapour then travels to a condenser where it turns to liquid by rejecting heat to the surroundings. Expanded, low-pressure liquid refrigerant then flows over the evaporator which pulls heat from the conditioned space to boil off the refrigerant. The refrigerant vapour can then be adsorbed again by the cool adsorbent material easily at night. Although there are similarities between absorption and adsorption refrigeration, the latter is based on the interaction between

gases and solids. The adsorption chamber of the chiller is filled with a solid material (for example zeolite, silica gel, alumina, active carbon and certain types of metal salts), which in its neutral state has adsorbed the refrigerant.

Cooling Thermal Energy Storage (CTES) System

The most important use of CTES systems is to shift the power consumption from peak to offpeak periods. For this reason these systems are also known as “off-peak cooling” systems. The performance of a TES system is described by its co-efficient of performance (COP). The COP of a system during peak and off-peak hours is defined by the chiller and compressor design. CTES systems are generally classified into three types- chilled water, ice storage and eutectic salt TES systems. Among these techniques, the Chilled Water Storage (CWS) and the Ice Thermal Storage (ITS) systems are the most promising ones in case of the normal applications. The ITS system has the

advantages of larger storage volume in comparison with two other systems. However, the COP of the ITS system is much lower than other techniques. In sensible CTES, the storage medium is usually water-based whereas in latent CTES systems, eutectic salts with phase change materials is generally preferred as storage medium. Sensible CTES systems account for most cold TES applications presently. Thermochemical TES may prove useful for cooling TES systems provided ongoing efforts to develop systems are successful. So, in short, the various advantages of using CTES system are: -

- Reduction in electricity bills by shifting the power consumption from peak to off-peak periods.

- Usually, the systems with CTES would consume less operating energy than conventional air conditioning (AC) systems due to constant and comparatively lower temperature during the nights.

- Producing off-peak electricity is cheaper as it would consume less fuel.

- Chiller efficiency is improved by shifting the electricity consumption from daytimes to nights when the ambient temperature (Ta) is considerably low.

- The significant air temperature difference across the Air Handling Unit (AHU) reduces the required air volume required for circulation. Hence, smaller AHUs, less duct working and less electrical equipment's are required.

Chilled Water Storage (CWS)

It is a famous strategy adopted in many countries to save energy by shifting power consumption from peak hours in the daytime to off-peak hours during the nighttimes by employing chilled water to store cool thermal energy. In the past, prior to the successful evolution of thermally stratified systems, many different types of CWS designs have been developed and employed. Designs of CWS were such in order to primarily avoid temperature mixing of chilled water with return water. However, they often require complex tank configurations or piping systems that are expensive and difficult to operate. The CWS systems currently in use can be classified as (a) labyrinth, (b) baffle, (c) tank series, (d) membrane tank. (refer fig.4)

Ice Thermal Storage (ITS) The most popular technique for storing cool thermal energy was the use of ice due to its high latent heat of fusion i.e.hsf = 334 kJ/kg. This method was used especially when the available space was limited. The supplied chiller in this technique must be able to produce charging temperature in the range of -60C to -30C in order to produce ice. Investigations revealed that employing the ITS system would downsize the cooling generation devices such as pipes, ducts and AHUs. This downsizing will help in lowering the primary cost of the HVAC system. The ITS storage technologies are generally categorized by their different combinations of storage media, charging or discharging mechanism. ITS systems can be commonly categorized into the following types –

- Ice Harvesters
- Ice slurry
- Encapsulated Ice
- External melt ice-on-coil storage systems
- Internal melt ice-on-coil storage systems

Ice Harvesters

This technique is a dynamic type of ITS system consisting of an open insulated storage tank and vertical plate surface positioned above the tank. A circulating pump brings the water at a temperature of 00C on the outer surface of the evaporator, which is fed internally with liquid refrigerant. Normally, thickness of the produced ice varies between 8 mm and 10 mm depending on the length of the freezing cycle. (refer fig.5)

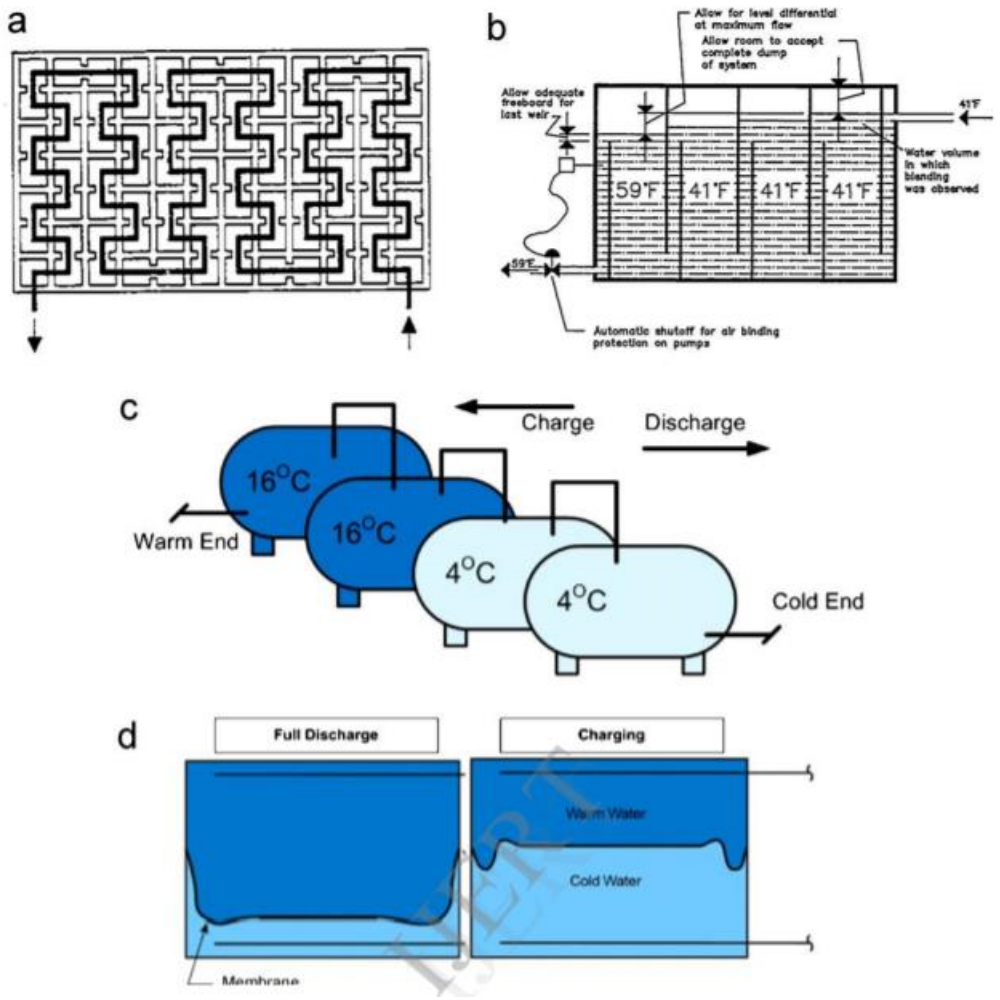


Fig.5- Schematic diagram of a typical ice harvesting ITS system

The ice would then be harvested by feeding a hot gas to the evaporator. The outer surface temperature rises to about 50C causing the ice in contact with the plates to melt and fall into the storage tank. During the discharging period, the chilled water that circulates through the storage tank further reducing the water temperature to cope with the load. Due to the system complexity, only a few manufacturers are involved with these systems, which are normally employed only in special applications.

Literature survey of work carried out by various authors

M. M. Hussain, et al. [1]: The simulation of thermal energy storage (TES) system for HVAC system has been dealt with in this paper. To store cooling capacity, TES system is integrated with conventional HVAC system. Ethylene Glycol is used as a storage medium in this system. Exergy and Energy analyses have been used to determine the thermodynamic performance of the system. Effect of various parameters such as ambient temperature, cooling load and mass of storage on the performance of the TES system has been also studied in this paper. The results of various studies and analyses conducted on TES systems revealed that the storage temperature International Journal of Engineering Research &Technology Vol. 2 Issue 2, February- 2013 ISSN: 2278-0181 www.ijert.org 10 IJERT decreases linearly with time when there is no load and follows the load profile during daytime and decreases linearly with time at the end. Also, it was found out that the storage temperature decreases slightly with increase in ambient temperature when there is no load. COP of the system was found out to decrease sharply with small increase in storage temperature. It was also discovered that for all mass flow rates of discharging fluid, the energy efficiency of the system was found out to be nearly 80%. But, the exergy efficiency of the system decreased with increase in mass flow rate of the discharging fluid and increased with increase in reference temperature.

FakehaSehar, et al. [2]: In this paper, the impact of ice storage systems on the chiller energy consumption for large and medium-sized office buildings in diverse climate zones has been investigated. The various studies indicated that the systems with ice thermal storage (ITS) have higher chiller energy consumptions than the conventional non-storage systems because of the day and night operation of the chiller. By discharging ice storage during the peak hours, the ITS were able to achieve peak energy savings by reducing or even by completely eliminating the chiller operation during the daytime. It was also noticed that climatic zones with summers having high temperatures and relative humidity (RH) increase not only the building cooling load but also the chiller energy consumption by decreasing the cooling intensity of the condenser water, for example- Miami and Las Vegas. But, climate zones with less extreme summers have lower chiller energy consumption due to lower building cooling loads and more cooling of condenser water, for example- Seattle.

Mehmet Azmi Aktacir, [3]: In this study, a PV-powered multi-purpose refrigerator system has been erected to investigate experimentally its daily and seasonal operating performances based on semi-

arid climatic conditions of Sanliurfa province in Turkey. It is one of the sunniest rural regions in the world and hence the need for refrigeration is critical. The overall results revealed that PV-refrigerator system can be reliably used in places where the local grid was unreliable and the refrigeration need is critical. On observation, the following results were observed- Low temperature of 10.6°C was reached in the refrigerator, the highest energy amount produced by PV panels was recorded between 11:00 am and 14:00 pm, amount energy consumed by the refrigerator was determined to be 347.7 Wh/day, the amount of energy stored in the battery bank was 78.2 Wh/day while the amount of electric energy produced by photovoltaic panel was 425.9 Wh/day.

Sanford A. Klein and Douglas T. Reindl, [4]: In this paper, it was stated that the energy use associated with refrigeration system operation and the environmental impacts associated with its generation and distribution often outweigh the choice of environmental friendly refrigerants. In this article, three approaches to use solar energy for refrigeration at temperatures below 0C were reviewed and their operating characteristics were compared. The COP of all the three refrigeration cycles- Solar Electric, Solar Mechanical and Absorption cycles were compared and found to be low due to various barriers like firstly, the solar refrigeration systems are complicated, costly and bulky because of the necessity to locally produce the power required for operation and secondly, the energy source for these systems i.e. solar energy is variable which requires energy storage system that further adds to the system size and cost. The PV system was International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 2, February- 2013 ISSN: 2278-0181 www.ijert.org 11 IJERT most viable of all other systems especially for small capacity portable systems whereas the absorption systems were more feasible for large stationary refrigeration systems.

S.M. Hasnain, et al. [5]: In this paper, the incorporation of ice thermal storage with conventional air conditioning systems in Saudi office was studied. This incorporation reduced the peak electric demand, cooling plant capacity and new electric connection charges of an office building. For this study, two different scenarios were studied. The partial ice storage technique adopted for this study reduced the peak electrical load for Scenario-I and Scenario-II, by 15 and 23%, respectively. It was estimated that an ice storage system would reduce the peak cooling load between 35 and 40% in this type of Saudi buildings. The savings that resulted by downsizing the cooling plant overcame the cost of storage and the additional interface equipment. Similarly, it wass also estimated that in Saudi Arabia, the use of ice storage systems with gas turbines for inlet air cooling will increase the turbine's output by 30% and reduce its heat rate by 10% at a mere fraction of the cost of installing the additional capacity for power generation in order to meet the summer peak demand.

Todd Otanicar, et al. [6]: In this paper, a variety of solar cooling schemes have been economically and environmentally analyzed to reveal some key details regarding system choice. For solar electric cooling the system, the cost is highly dependent on the system COP when PV prices remain at the

current levels but when prices are lowered the impact of COP on cost diminishes. For solar thermal cooling, the cost of solar collection is much lower as a percentage of the overall cost, but the cost of the refrigeration system represents a larger percentage of the total cost. Additionally, the paper reveals that the costs for solar thermal cooling are not projected to decrease as much as PV cooling over the next 20 years due to the relatively stable cost of collection and storage. Solar electric cooling, even with the associated impact of refrigerants with global warming impact, have a lower projected emission value of carbon dioxide per kWhr of cooling than any of the thermal technologies due to the much larger COP values associated with solar electric cooling. One additional favorable aspect to solar electric cooling systems is the collector area foot print i.e. for solar PV systems, expected sizes in 2010 were between 24 and 48 m2 as compared to 78 and 106 m2 for solar thermal systems depending on system COP.

David MacPhee, et al. [7]: In this paper, the solidification process for an encapsulated ice TES is investigated. Using Fluent 6.3 software, a domain consisting of one capsule containing water as the PCM and with an outer shell made of PVC is simulated from an initial temperature of 275 K until completely frozen, using ethylene glycol as the heat transfer fluid (HTF). The purpose of this study is to assess how changing capsule geometry, inlet HTF temperature and flow rate affect the performance of the charging process. Using both energy and exergy analyses, efficiencies were calculated for each simulation, while varying the inlet temperature from 267 to 271 K, and choosing three flow rates, Q = 0.87 l/s, 1.74 l/s and 2.61 l/s. The results indicate that considerable cost and energy savings could be realized by utilizing a higher HTF temperature, perhaps a few degrees below the solidification temperature of the PCM. It is possible for the designers to increase flow rate to make up for the increase in charging time associated with this increase in HTF inlet temperature since, the losses associated with viscous dissipation and hence, International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 2, February- 2013 ISSN: 2278-0181 www.ijert.org 12 IJERT pressure drop have been shown to be inconsequential compared to other modes of losses. Doing so should allow for an increase in efficiency while still maintaining a working and effective encapsulated ice TES system.

B. Rismanchia, et al. [8]: The work in this paper investigated the feasibility and potential of employing ITS systems for the cooling application of office buildings in Malaysia along with the economical and environmental benefits of utilizing these systems. This study is mainly conducted due to the vast potential that the country has, the statistical data shows that in Malaysia, AC systems are the major energy consumers in office buildings with around 57% share. However, they are not well promoted in Malaysia and their potentials are not yet well investigated. The overall results show that the full storage strategy can reduce the annual costs of the air conditioning system by up to 35% while this reduction is limited to around 8% for a load levelling strategy. By comparing the installation, maintenance and electricity costs of the conventional system with the ITS system, it was found that

for the full storage strategy it will take between 3 and 6 years for the benefits of the investment to be equal with the investment. For the load levelling strategy this period varies between 1 and 3 years. The comparison results between the conventional AC system and the ITS system indicate that a proper design could lead to lower energy consumption due to better utilization of the equipment. It shows that the load levelling strategy consumes around 4% less energy than the conventional AC systems. The annual energy saving stated that the annual CO2 emission reduction for load levelling strategy varies from 3000 to 60,000 ton for the total system capacities of 352 and 7034 kW.

David MacPhee, Ibrahim Dincer, [9]: In this paper, a performance assessment of four main types of ice storage techniques for space cooling purposes, namely ice slurry systems, ice-on-coil systems (both internal and external melt), and encapsulated ice systems is conducted. The ice making techniques are compared on the basis of energy and exergy performance criteria including charging, discharging and storage efficiencies, which make up the ice storage and retrieval process. Losses due to heat leakage and irreversibilities from entropy generation are included. A vapor-compression refrigeration cycle with R134a as the working fluid provides the cooling load, while the analysis is performed in both a full storage and partial storage process, with comparisons between these two. In the case of full storage, the energy efficiencies associated with the charging and discharging processes are well over 98% in all cases, while the exergy efficiencies ranged from 46% to 76% for the charging cycle and 18% to 24% for the discharging cycle. For the partial storage systems, all energy and exergy efficiencies were slightly less than that for full storage, due to the increasing effect wall heat leakage has on the decreased storage volume and load. The results show that energy analyses alone do not provide much useful insight into system behavior, since the vast majority of losses in all processes area result of entropy generation which results from system irreversibilities.

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STUDY OF ABRASIVE JET MACHINE

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Abstract –

Abrasive Jet Machining (AJM) or Micro Blast Machining is a non-traditional machining process, wherein material removal is affected by the erosive action of a high velocity jet of a gas, carrying fine-grained abrasive particles, impacting the work surface. The process is particularly suitable to cut intricate shapes in hard and brittle materials which are sensitive to heat and have a tendency to chip easily. As Abrasive jet machining (AJM) is similar to sand blasting and effectively removes hard and brittle materials. AJM has been applied to rough working such as debarring and rough finishing. With the increase of needs for machining of ceramics, semiconductors, electronic devices and L.C.D., AJM has become a useful technique for micromachining. The experimental results of the present work are used to discuss the validity of proposed model as well as the other models. With the increase in nozzle tip distance (NTD), the top surface diameter and bottom surface diameter of hole increases as it is in general observation of abrasive jet machining process. As the pressure increases, the material removal rate (MRR) is also increased. The present study has been introduced a mathematical model and the obtained results have been compared with that obtained from the theoretical. Key Words: Abrasive Jet Machine (AJM), LCD, Nozzle Tip Distance (NTD), Material Removal Rate (MRR)

1.INTRODUCTION

Abrasive jet machining (AJM) is a non-traditional machining process that can machine material without generating heat and shock and also without formation of chips. Abrasive processes are usually expensive, but capable of tighter tolerances and better surface finish than other machining processes chances, delectability, costs and safety aspect etc. Abrasive jet machining (AJM) is a process of material removal by mechanical erosion caused by the impingement of high velocity abrasive particles carried by a suitable fluid (usually a gas or air) through a shaped nozzle on to the work piece. Common examples include Cutting, Drilling, Surface finishing, Etching, grinding, honing, and polishing. The erosion phenomenon in an AJM study may be considered in two phases. The first phase consists of transportation problem, that is, the quantity of abrasive particles flown, and the direction and velocity of impinging particles as determined by the fluid flow condition of solid-gas suspension. The second phase of the problem is the determination of the material removal rate or the erosion rate.

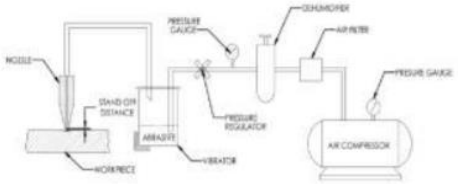

Fig -1: Schematic Layout of Abrasive Jet Machine

The erosion of a surface by impacting solid particles is a discrete and accumulative process. Hence, the models are first made on the basis of a single particle impact. The mechanism of erosion in such cases is complex, involving mechanical, chemical and material properties. The erosion is a function of several variables such as:

a) Speed and angle of impact;

b) Ductility and! or brittleness the impinging particles;

c) Elasticity of the material; of the material and

d) Shape and geometry of impinging particles;

e) Impinging particle diameter to work-material, thickness ratio;

f) Average flow stress; g) Material and density; and

h) Distance between the nozzle mouth and work piece

An AJM set-up may be of two types: one employing a vortex type mixing chamber and the other employing a vibratory mixer. In the former, abrasive particles are carried by the vortex motion of the carrier fluid, whereas in the latter type abrasive particles are forced into the path of the carrier gas by the vibrating motion of the abrasive particle container.

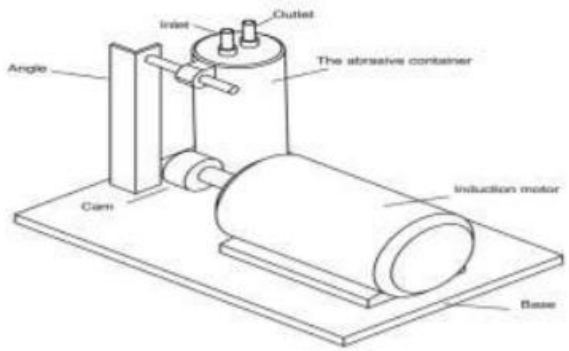

Fig -2: The vibrator assembly

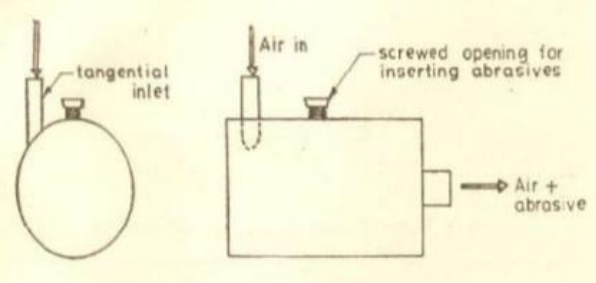

Fig -3: Vortex type mixing chamber

1.1 PROCESS PARAMETERS OF AJM

1.1.1 CARRIER GAS (MEDIUM):

(a) Carbon dioxide,

(b) Nitrogen,

(c) Air: Air is most widely used.

But oxygen never used as a carrier gas due to fire hazards.

1.1.2 ABRASIVE:

Abrasives are available in many sizes ranging from 10 micron to about 1.3 mm. the smaller sizes produce a finish cut and are suitable for polishing, cleaning and grooving. The larger sizes are more suitable for cutting and peening because of their faster cutting action.

a. Aluminium oxide suitable for cutting, grooving and debarring operations.

b. Silicon carbide used for similar operation but for harder material

c. Sodium bicarbonate is useful for light duty work like cleaning, cutting and debarring for soft materials.

d. Dolomite also is suitable for fine etching or polishing work only.

e. Glass beads can be used for polishing surface to a matte finish and debarring work.

1.1.3 VELOCITY OF ABRASIVE:

The jet velocity is a function of nozzle pressure & design. The range of jet velocity is 150-300 m/min.

1.1.4 WORK MATERIAL:

It is recommended for processing of hard, brittle, and glass sheets material.

1.1.5 NOZZLE:

AJM nozzles generally made of WC or Sapphire to resist abrasive wear due to the high velocity abrasive stream. The nozzle has either a right angled or straight edge shape.

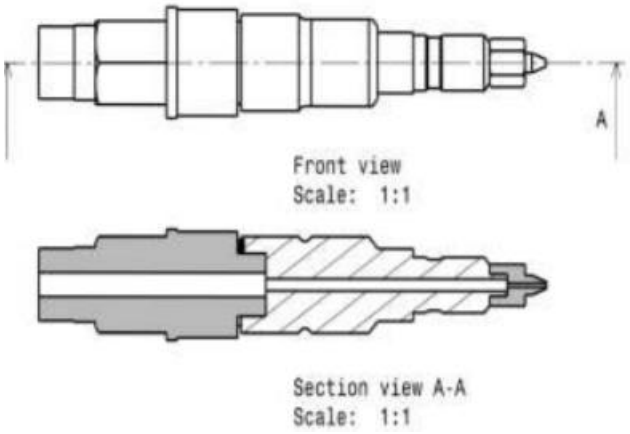

Fig -4: Nozzle

1.1.6 NOZZLE TIP DISTANCE (NTD):

It is the distance between the nozzle tip & work material. It is also called as Standoff Distance (SOD).

1.3 COMPONENTS OF AJM

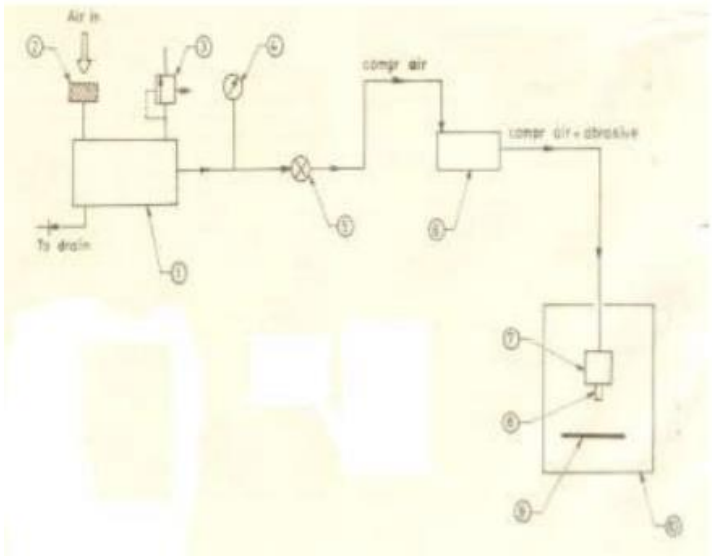

Fig -6: Components of AJM

a) Compressor

b) Air filter cum drier

c) Relief Valve

d) Pressure Gauge

e) Opening Valve

f) Mixing Chamber

g) Nozzle Holder

h) Nozzle

i) Work piece

j) Working Chamber

1.4 PROCESS

Glass was used as a test specimen, was cut into square and rectangular shape for machining on AJM. Specimens were cleaned using air jet and weighed on a sensitive scale, accurate to 0.001 gm. The compressed air from the compressor enters the mixing chamber partly prefilled with fine grain abrasive particles. The vibratory motion of the air created in the mixing chamber carries the abrasive particles to the nozzle through which it is directed on to the workpiece. The nozzle and the work-piece are enclosed in a working chamber with a Perspex sheet on one side for viewing the operation. The abrasive particles used were SiC, Al2O3, Sodium Bicarbonate (grain size 60 microns and 120 microns).The nozzle material was stainless steel and the nozzles used were of different diameters. This type of set-up has the advantage of simplicity in design, fabrication and operation. The equipment cost is much less except the compressor. The machine work-piece was then removed, cleaned and weighed again to determine the amount of material removed from the work piece. The size of hole at the top surface and bottom surface was measured and the results were tabulated.

1.5 ADVANTAGES

a) Ability to cut intricate holes shape in materials of any hardness and brittleness.

b) Ability to cut fragile and heat sensitive material without damage.

c) No change in microstructure as no heat is generated in the process.

d) The process is characterized by lower consumption and capital investment.

e) There is no contact between the tool and work-piece.

f) Good surface finish of 10 to 50 microns is possible with the process using finer abrasive.

g) Cutting action is cool because the carrier gas serves as a coolant.

1.6 DISADVANTAGES

a) Material removal rate is low about 15 mm3 / min.

b) The parts manufactured by this process have to be cleaned.

c) Embedding of the abrasive in the work-piece surface may occur while machining softer material.

d) The abrasive material may accumulate at nozzle and fail the process if moisture is present in the air.

e) It cannot be used to drill blind holes.

f) Nozzle wear rate is high and abrasive particles may get embedded in the work surface.

1.7 APPLICATIONS OF AJM

a) Machining of hard and brittle materials like ceramics, quartz, glass, sapphire, mica etc.

b) Fine drilling and micro-welding.

c) Machining of semi-conductors.

d) Production of intricate profiles on hard and brittle materials.

e) Cleaning and finishing of plastic compounds. Ex. Nylon, Teflon.

2. WORKING PRINCIPLE OF AJM

Fine particles are accelerated in gas stream. The particles are directed towards the focus of machining. As the particle impacts the surface, it causes a small fracture, and the gas stream carries both the abrasive particles and the fractured (wear) particles away.

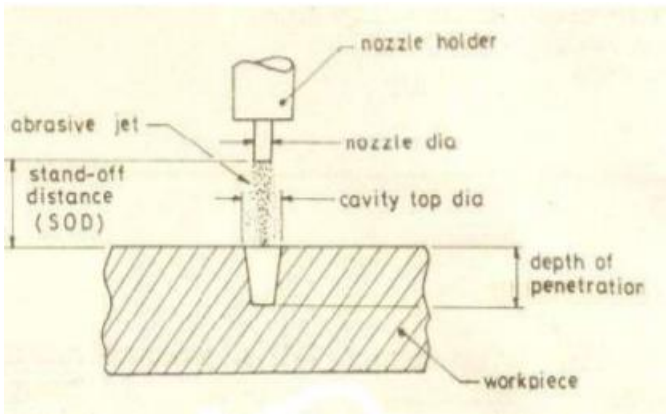

Fig -6: Working principle of AJM

Abrasive jet machining (AJM), also known as abrasive micro blasting, pencil blasting and micro-abrasive blasting. “Abrasive blasting machining process that uses abrasives propelled by a high velocity gas to erode material from the work piece.” The working principle of Abrasive jet machining (AJM) is similar to sand blasting in which AJM effectively removes hard and brittle materials. AJM has been applied to rough working such as debarring and rough finishing. Common uses include cutting heat-sensitive, brittle, thin, or hard materials. Specifically it is used to cut intricate shapes or form specific edge shapes. A machining operation is basically a material removal process, where material is removed in the form of chips. In a machining operation, the output parameter is achieved by controlling various input parameters. Drilling of glass sheets with different thicknesses have been carried out by Abrasive Jet Machining process (AJM) in order to determine its machinability under different controlling parameters of the AJM process.

2.1 EXPERIMENTAL SET-UP

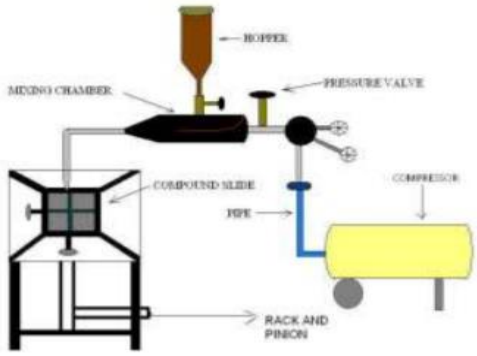

Fig -7: Schematic Diagram of Experimental Set-Up

The compressed air from the compressor enters the mixing chamber partly prefilled with fine grain abrasive particles. The vortex motion of the air created in the mixing chamber carries the abrasive particles to the nozzle through which it is directed on to the work-piece. The nozzle and the workpiece are enclosed in a working chamber with a Perspex sheet on one side for viewing the operation. The nozzle and mixing chamber are shown below.

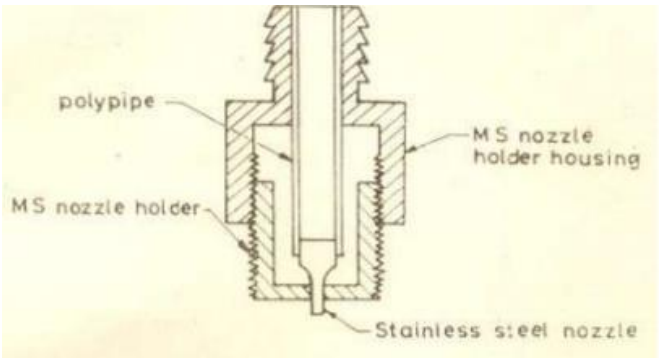

Fig -8: Nozzle Assembly

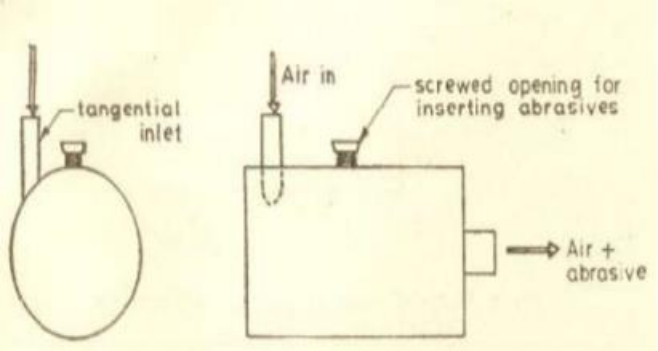

Fig -9: Vortex

Type Mixing Chamber The abrasive particles used were SiC (grain size 60 microns and 120 microns). The nozzle material was stainless steel and the nozzles used were of diameters 1.83 mm and 1.63 mm. This type of set-up has the advantage of simplicity in design, fabrication and operation. The equipment cost is much less except the compressor. The mixture ratio is controlled by the inclination of the mixing chamber. The mixture ratio is defined as: Where mp is the mass flow rate of the abrasive particles and ma the mass flow rate of air.

3. CONCLUSION

It is very clear that AJM is greater Non-conventional machining process which is used as a multipurpose system. It is also a most effective among various affordable systems. This system is eco-friendly. Even some of the companies in India like ABB, L & T and ESSAR are already using this system with CNC programming. This system is also use as Water Jet Machining (WJM) in which abrasives such as garnet, diamond or powders can be mixed into the water to make slurry with better cutting properties than straight water. Further development in WJM is called Hydrodynamic Jet Machining (HJM) which combines the principle of Water Jet Machining and Abrasive Jet Machining process. AJM is also used as Abrasive Flow Machining (AFM), Ultrasonic Machining (USM).

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Thermo electric refrigerater

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Abstract

The global increasing demand for refrigeration in field of refrigeration air-conditioning, food preservation, vaccine storages, medical services, and cooling of electronic devices, led to production of more electricity and consequently more release of CO2 all over the world which it is contributing factor of global warming on climate change. Thermoelectric refrigeration is new alternative because it can convert waste electricity into useful cooling, is expected to play an important role in meeting today's energy challenges. Therefore, thermoelectric refrigeration is greatly needed, particularly for developing countries where long life and low maintenance are needed. The objectives of this study is design and develop a working thermoelectric refrigerator interior cooling volume of 18L that utilizes the Peltier effect to refrigerate and maintain a temperature from 33 °C to 22 °C. The design requirements are to cool this volume to temperature within a time period of 1 hr and to obtain COP in the range of 0.2 to 0.6. The design requirement, options available and the final design of thermoelectric refrigerator for application are presented.

Key Words: Carbon dioxide, thermoelectric refrigerator, interior cooling volume, time period, COP etc.

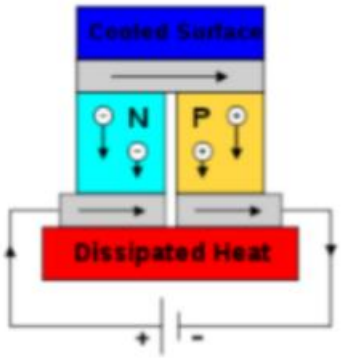
1.INTRODUCTION

Refrigeration means removal of heat from a substance or space in order to bring it to a temperature lower than those of the natural surroundings. Thermoelectric cooling is a way to remove thermal energy from a medium, device or component by applying a voltage of constant polarity to a junction between dissimilar electrical conductors or semiconductors. Thermoelectric Refrigeration provides cooling effect by using thermoelectric effect i.e. Peltier effect rather than the more prevalent conventional methods like those using the 'vapor compression cycle' or the 'gas compression cycle'. Thermoelectric Refrigeration finds applications in electronic systems and computers to cool sensitive components such as power amplifiers and microprocessors. TER can also be used in a satellite or space application to control the extreme temperatures that occur in components on the sunlit side and to warm the components on the dark side. In scientific applications like digital cameras and charge-coupled devices (CCDs) TER are used to minimize thermal noise, thereby optimizing the sensitivity and image contrast. The coefficient of performance (COP) of compression refrigerators decreases with the decrease in its capacity. Therefore, when it is necessary to design a low-capacity refrigerator,

TER is always preferable. Also, better control over the space temperature is the major advantage of the TER. Hence, TER is good option for food preservation applications & cooling of pharmaceutical products.

1.1 PRINCIPLE

Peltier Effect: It states that when electric current is maintained in a circuit of material consisting of two dissimilar conductors, one junction becomes cold and the another junction becomes hot.



1.2 MATERIAL REVIEW

Thermoelectric module is made of two different semiconducting materials, which generate thermoelectric cooling effect (Peltier effect) when a voltage of similar polarity & in appropriate direction applied through the connected junction. Two heat sinks & fans are attached to hot and cold sides of thermoelectric module in order to enhance heat transfer and system performance. There exists an optimum current & optimum voltage for maximum coefficient of performance (COP) for a specific module and fixed hot/cold side temperatures.

a good thermoelectric material should have high Seebeck coefficient, high electrical conductivity, and low thermal conductivity. Commonly used thermoelectric materials are Bismuth Telluride (Bi2Te3), Lead Telluride (PbTe), Silicon Germanium (SiGe) and Cobalt Antimony (CoSb3), among which Bi2Te3 is the most commonly used one. These materials usually process a ZT value (figure of merit at temperature) less than one. From 1960s to 1990s,developments in materials in the view of increasing ZT value was modest, but after the mid-1990s, by using nano structural engineering thermoelectric material efficiency is greatly improved. Thermoelectric materials such as primary bulk thermoelectric materials like skutterudites, clathrates and half-Heusler alloys, which are principally produced through doping method are developed but not exploited for commercial use. [10]

The best commercial thermoelectric materials currently have ZT values around 1.0. The highest ZT value in research is about 3. Other best reported thermoelectric materials have figure-of-merit values of 1.2-2.2 at temperature range of 320-5200C. It is estimated that thermoelectric coolers with ZT value of 1.0 operate at only 10% of Carnot efficiency. Some 30% of Carnot efficiency could be

reached by a device with a ZT value of 4. However, increasing ZT to 4 has remained a formidable challenge. Bell also mentioned that if the average ZT reaches 2, domestic and commercial solidstate heating, ventilating and air-cooling systems using thermoelectric material would become practical. [10]

2. LITERATURE REVIEW

Jincan Chena et al.,[1]:- According to non-equilibrium thermodynamics ,cycle models of single-stage and two-stage semiconductor thermoelectric refrigeration were experimentally investigated. By using the three important parameters which governs performance of thermoelectric refrigerator i.e.coefficient of performance (COP), the rate of refrigeration, and the power input, development of general expressions performances of the two-stage thermoelectric refrigeration system took placed. It was concluded that performance of thermoelectric refrigerator depends on temperature ratio of heat sink to cooled space. When this ratio is small, the maximum value of COP of a two-stage thermoelectric refrigeration system is larger than COP of a single-stage thermoelectric refrigeration system; however maximum rate of refrigeration is smaller than that of a singlestage thermoelectric refrigeration system. Hence it is convenient to use single stage thermoelectric refrigerator when ratio is small. When temperature ratio is large two stage thermoelectric refrigerator is observed to be superior than single stage by both parameters i.e. maximum value of COP and maximum rate of refrigeration.

X.C. Xuan et al., [2]:- In this paper Two stage thermoelectric refrigerator was investigated with two design configurations. Two configurations were pyramid style and cuboid style as shown in respective figures. In pyramid style configuration top side is being coldest as current is unidirectional. In cuboid style configuration current can be alternated causing top and bottom side to be switched between heating and cooling mode. To obtain optimization methods other multi stage designs can be used. The point of maximum cooling capacity and maximum COP both were taken into consideration while investigation for optimization for the two-stage TE coolers. It was concluded that value lies between 2.5-3 for both parameters that is optimum limit of ratio of number of thermo electric modules of two stages in pyramid style TE cooler and optimum limit of ratio of electric current between stages of cuboid style TE cooler. Maximum temperature difference of pyramid-style cooler is greater than single stage cooler.

Jun Luo et al., [3]:- Using finite time Thermodynamics theory performance of a thermoelectric refrigeration system, with multielements was analysed. To improve and maximise the cooling load and coefficient of performance (COP) optimisation of the ratio of the heat transfer surface area of the high temperature side to the total heat transfer surface area of the heat exchangers was done. The analysis of number of parameters which affects optimum performance of Thermoelectric system was done , parameters were number of thermoelectric refrigerating elements, the Seeback coefficients,

internal heat conductance, the heat source temperature and internal electrical resistance. As well as the analysis of other parameters like influences of total heat transfer surface area and working electrical current on the optimum performance was done. They concluded that the cooling load and coefficient of performance (COP) of TE system is greatly influenced by total heat transfer surface area and working electrical current. These results can be used for designing and manufacturing of practical Thermoelectric refrigerators.

D. Astrain et al.,[4]:- In this paper a device using phase change material based on Thermosyphon principle was developed. This device was used and tested as a heat dissipater for hot side of TE cooler. Performance of TE cooler with this device was compared with TE cooler with conventional heat dissipater made up of fins. It was concluded that with the help of developed phase changing device it is possible to reduce thermal resistance between hot side of TE cooler and atmosphere up to 23.8% at 293 K ambient temperature and 51.4% at 308 K ambient temperature, compared to commercial finned heat sink . Decrease in thermal resistance ultimately causes heat to dissipate more effectively from heat sink of TE cooler, therefore improving the COP of TE cooler. At the same values of temperatures it was observed that COP increases by 26% and 35% respectively.

Yuzhuo Pan, et al, [5]:- Author of this paper designed and analyzed an Irreversible multi-couple thermoelectric refrigerator, which operates between two reservoirs maintained at constant temperature. Effect of other factors like external and internal irreversibility of thermoelectric refrigerator on performance was also studied. They have specified many important parameters which affects coefficient of performance (COP) of system. Results of obtained from experiments leads to knowledge of information about performance characteristics of real multicouple thermoelectric refrigerator. This information may be used to manufacture and design thermoelectric refrigerator which will perform at its optimum level.

Hongxia Xi.et al, [6]:- In this paper Author done survey on solar based driven Thermo electric technology. A brief history of development of solar based driven Thermo electric technology was presented. It's today's status and drawbacks present in current Technologies were reviewed. Applications, future scope, advantages over conventional technology where also discussed. In this paper they have discussed about two main modes, that are solar based thermoelectric power generation and refrigeration. Current status of both Technologies was described. Problems related to this technology and there possible solutions were presented. Ultimately these Technologies with some more development may lead to solve demand of Environment protection and energy conservation.

SuwitJugsujinda et al, [7]:- In this paper they have fabricated thermoelectric refrigerator using thermoelectric cooler. Thermoelectric refrigerator (25 × 25 × 35 cm3) and thermoelectric cooler (4 × 4 cm2). This system was applied to 40 W electric power without any cooling fan as heat dissipater at

heat sink. They have measured temperature of this system at ten different points. It was concluded that these experiments results into temperature of cold side of thermoelectric cooler to be decreased from 30°C to -4.2°C for 1 hour and decreased to -7.4°C for 24 hours with heat plate temperature being 50 °C. Temperature of cold side of thermoelectric refrigerator decreased from 30°C to 20°C for 1 hour and decreased further in 24 hours. 3 and 2.5 are the maximum value of coefficient of performance (COP) of thermoelectric cooler and thermoelectric refrigerator respectively. S.A.Omer et al, [8]:- This paper presents some results of thermoelectric refrigeration system using phase change materials (PCM) integrated with thermosyphones. They investigated two models of thermoelectric refrigeration system, one with conventional finned devices as heat dissipater and other with phase change material (PCM) as heat dissipater. After results they have concluded that coefficient of performance (COP) and effectiveness of thermoelectric refrigeration system with Phase Change Material (PCM) is higher than conventional one. They have also compared thermoelectric refrigeration system of two kinds, one is using phase change materials (PCM) without thermal diode and other integrated with thermal diode (Thermosyphones). Results shows that thermosyphones used prevent leakage of heat during power off. Overall they have concluded system can be work with the help of renewable energies like solar energy producing electricity. It is suited for medicine and food storage.

3. CONSTRUCTION

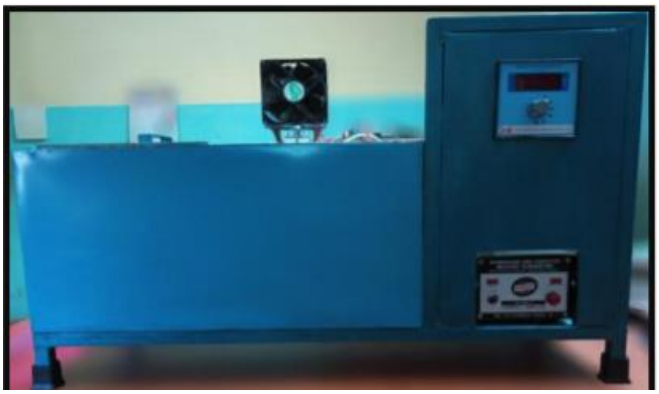
The cabin of volume 21 lit. is fabricated using galvanized sheets and polyurethane foam(puff). The inner surface of the cabin is insulated completely using puff (3.8mm) so as to isolate the cooling cabin from the atmosphere. The thermoelectric module is sandwiched between two CPU heat sinks of different sizes using thermal paste to set a single unit. Thermal paste plays a vital role in conduction of heat from Peltier module to the aluminum heat sinks. One such unit is made. These units are placed in the cut slots with the smaller CPU heat sink facing the interior of the cooling cabin and the larger CPU heat sink on the outside of the cabin to establish greater heat rejection. Additionally, fans are fitted on the inner and outer side of the heat sinks. Electrical connections are made and power is supplied from a 12V battery eliminator. K type thermocouples are placed inside the cabin and outside the heat sink to record the temperatures. Separate control panel containing dc eliminator switches and temperature indicator is made for taking readings.

4. WORKING

Experiments are conducted to analyses the COP. The power supply from the battery eliminator is given to system and readings of temperatures at different places are taken by placing the thermocouples near modules, at center and outside the heat sink for every 10 minutes of time. The readings are tabulated and check for least temperatures occur in cabin and maximum temperatures occur at the outside heat sink. After that the power is switch OFF and checks for the storage times of

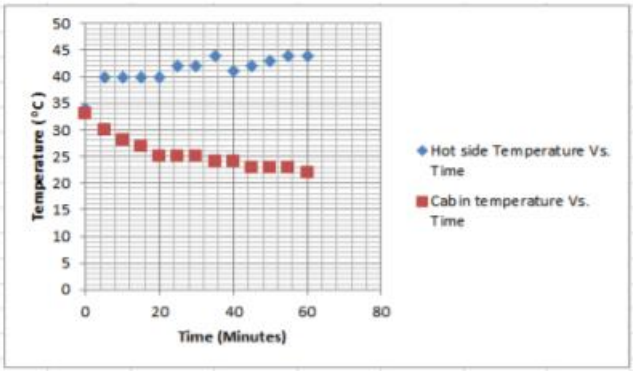
the cabin and readings are taken. The tabulated values are plotted as temperature vs time for power ON and OFF conditions.

5. EXPERIMENTAL SETUP



6. RESULT AND DISCUSSION

Sr. No.	Parameter	Values
1	Maximum temperature difference in ºC	22
2	Time taken in minutes	60
3	$(COP)_{theoretical}$	0.4855
4	$(COP)_{actual}$	0.3143



From result table and graphs, it can be concluded that as time goes on increasing, the temperture inside the cabin falls down gradually. At the same time, hot side temperature remains constant (near about 40°C).

7. CONCLUSIONS

1. The Coefficient of performance of the system for TEC1- 12706 is calculated from the average of readings. It is observed that COP of Thermoelectric refrigeration using TEC1-12706 is lesser than COP of VCRS.

2. Solar power can be used as power source to the system as it is a renewable source of energy. This immensely decreases the working cost of the refrigerator and burden on the earth.

3. Liquid cooling at hot side can be used to increase the refrigeration effect.

4. Waste heat can be recovered using ducts for heating purpose.

5. Number of Peltier modules or multistage Peltier modules can be used to increase the cooling effect.

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VENDING MACHINE

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Abstract –

This paper presents different beverage machines each includes unique operation like vend beverage when user will insert coin or design of vending machine depends on FSM etc. Vending Machine is a system which can vend or offer different products normally installed in supermarkets like household goods, railroad lines, offices, institutes and various other public region. Dispense different products is an automated process, without man power easy to save precious time of human normally seen in fast moving cities because of fast paced life. This paper compares different aspects or response like space, time, speed, power dissipation of a vending machine that is automated product to create our day to day life more suitable and to cover market viability. Key Words: Vending Machine, FSM, Human Machine Interaction, Xilinx ISE and Cadence, etc.

1.INTRODUCTION

Vending Machine (VM) is a machine which can automatically vend different products according to user demand. Vending machine is a machine which uses digital and mechanical energy or mechanisms uses actuators etc. in order to dispense items like medicines, food products, passes or licenses to users automatically means without man power on payment into slot. In most cases vending machines receive two sets of instalment, Credit/Debit Cards and Cash. Credit/Debit Card attributes require to be seized for sales along credit cards. Coffee vending machines can be installed anywhere such as bus station, office, residential region, construction, etc. Accordingly, humankind who likes to drink coffee or tea can buy a cup of coffee or tea anywhere and anytime from them.

2. SURVEY ON DIFFERENT VENDING MACHINES

A great flavoring drink permits workers, guest and customers a bit of gratification in a overdone day. All foods, beverages and constituents offered for disposal through vending machines will be constructed, handled and developed in creations.

2.1 Influential Factors of Vending Machine to Enhance the Interaction Performance

General VM buy activity. The entire operation carried 5 steps, namely starting buy, selecting, filtering, instalment and closure. The selected particular performance solutions in each step were clarified and costumers' tasks in each selection were examined.

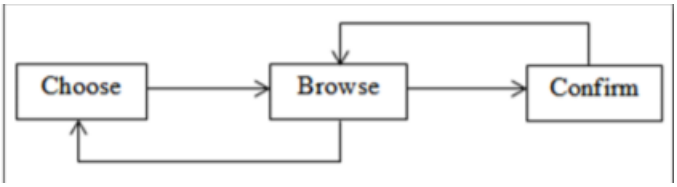

Fig. 1 : Concept of model

Vending machine interface action is mostly divided into four important steps of click, browse, confirm and return. Click, browse and confirm are the three important steps as the main important action. Phase return is considered as an coincidental performance, that is, return demands are constructed when the costumer handles incorrectly. Return is splited into two kinds: return to the previous step and return to the start sheet. Choose - browse - (return) – establish the correctness that can be deliberated into the less time for T=a+b+c as stated by to buying operation. Buy time is being enlarged when the return performance appears. Then the total time for the buy action can be decided as T0=a+b+c+d. They hypothesize that increase the time of buy are 2 return actions: 1. The first time to considering for the return button. 2. Returning to the start sheet, click on the return button and halting on each sheet before this one. The concept of model is shown in above figure. It market viability with improving intellectual benefits or regulation, shortens buy time and stay away from performance defeats.

2.2 Comparison of different attributes in FSM based Vending Machine

They speak about two different set of rules for a vending machine as delineated below and then detecting out the changing speed, timing restraint, power, space demand andusability of logic present in stratixfpga family in order to observe out more well organized and synthesizable that is covert HDL into actual component machine as for this vending machine specification. Vending machine characteristics to be executed is related as below:

1The machine withdraws multiples of Rs10 only.

2. The machine can disburse:

Water:Rs 20 (Wi)

Snacks: Rs 20 (Si)

Soft Drink: Rs30 (Ci)

3. It has a Cancel key or tab (Cc)

4. Only one input may be operate at a time

5. A system can be disbursed in one complete clock cycle

6. If more than Rs 30 is put, the money is automatically that is without physical interaction the extra money come back means returned

7. If no inputs are active lively, the state system remains in same state that is in the current state

. 8. Outputs: All construct a pulse that operates the deliver contraption:

Ro: Return out (all money in the system)

Wo: Water out, Co: Soft drink out

So: Snacks out,

out10: Rs 10 out

Originally the system was in its set initial position or condition which called state A for the design reason. Given an input of Rs 10 the system design moved in its 2nd condition which was state B involved with this point the vending system is griping Rs 10 in its balance and the user has 2 selections either to reject the vending operation with the input of Cc that is cancel which is available on the system or set in another Rs 10 note in the system and go on to the next condition which is state D. Now at this period vending system assembled Rs 20 accordingly user is qualified to select options between water or snacks both of which are of Rs 20 and then go back to its inceptive condition besides beat Cc (cancel) key to finish the operation or besides set in another Rs 10 note in the machine to vend the soft drink which prices Rs 30 so by now the user has extended state G, another Rs 10 note will be directly discarded and signal out10 goes high radiating off the additional Rs 10 out of the system from this condition user can prefer any one of the three outcomes to vend from the vending system that is soft drink (Co), water bottle (Wo) or snacks (So) or one can comparable Cc (cancel) and all money will be get back by forcing Ro signal. Total number of conditions utilized is from A to H that is 8 conditions constructing it a little redundant. Next the same vending system with same characteristics with a little more expert or skillful way so as to reserve some space and condition demand and then observe out the wanted system is well organized or not than the foregoing space proceeding system in phrases of different essential features of a design cycle. Differentiating two dissimilar algorithms, the key difference is under timing restriction permitting positive setup time and negative hold time. One design finding one more additional condition it is better organized in terms of timing restriction and space.

2.3 Smart Coffee Vending Machine

A smart vending system accommodates a sensor and actuator network which made up of a gateway, arising from a person's surroundings sensors, and controllers. A gateway suits an overpass between the network and an implementation managing on a smartphone that is mobile along Bluetooth. The gateway presented with some missives associated to the arising from person's surroundings

conditions (for example, cleaning status) of the system from the sensors. Those missives are sent to the supplication. In inclusion, the gateway sends command missives involving the customer's predilection on the taste of coffee to the controllers. On an approach of the verification of abstraction, they establish two magnetic sensors and three controllers. The vending system and the apparatuses established in the vending system. The magnetic sensors are established interior the system: one is connected to the substances mixer and the other is connected to the body of the system. The sensor on the body is joined to a sensor interface which conveys resolute data to the gateway. The sensors react like a switch. If the mixer is isolated from the body, an unsecured happening occurs. Otherwise, a secured happening occurs. The remoteness of the mixer is examined to be the cleaning status of the system. The substances mixer is a tool in which water, coffee, sugar and powered coffee creamer are motley to create a cup of coffee. As a much of remnant of thosesubstances are connected to the internal exterior of the blender, the blender should be cleaned from time to time. The blender has to be disconnected from the system while it has been washed. Accordingly, it is supposed that the blender is wash if it is isolated from the system. By the supposition, the role of the sensors examines whether the system is washed or not for a definite time interval. With the details of data collected from the sensors, the gateway computes the constituting wave of cleaning for a particular time and regulates whether the system is clean or not. The gateway conveys these detailed data to a smart phone application when the supplication links to the gateway. The controllers adjust and manage the quantity of coffee, sugar and powered coffee creamer depending on whether to customer's predilection on the taste of coffee. The customer's predilection is collected from a smartphone supplication through the gateway. Each controller handles the gyration of a motor which regulates the quantity of each substance. The quantity of the gyration is handled in three steps: less, normal, and much. Smart vending system which can automatically that means without man power and without physical contact with that object evaluate its own under cover situated arising from person's surrounding conditions and handle the quantity of coffee, sugar, and powered coffee creamer to create a cup of coffee depending on whether to customer's predilection on the taste of coffee. A sensor and actuator network which made up of a gateway, magnetic sensors, and controllers and a smartphone supplication depended on Android. The network and the supplication interchange some data through Bluetooth.

2.4 Automatic Beverages Vending Machine and it's performance on Cadence and Xilinx 13.1

The popular behavior of any vending favors the as a result of steps with available make different depended on the end user demands. The systems generally work, when some money is set in a time period. Then, a key or tab requires to be forced or a bar dragged. If the exact amount value is loaded into the time period of the system, the selected object will be dribbled to a flat container, where it can be drawn out by the person creating the buy. Selection: User creates a selection of product. Waiting for money placing: When user puts money or cash, money token allows the quantity of cash or money placed into the vending system. Product Delivery: If accurate quantity of cash value is placed the

product will be dropped and if there is any assess will quantity that will be get back to user. Service: The vending system will request for service if the product is not able to be used in the system.

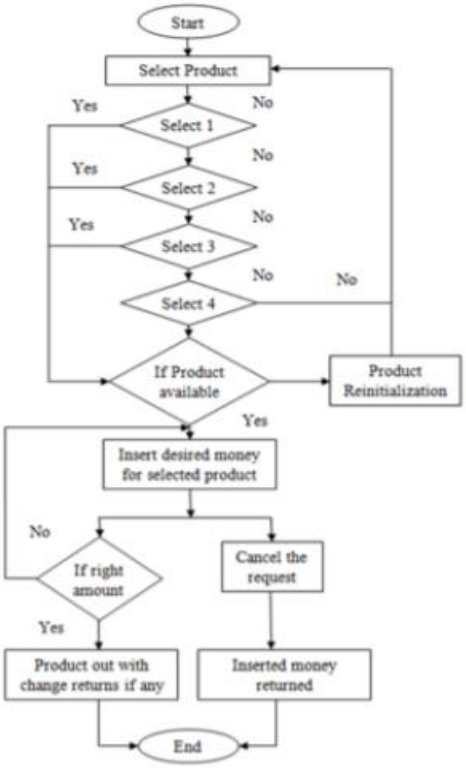

Fig. 2 : Flowchart for Vending machine

This same design they executed or contrivance on xlinix 13.1 and cadence so ultimately they judge regarding these execution, operating cadence permits optimized or improving efficiency related to space, power and delay.

2.5 Vending Mahine based on the short message payment

The vending system is predominantly collected of 3 parts: vending system correlated interact with system (containing vending system interface plate, monolithic integrated circuit and GPRS module), GPRS communication networks which are containing mobile diverting middle of GPRS base station controller, GPRS service support node as well as GPRS backbone networks etc. and the control center. The vending system communication interface module is predominantly collected with of monolithic integrated circuit and GPRS module and so on.

The monolithic integrated circuit obtains vending system's condition or position information via the Multi drop bus (MDB) protocol, reserves it to the burn and then sealants the user datagram protocol (UDP) data packet depending on whether to the user datagram protocol (UDP) agreement's message data, seals the IP data newspaper in addition to the IP highest part, and then seals the point to point protocol (PPP) frame depending on whether to the point to point protocol (PPP) frame's form,

broadcast it to the managing main center through the GPRS module by the IP protocol, assembles communication between monolithic integrated circuit and GPRS module via PPP. The user first sends the information data to the guest facility managing center and then the buying or selling from user center sends back the information frame to the user and the vending system GSM module. The user inputs the information data frame on the vending system and then the automatic managing vending system handles the information data frame to send the managing instructions automatically. The information data frame which the GSM module accepts is transferred to the buying and selling action of user center to assemble the last information data processing. The short message payment by acquiring M68HC11 and MC35 and construct it have the task of the short message shopping and assemble it simple to use and handle.

3. EXAMPLE OF IMPLEMENTATION OF VENDING MACHINE USING XILINX 14.2

Vending system that sells soda canes that costs are a 20 each. Additionally system has only 3 types of coins: 10, 20 and 50. System purpose is to design a state machine with different conditions that regulates when to disburses a cane, how to get back the change. In this design cane pay no attention to the volume of the storage, which means, it will suppose that there will ever be cane in the vending system. Also, suppose that only one operation could be created in every “clock cycle” or position. Understanding the possibilities : There are quite few options:

1) invading no money

2) placing 10 reproduced by another 10 => acquiring the can

3) placing 10 reproduced by 20 => accepting modification => acquiring a cane

4) placing 10 reproduced by 50 => accepting modification => getting a cane

5) placing 20 and acquiring the cane

6) placing 50 => accepting change => acquiring a cane.

State Diagram:



Fig. 3 : State Diagram

Explaining the states:

1) put_money: this is the first condition after idle condition; here the user sets in the coins.

2) in_5: If the user place 50, the system proceed to this condition. Pay attention that the machine gives back a 20 change without disbursing the cane yet.

3) change_1: after providing a 20 change for the user who paid 50 they require to get back another 10 change. Here, in this condition they do absolutely that. Again, note that the cane still has not been disbursed yet.

4) in_1, in_3, in_6: acquire to those conditions be controlled on the sum of money that been entered by the user.

5) soda_out: disbursing out the soda cane.

Simulation Result:

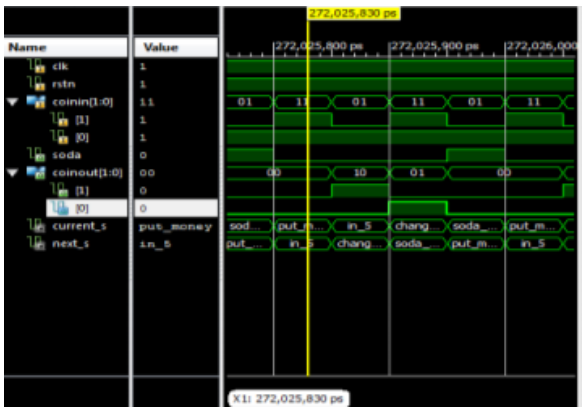

Fig. 4: Waveforms gives detailed information about system

4. CONCLUSIONS

Compared different vending machines and all are designed with different aspects like area, power and delay because of time, switching speed, etc. In smart coffee vending machine is more optimized system with customer preferences. Because according to customer choice they can also select amount to prepare coffee or tea. This is optimized system with some aspects which are power, area and time. Also explain with one example of dispensing soda according to inserted coin to cover market feasibility.

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WIND ENERGY VEHICLE

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Abstract-

Due to scarcity of fossil fuel in future and its detrimental effect on the environment, an alternative energy has to be discovered. Wind power is clean and sustainable natural resources that has yet to be fully utilized in the automotive industry. Also, the sun is probably the most important source of renewable energy available today. The hybrid system has been designed and installed to generate power which combines wind turbine and solar panel. The hybrid model system is renewable energy system, which helps conserve energy by reducing the use of fuel in vehicle. Hence developing a new method for the economical evaluation of Hybrid Systems for electricity production. Keywords- Scarcity, fossil fuel, environment, alternative energy, natural resources, renewable energy.

1. INTRODUCTION

Here the hybrid car is specially designed so that the energy limitation can be easily overcome y using the hybrid technology. As the battery running are beneficial for the society and more often this type of technology is fruitful for the environment. so to overcome the energy limitation we have installed wind with solar energy and that is called the regeneration of A. Reducing Carbon Dioxide Emissions The most effective way to reduce carbon dioxide (CO2) emissions is to reduce fossil fuel consumption. Many strategies for reducing CO2 emissions from energy are crosscutting and apply to homes, businesses, industry, and transportation.

B. SOLAR ENERGY

Solar energy is radiant light and heat from the Sun harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic's, solar thermal energy, solar architecture and artificial photosynthesis. The large magnitude of solar energy available makes it a highly appealing source of electricity.

C.WIND ENERGY

Wind power is the use of air flow through wind turbines to mechanically power generators for electricity. Wind power, as an alternative to burning fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation, and uses little land.

2. FIELD OF INVENTION

The fixed wind powered electricity generation systems in use, till now are dependent on wind direction and the force of the wind. But the wind is not available at all places and all time throughout the year. Therefore, there exists an immense need of a system for generating electricity from wind induced by moving vehicles which is available throughout the year at various places and with sufficient force of wind. Also solar powered electric vehicle is there but need to install it as an auxiliary fuel for fuel vehicle. Therefore, need of inventing a hybrid renewable energy source as an auxiliary source for fuel vehicle. Therefore, this invention provides a solution to the problem for generating electricity in this manner.

3. OBJECTIVES

1. The main object of the present invention is to provide a method and a system for generating electricity using easily available wind induced by moving vehicles and solar energy in transit or in operation.

2. The other objective is to provide a solution for reducing pollution created by fuel vehicle by use of freely available renewable energy source i.e. solar and wind energy.

4. METHODOLOGY

This paper deals with how energy can be stored by moving or standstill vehicle which has a fuel kit using wind and solar energy.

5. WORKING

Here first of all the vehicle that is presently running on battery say for ola electric vehicle can be modified by installing various new circuits. The solar panel will charge the battery on the day time. The circuit attached to the battery will protect the battery from damages the sunlight intensity is more in the summer the solar panel passes more amount of voltage than required by the battery and this leads to the battery damage so forstabilizing the voltage the circuit will be installed between the solar and the battery. As there is no one in the electric car we can install the carborator fan and the fan will be attached to the generator and the vehicle is in moving position even in the night time when the solar panel will not work the battery will be charged through the wind energy that is from the fan with dynamo attached and the battery will be charged. Clips are attached so that the user can change power source for charging the battery from solar to wind when required. And in another part the sensor based circuit is also installed this circuit will connected to the motors of the vehicle in the night time or at that when the driver forgets to apply brake in the traffic portion or when

driver fall asleep while driving in the night time this sensor circuit will continuously bypass the invisible rays and the rays will detect the in front object of the vehicle if suddenly in front objects say for any vehicle has applied brake and the driver forgets to apply brake this sensor will automatically will calculate the distance and the both objects comes closer then the sensor will pass command to the circuit and the brakes will be applied automatically. This system can save lot of life even it can avoid accidents. For increasing the loading capacity of the motor the gear section that is the gear box is also installed that will increase the loading capacity of the motor without consuming more voltage and power from the battery.

Chart -1: CIRCUIT DIAGRAM



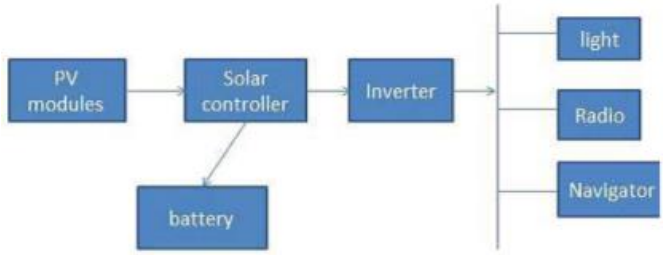
A. CONVERSION OF WIND ENERGY INTO ELECTIC ENERGY:

In this prototype the wind capturing device is a fan. Fan is mounted on the front side of the chesis with the truncated cone in front of it. Fan will get rotated by the wind blown by the blower which will get directed toward the fan due to cone where in actual it will be the wind around the vehicle when vehicle is in running condition. Rotating fan will convert the captured kinetic energy of wind into mechanical energy .The centre shat motor which is connected to battery will convert this mechanical energy into electric energy which is going to stored in the battery. Fig shows below the energy stored by prototype from wind energy.

B. **CONVERSION OF SOLAR ENERGY INTO ELECTRIC ENERGY:**

Solar panel is situated on the top of battery in the prototype. Where in actual vehicle it will be mounted on the upper body of chess is of four wheeler. While the vehicle in running position or stand still and have a sufficient solar energy the solar panel will trap that energy and due to the

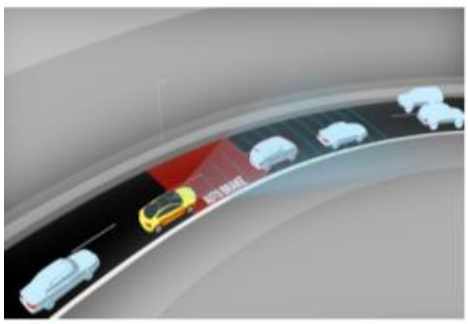
photovoltaic effect of solar panel, it will convert this solar energy into electric energy which will get stored into the battery.



6. AUTOMOTIVE TRACKING SENSORS

The sensors used to track objects and monitors, the movement of the host vehicle as well as the movement of the surrounding objects to predict collisions are known as 'tracking sensors'. In automotive applications, cost of the sensor is a major factor.





7. ADVANTAGES

1. Zero Carbon emission

2. Accidents are avoided due to automatic braking

3. Use of brushed motor

4. Vehicle speed has been increased

5. Can run in the city as well as on highways.

8. DIS-ADVANTAGES:

1. Limited vehicle speed

2. Limited distance covered

3. Takes more time to charge the battery.

4. Only can be used in city.

9. CONCLUSIONS

After making the final completion of project it is found that project is in working condition. It is found that prototype captured the solar energy through solar panel and wind energy through fan induced on it. There are huge potential for producing electricity from renewable sources. This paper gives a clear idea that vehicle powered with the help of solar energy and wind energy is more effective than fuel vehicle.

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WIND MILL BASED WATER PUMPER

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Abstract –

The main source of energy has been coal, oil, natural gas, nuclear energy, wood and coal. However, all these sources are limited and are the main cause of pollution and this has led to development and more focus on sustainable energy supply with minimum pollution effects. Hence research and analysis has shown that wind energy, solar energy and biomass are the most prominent solutions to the above problems because they are eco-friendly and readily available in nature. Wind energy can be generated using windmills that provide mechanical energy that is used directly on machinery e.g. water pump and grinder; or wind turbines that provide electrical energy. The main objective of our project was to design a windmill and therefore our scope will be limited to a windmill for water pumping water. Windmills are classified into two main types based on the axis about which they rotate. Horizontal axis has the main rotor shaft running horizontally and if the rotor must be oriented in the direction of the wind, a wind vane is coupled with a servomotor. Vertical axis has the main rotor shaft running vertically. The rotor assembly can have two or more blades depending on the desired solidity. In our design, we used a horizontal axis windmill with 3 blades, tensile strength 31 N/mm², density 0.855 g/cm3, length of blade 30 inch (2.5 feet) and strength of blade is 4500- 6000 psi. Key Words: natural resources, renewable energy, wind pumps, insufficient fuels, aerodynamic blade.

1.INTRODUCTION

Energy today has become ultimate need of world. Today every application which has been develop in the world require energy supply for its functioning but population of the world is increasing causes tremendous pressure on the energy and mineral resources leading to their exploitation. More ever the greenhouse gases are increasing due to exploitation of these resources. So we need to focus an alternative solution for this problem. Light, wind, Biomass, water etc. are some of the alternative for this problem. Wind is one of the most clean and highly abundant resources in nature.

1.1 Definition

Wind This is air in motion and it is a natural resource that is freely available in space and moves at varying speeds depending on the geographical location Wind energy Wind energy originates from solar energy where the sun heats the atmosphere unevenly causing some parts to be warmer than others. The warmer patches of air rise and other air patches blow in to replace them. Thus alternating air flow which results in wind. Windmill Windmills are machines that are used to harness the kinetic

energy of the wind which blows over the blades rotor assembly causing it to rotate on a shaft. The resulting shaft power is then used to provide mechanical work for pumping water.

1.2 Objective

- Lifting the water without using electricity and fossil fuel.
- Setup must be non-polluting and less noise operation.
- Setup cost should be less and maintenance free, one time investment is preferable.
- It must produce some amount of power.
- Installation must be easy and cheap.
- Fuel must be cheap, clean and renewable.
- Solution for the above problem must be eco friendly

2. MATERIAL SELECTION

There are various materials available for design of blade such as wood, fiber, steel, aluminum, carbon fiber, polypropylene plastic. Out of which we have used polypropylene plastic (pp) type material for our design because of following reasons: Polypropylene blade performance and also to decrease process temperatures by adding special particles like nano, fillers.etc in order to replace the current thermo sets by utilizing the benefits associated with the thermoplastics like emission free, process-ability, recyclability, and weld-ability. Polypropylene materials offer higher strength to weight properties than thermo sets, therefore leading to lighter aero foils which can lead to cheaper transport costs and reduced turret weights.

3. MANUFACTURING

3.1 DESIGN OF BLADE

Aerodynamic performance is fundamental for efficient rotor design. Aerodynamic lift is the force responsible for the power yield generated by the turbine and it is therefore essential to maximize this force using appropriate design. A resistant drag force which opposes the motion of the blade is also generated by friction which must be minimized. Turbines operate for long periods at ground level where insect and dust particulate build up is problematic. This build up known as fouling can have detrimental effects on the lift generated. Provision is therefore made for the reduced sensitivity to fouling of wind turbine specific aero foil designs. The structural requirements of turbine blades signify that aero foils with a high thickness to chord ratio be used in the root region. Such aero foils are rarely used in the aerospace industry. Thick aero foil sections generally have a lower lift to drag

ratio. Special consideration is thereforemade for increasing the lift of thick aero foil sections for use in wind turbine blade designs.

3.2 CRANK SHAFT

Another most important component for the smooth functioning of prototype is crankshaft. Crankshaft should poses high strength, rigidity and toughness due to these requirement they are manufactured by casting and forging production techniques. Crankshaft is component connected between the turbine blade and connecting rod. With the rotation of turbine blade, certain mechanical motion is obtained which is transmitted to the crankshaft leading to rotary motion of connecting rod with piston in the pumping assembly.



3.2.1 DESIGN OF CRANKSHAFT

The size of crankshaft was too large so we have fabricated it to the required size for our project. Above table shows the original size & required size.

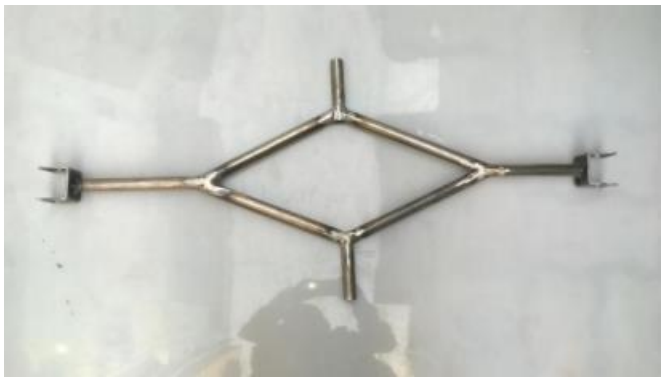
3.3 CONNECTING ROD

Connecting rod is long slender component between crankshaft and piston assembly via sew-saw mechanism. Mechanical motion obtained from the crankshaft for the reciprocation of piston rod in pumping assembly is transmitted via connecting rod. Connecting rod should have high ultimate tensile stress, resistance for the bending, fatigue stresses so it should be manufactured by casting and forging production techniques



3.4 SEW-SAW MECHANISM

Sew-saw mechanism is the basic principle for reciprocation of piston in pumping assembly is achieved by sew-saw mechanism. Blade rotate further leading to the rotary motion of crankshaft. This rotary motion is further transmitted in the form of transverse motion for the reciprocation of piston rod in pumping assembly.



3.5 PUMP

There are two types of pumps;

1. Volumetric (Positive displacement pump)

2. Centrifugal (Roto-dynamic pump)

Out of which we have used positive displacement pump. Positive Displacement Pump are further categorized as

- Rotary lobe pump
- Progressive cavity pump
- Rotary gear pump
- Piston pump
- Diaphragm pump
- Screw Pump
- Gear pump
- Hydraulic pump

Hence for better displacement and sufficient water discharge we have used “Piston Pump (single acting reciprocating pump)” Piston pumps are generally connected to a surface-mounted motor and used to pump water from shallow wells, surface water sources, and pressurized storage tanks, or

through long pipes. The suction head is limited to 6 meters. They are not tolerant to silt, sand, or abrasive particles because the piston seals are easily damaged. Filters may be used to remove the dirt

4. WORKING

To conduct trail, we have done set up of wind operated water pump. Windmill blades made up of polypropylene (pp) plastic. Turbine is fixed on crank shaft. Crank shaft is mounted on supporting stand. To permit relative angular motion crank shaft is mounted between bearings. One end of connecting rod is connected to crank shaft and other end connected to sew-saw mechanism by using connecting pin. A piston rod of pump is connected to one end of sew-saw mechanism. All these assembly mounted on structure insucha manner so that we should get the desired motion of piston rod. When wind is imparted on blade kinetic energy of wind is converted into mechanical energy as an angular motion of crank shaft. This angular motion of crank shaft is converted into transverse motion by sew-saw mechanism. Transverse motion is given to piston of pump so that piston will move in transverse direction. When crankshaft rotates the piston will moves in upward and downward direction inside the cylinder. When piston moves from bottom dead centre to top dead centre of cylinder, vacuum is created due to which water is sucked inside cylinder. When piston moves from top dead centre to bottom dead centre pressure of water increased above atmospheric pressure at the end water is discharged through pipe. Due to pump is single acting reciprocating pump thus there is alternate flow of water in the delivery pipe. The shaft power can be used to generate electricity by using alternator, which is mounted on crankshaft.



6. CONCLUSION

The goal of project is accomplished from the requires analysis and fabrication of prototype that is utilization of wind power to pumping water and generate electricity. Most preferable and suitable material from the design consideration point of view satisfying all the optimum condition and requirement is found to be Polypropylene Plastic. From result we have seen the efficiency of aerodynamic shape blade.

ACKNOWLEDGEMENT

The authors would like to present their sincere gratitude towards the faculty of Department of Mechanical Engineering, Dr.DaulatraoAher College of Engineering, Karad, Satara

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WIND WATER PUMPING

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Abstract:

In our project wind energy is used to rotate the wind blades. This blade coupled to the shaft. At the end of shaft, the flywheel is placed. The eccentric arrangement is provided in the flywheel. When the blade rotates automatically fly wheel also rotates. Due to the eccentric arrangement the rotation motion of the flywheel is converted into linear motion. This reciprocating motion is given to the handle of the pumping system. The up down motion of the handle is given to the piston, where the water is sucked using pressure variation from lower ground. Finally the water is supplied to the outlet. Wind blade provides the continuous motion which helps to supply the water continuously .Since time immemorial, the main source of energy has been coal, oil, natural ga s, nuclear energy, wood and coal. However, all these sources are limited and are the main cause of pollution and this has led to development and more focus on sustainable energy supply with minimum pollution effects. Hence research and analysis has shown that wind energy, solar energy and biomass are the most prominent solutions to the above problems because they are eco -friendly and readily available in nature. Keyword: Fly wheel, Reciprocating pump, Blade, and etc….

INTRODUCTION

Energy from the air can be utilized in multi various ways. It can be tapped directly from air in the form of electrical energy. The contribution of these sources in the total consumption of energy in the world is about 15%. The scope for application of air energy now stands inherently enhanced through intensive research and development carried out all over the world. Air can be directly utilized for the purpose of cooking and drying. By the same time, it can be also used for boiling of water, air heating and refrigeration. Furthermore, wind energy can be utilized for driving motors for pollution free riding at this time, where air pollution plays a major problem for environmentalist

II. EXPERIMENTAL PROCEDURE

The experimental analysis of this project started with a detailed study of various mechanisms that could be used in this project and their practical applications. Since this project involves the effective utilization of energy derived when a nature air the design aspects may not actually coincide with the requirements for the fabrication and practical applications. Hence, the method of Reverse Engineering was adopted in this project. As per this method the tower was first fabricated based on the requirements with standard parts keeping in mind various safety precautions. Testing and then the

basic designing of the parts followed this. If any of the parts was found to possess strength lesser than the required, it was replaced by a standard part of greater strength. The wind energy is converted into mechanical energy. Initially this project had a nature air area and tower with a fly wheel leaf reciprocating pump arrangement .Also the rotation of the flywheel was not found to be satisfactory, reducing the efficiency of the leaf. This flywheel and leaf has a velocity ratio of 1:1. Leaf is attached to the flywheel. Windmills generally consist of two basic types with the classification being based on the orientation of the axis of the rotor. The main classifications are discussed below:

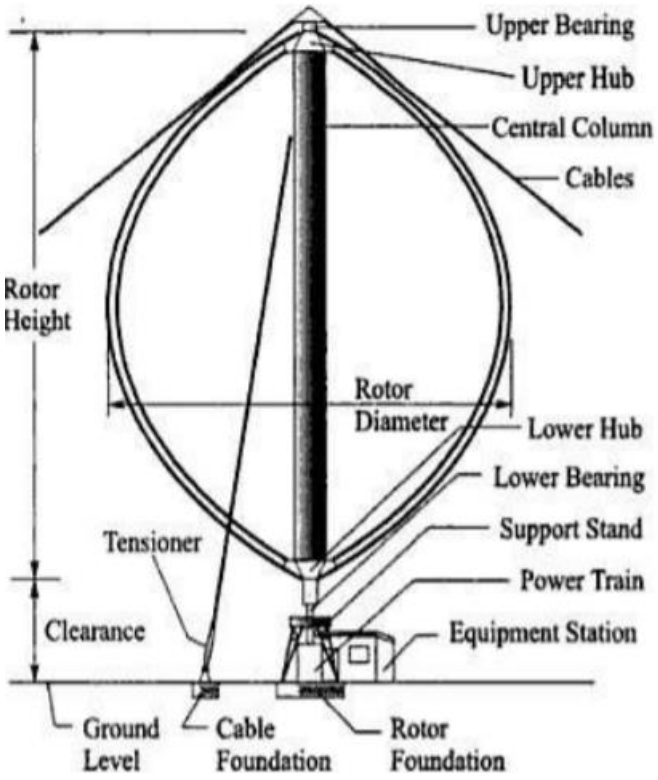

Figure.1. Wind Mill with Pump

2.1 Vertical Axis Wind Turbine (VAWT)

This has blades which are arranged on the vertical axis and are rotated by wind and therefore it doesn't require a yaw mechanis m since it can harness wind from any direction. It does not rely on the direction of the wind to generate power as in the case of the horizontal axis. They usually operate closer to the ground which has an advantage of allowing for placement or replacement of heavy equipment. However this is a disadvantage as winds are lower near ground level hence less power output. 2.2 There are two main types of the VAWT namely: Savonius It operates like a water wheel which uses drag forces. It has a simple design and is therefore relatively simple and cheaper to build. It is mostly used in situations that do not require large amounts of power. However, it is less powerful than most HAWT because it uses drag to rotate itself and has a higher power to weight ratio. The total amount of turning torque of the mechanism relies on the drag force on each blade. Darrius It uses

blades similar to those used in the horizontal axis wind turbine (HAWT). It has two or more curved blades that depend on wind in order to revolve around a central column. It functions by generating a lift using the rotating motion of the blades. The wind acting on the blade creates a rearward momentum change which propels the blade in the direction of rotation. This cannot occur unless the blades are already rotating and therefore they require a separate means of starting i.e. they are not self-starting. Figure.2. Vertical Axis Wind Turbine

2.3 Horizontal Axis Wind Turbine (HAWT)

It has blades that are similar in design to aircraft propellers where air flow over the air foil shaped blades produces a lifting force that turns the rotor. They should be placed on towers to ensure maximum use of the winds at higher levels. For large scale types, they have an active yaw mechanism with wind direction sensors and motors that will rotate the nacelle. In both upwind and downwind the rotors should be perpendicular to the direction of wind and if the rotor is held in a fixed position, only 21% of the wind energy will be captured (Wortman, 1983).For upwind type, the rotor rotation is accomplished by using a vane to measure the direction of the wind and then the information is communicated to the yaw drive. The yaw drive then drives the rotor so that the turbine is facing the direction of wind for maximum harness. They don't suffer from wind shade phenomenon as the wind is tapped early enough before obstruction by the tower. For downwind types, they don't use a yaw drive because the wind itself orients the turbine. The blades are situated on the downwind side and therefore capture the wind and rotate following its direction. These designs are prone to "wind shade" a process in which the wind flow is obstructed by an object e.g. the tower thus reducing amount of wind and therefore a reduction in the power output.

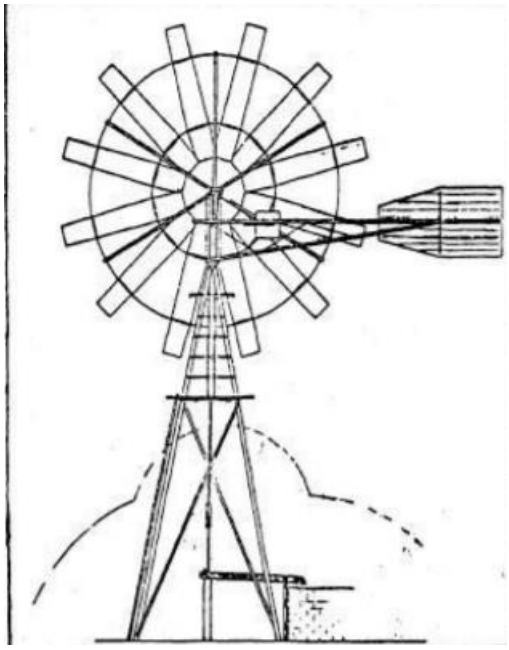

Figure.3. Wind Mill

III. DES CRIPTION

3.1 Field of the Invention

The present invention relates generally to the recovery of water from an underground source through the use of a reciprocating pump system. The present invention relates more specifically to an improved water pumping system adapted to be driven by a windmill that utilizes an air lift fluid pump for generating a flow of water to the surface.

3.2 Description of the Related

Art Water pumping windmills may be found on farms and ranches worldwide and provide critical water supply for domestic and livestock use, especially in areas where electrical and fuel driven pumps are not practical. The type of technology associated with these windmill water pumps has enjoyed continuous use since the late 19th Century and may be generally illustrated by U.S. Pat. No. 1,632,188 assigned to the Dempster Mill Manufacturing Company (1927). This type of windmill pumps water by means of a positive displacement, reciprocating pump, submerged below the static water level of a drilled well. The pump is conventionally connected and supported by a water discharge pipe which leads to the surface and a reservoir for the water. The pump is driven by a reciprocating rod, typically made of wood or fiberglass, which reaches down from the windmill's transmission to the pump through the discharge pipe. It is typical in reciprocating water pumps of this type to utilize a barrel or cylinder within which a piston is moved in a reciprocating motion by the pump rod. Both the piston and the bottom of the pump barrel incorporate check valves that allow water to flow only in the upper direction. The check valve at the bottom of the cylinder is commonly called the foot valve, while the valve in the piston is commonly called the lift valve. When the piston is lifted by the pump rod attached to the surface windmill, the lift valve closes and the piston lifts the entire column of water above it until water overflows out of the discharge pipe at the surface. At the same time a slight suction is formed under the piston causing the foot valve to open and water to flow in under thepiston. During the next half of the cycle the piston moves down causing the foot valve to close and the lift valve to open such that water flows through the piston into a position to be lifted during the next half cycle. Water flow valves, such as those described above, must be periodically replaced. The lift valve, which is typically made of leather or rubber, eventually wears due to particles of sand or earth in the water. Other check valves involved with the system also have finite useful lives and must be replaced on a regular basis. Replacement typically involves the removal of the pump rod, discharge pipe and pump by lifting the entire assembly up from the drilled well in order to access the valves. Such replacement efforts involve considerable labour and expense and greatly affect the down time of the windmill pumping system. Obviously, many efforts have been made in the past to replace the windmill pumping system powered by electrical motors and internal combustion engines. The present concern relates only to such efforts that have sought to improve upon wind driven pumping

systems. One effort in the past is described in U.S. Pat. No. 3,367,281 issued to Gray on Feb. 6, 1968 entitled apparatus for pumping water from wells using wind power. The Gray patent discloses a water pumping device in which compressed air is generated by a windmill, stored in a tank, controlled through a pressure regulator, and delivered to a displacement type water pump. This invention, although not overly complex, is not directly adaptable to the typical windmill structure. The Gray disclosure describes a down stroke of a windmill pump rod as the compression stroke which does not lend itself well to application in conjunction with typical windmills that are designed to apply force and power on the upstroke of the pump rod. The pump rod conventionally made of wood would likely snap if used to compress air on the down stroke. The Gray invention also utilizes solenoid valves that are electrically controlled to effectuate the air compression cycle. Such electrically controlled valves are typically not practical in remote windmill locations. Finally, the Gray invention further requires the use of an air hold-up means and a pressure regulator. U.S. Pat. Nos. 4,385,871 and 4,358,250 provide further examples of inventions generally related to the conversion of wind energy into compressed air for the purpose of water pumping. These earlier efforts, however, also do not address an appropriate adaptation of the air compressing mechanis m to the typical windmill structure or to the utilization of the same in conjunction with an air injection type water pump. **IV. S ELECTION OF SITE TO WORKING**

The viability of a windmill is greatly affected by its location. The site must have sufficient wind power to move the windmill and also be away from obstructions that might cause turbulence. The speed of wind for a given location is not constant and thus the climatic condition of the site should be examined for over on a year and recorded on a wind map which is then used to analyze the suitability of the sit. To avoid distractions, most windmills are located on hilly areas or the rigs are tall enough to ensure the rotor is far above the obstacles. The site of our windmill had been identified and there was no need for selection of another site. However, we did an analysis on the site to determine its suitability and the findings were as follows. The location of the windmill is strategically away from tall buildings and tree.

V. CONCLUS ION

The total torque output of the windmill is 106.4572 Nm and this is sufficient to sustain the desired flow rate of (0.1736 X 10-3) m3 per second with a maximum head of 30m, and also to overcome other barriers to 5motion e.g., friction. The number of blades used is 24 with a total surface area of 0.5585 m2 and this gives a solidity of 0.8, the minimum (optimum) value of solidity for a windmill and therefore ensures conformity with the standard specifications. Gears and bearings are subject to very high heat losses due to friction and this will be greatly minimized by application of oil and grease and therefore greatly improving the efficiency. All materials used are locally available and at a low cost making the model economically viable.

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FABRICATION OF RICE PLANTING MACHINE OPERATED MANUALLY

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ABSTRACT

Agriculture is the most important sector of Indian economy. Rice being the major crop cultivated in India, a huge amount of work force is engaged in rice production. The common practice of rice cultivation is manual transplanting of seedlings. Besides being costly, cumbersome and time consuming it is very labour-intensive task. To mechanize the transplanting system several attempts has been made to design and fabricate transplanting machines. Due to high price of an automated paddy transplanter it becomes impossible for a small scale farmer to purchase a non-subsidized automated paddy transplanter. An attempt has been made to fabricate a manual paddy transplanter which is effective as well as cheap. Selection of an efficient power transmission system and a suitable mechanism to drive the planting claw is given due considerations in its design. The objective of this project is to design a paddy transplanting mechanism to transplant rice seedlings by small scale farmers in the country.

Keyword: - saplings, Tray, Rocker arm, wheels, paddy transplanter

1. INTRODUCTION

Rice being the important food crop covers about one fourth of the total cropped area and cater food to half of the Indian population. In India, average rice production per hectare is 2.2 tonne. Rice is the staple food of more than half of the world. It constitutes 20% of the total daily nutrition need of an average person. More than 3.5 billion people depend on rice for their daily demands. A Rice Transplanter is an agricultural machine used for transplanting saplings to the field. .This is very important as it reduces the time taken to transplantsaplings (when compared to manual transplanting), thus allowing more time for harvesting. Hence, paddy transplanter is one type of transplanter which plants paddy saplings to the field. The main objective to develop a mechanism for transplanting rice seedlings is:

- To increase the efficiency of traditional rice planting method without sacrificing its basic purpose
- To achieve higher productivity, yield and reduce health risk.
- To develop an alternate source of income for rural youth through custom services.
- To develop an instrument, which will be cheap to buy, repair and maintain.
- To reduce the labour cost.

Rice transplanting requires considerably less time and labour than manual transplanting (1–2 ha/person/day versus 0.07 ha/person/day). It also save from Tedious Farming Work Struggle, the tedious working of planting paddy by hand.

1.1 Literature Review

1) Design & Development of Rice Planter Machine, D hanesh D Patil ,Dr. Mangesh R Phate, ISSN 2347-6710, Vol. 5, Issue 7, July 2016. They used 4 row, 3 row and 2 row rice transplanter on the basis of their study of various parameters they concluded that the 3 row rice transplanter was the best among all transplanting methods. So ,Due to higher costing for 3 row rice transplanter, we are manufacturing 2 row rice transplanter.

2) Design Analysis and Fabrication of Manual Rice Transplanter , Satish Kumbhar, Sangram Khot, ISSN 2347-6710, Vol. 6, Issue 3, March 2017. The cost is cheap than motor and hand cranked mechanical rice transplanter. The four bar mechanism gives the each operating and maintenance with less parts which reduces the weight. Therefore we are using four bar mechanism for giving a simple and easy operation of rice transplanter machine.

3) Ergonomic Evaluation of Manually Operated Six-Row Paddy Tramsplanter, Rajvir Yadav, Mital Patel, ISSN 147- 157, 2007 The height at which push-pull forces were applied was the most important variable in affecting the force output. They concluded that the foot placement, handle height and body postures all affected the push-pull strength. Further reported that the posture of workers while performing some tasks is another factor that can influence energy requirements. Transplanting in bending posture required the highest energy than any other posture. The body posture during the push and pull force is important factor while transplanting.

4) Impact of SRI Technology on Rice Cultivation and Cost of Cultivation, Ramapuram Jayapal Reddy, Dr. N. Sandhya Shenoy,ISSN 2250-3153, Volume 3, August 2013. They conducted an economic analysis of traditional SRI rice cultivation practices in Mahbubnagar district of andrapradesh. It was concluded that the SRI (system of rice intensification)method of cultivation is advantageous to the paddy farmers as compared to traditional method. By studying the SRI system, we came to know the proper area for planting.

1.2 Construction and working

Rice transplanters have seedling trays where mat-type nurseries of seedlings are laid. The tray shifts seedlings like a carriage of typewriters as pick-up forks get seedlings from the tray and put into the ground. The pick-up forks act like human fingers by taking the seedlings from the tray and pushing them into the earth.This machine is operated on wheel so no use of extra arrangement to run the

mechanism. Four bar mechanism helps the machine to operate more comfortable and easier and with low noise, Low noise designed transplanting arms can help to judge transplanting condition timely. The machine is with compact structure and small volume and can operate in the field easily.

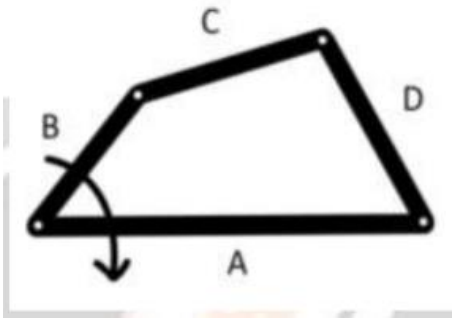


Fig1: “Four Bar Linkages”

In the Rice Transplant Machine , we are using “Four bar mechanism” to carryout the work. A Four bar mechanism consists

ofFixed Link- fixed part in linkage

Crank-can rotate full 360 Degrees

Coupler Rocker

Arm-can rotate through limited range angle

Connecting rod-connects the crank and lever

Components of rice transplanter -The manually operated rice transplanter machine consist of the following main components:

Sprockets

Chains

Tray

Shaft

Fork

Rocker Arm

Connecting rod

Bearing

Wheels

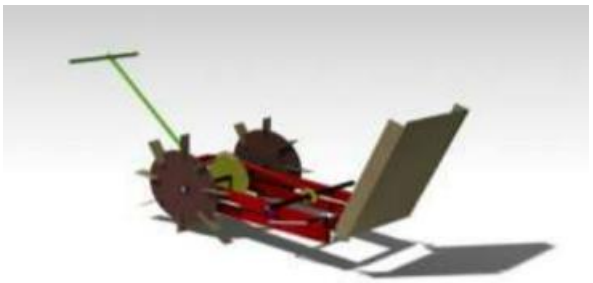
Working-

Paddy seedlings are kept in tray and allowed to flow down under gravity. The fork which is attached to shaft picks up the seedlings from the tray and keeps it in a horizontal position on the skid. The motion of the wheel and shaft is given by hand using chain and sprocket mechanism.



Fig2 : "Working Mechanism"

Here, simple four bar is used to plant paddy seedlings in the field. In this mechanism fixed Link has no motion in the mechanism, Crank will be having rotatory motion. Coupler is transmitting motion to the rocker arm. The extended portion of coupler is used to pick up the seedling from the tray which is called as the fork. Due to rotation of crank the fork will do oscillatory motion in up and down direction. Fork follows a curved path when going to downward direction. At certain point of the path the fork will grab the seedling from the tray and plant it in the soil while traveling in downward direction. After that the fork will reach its highest position and the process continuous until the rotation is stopped. Rocker arm carries out oscillatory motion with a limited range of angles.



2. CONCLUSION

Since the farm land is of the average size in the area thus a mechanized paddy transplanter would highly aid in the rice transplantation. It will also decrease the high dependence of farmers upon labourers for transplantation. Transplanting through the manual rice transplanter have got seven advantages like less water for raising the mat type seedlings, less area for raising seedlings. It saves

the costly seed by 50%. The cost for uprooting of the seedlings is zero. Due to the machine transplanting, the raw-to-raw distance is fixed.

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FABRICATION OF SOLAR CAR

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Abstract:

The primary goal of this venture was to structure and create the Electric Solar Vehicle which is intended for singleseated vehicle fuelled by 2 kW BLDC centre engine (motor). Electric sun oriented vehicle is fabricated to improve a safe and Eco-friendly transportation. In the current scenario, due to increase in population and usage of vehicles, the consumption of fossil fuels like petrol and diesel are keep on increasing. Due to this, the availability of fossil fuel will reduce in turn to increase in demand and cost and it will be exhausted in future. Because of this, it is necessary to find the alternate fuel to operate the vehicles. In the non renewable energy sources, Solar energy is one which is freely available. Daylight is viewed as a wellspring of vitality which can be utilized for many applications. Sun based vitality is being utilized to create power through daylight. The fundamental segment to fabricate a sunlight based vehicle with a sun based board solar panel and a battery to store the electrical vitality. The sun based cells gather a bit of the sun's vitality and store it into the batteries of the solar based vehicle. After the vitality is stored in the batteries, it is accessible for use and the engine and controller is made to drive the vehicle. There are two arrangements of batteries; one of which will get the electrical vitality from the solar board to drive the engine and another will be utilized as helper control source which will give expected capacity to other electrical gadgets being utilized in the vehicle. After that the engine controller changes the measure of vitality that streams to the engine to compare to the throttle. The engine utilizes that vitality to drive the wheels.
Keywords: BLDC Motor and controller, Batteries, Solar panel, Seamless pipes, Steering set, Tyres and brake set.

INTRODUCTION

The idea of fabricating sunlight-based vehicle is from Imperial Society of Innovative Engineers (ISIE) which arranges the electric sun-based vehicle title ESVC which is an Asia's biggest sun-oriented vehicle title. According to this, a solitary situated sun-based vehicle is designed and fabricated with a BLDC motor, power source (battery) and additionally sun-based board. The reason for this venture is Eco-accommodating and safe to ride. A sunlight-based vehicle is essentially controlled by direct sun-oriented vitality. 48 V 100 amps Li-ion battery is used to run the 48 V 2000 W BLDC motor which transmits power to drive the vehicle. The vehicle is fabricated for hustling on the dashing track, so least load of the vehicle gives most extreme effectiveness. Seamless Pipes (AISI 106-B Grade) is used

in the vehicle. The structure of the vehicle is displayed with the end goal since vehicle is fit for the track and to take corners in the most effortless way.

II. LITERATURE REVIEW

Imperial Society of Innovative Engineers [1] are well known Society of India for organizing Motorsports events, live projects based industrial training and research and publication. ISIE – India provides a platform to the students and professionals for the development and enhancement of their technical as well as managerial skills. A platform especially for engineering students is developed where they can easily face real-time engineering problems and find the best solution, especially in the sector of Electric and Hybrid. Sharma et al. discussed that the future of vehicles seems to be with the combination of various energy sources. This sort of growth in vehicles to look for the benefits from the best quality of each energy source and it is particularly useful in urban driving vehicles. Cities of India one of the major mediums of transportation like buses, lorries and auto rickshaws, which produce a huge amount of air contamination as well as greenhouse gases like CO2. At present, transportation charges increase due to the usage of costly non-renewable fuel [2]. Singhalet al. discussed thatthe renewable energy is essential for today's world as the non-renewable sources that are going to get exhausted shattered in near future [3]. The solar vehicle is one of the replacement of the nonrenewable sources of energy. The basic principle of Electric Solar Vehicle (ESV) is to use energy that is accumulated in a battery during and after charging it from a solar panel. The batteries are in charged conditions are used to drive the motor which serves here as an engine and runs the vehicle in reverse or forward direction. Wamborikar et al. detailed that energy from the sources for generating electricity, running automobile vehicles etc. But the main drawbacks of these fossil fuels are that they are not environmental friendly and they are exhaustible [4]. To deal with these problems of fossil fuels, it is necessary to look at the non-conventional sources of energy. Because of this, an Electrical motor vehicle that runs on solar energy is designed. Vishal improved that the solar car is to create an eco-friendly vehicle with the help of solar energy [5]. Initially solar panels are used as a source of power to charge the batteries in addition to that self power generation system and thermo-electrical power generation system are also used as an alternate source to charge the batteries. These systems help to run the vehicle during the absence of solar power.

III. COMPONENTS USED IN SOLAR CAR

A. Wheels & Tyres: There are different types of tires accessible in the market and the determination is made based on the traction of the tires.

Design and Fabrication of a Solar Car

Minimized structure of the tire is likewise considered while doing the choice. Slicks give better grip than a treaded tire. Activa Aviator tires are chosen since they have increasingly more surface region and better footing. Wheel specifications: Wheel diameter and tread width are 12 inch and 4 inch respectively.

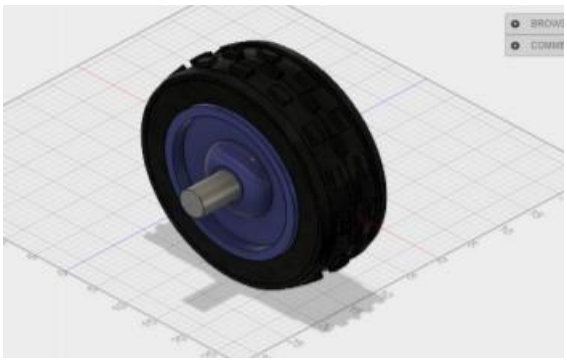

Figure 1 Designed Tyre using software

B. Brake:

Brakeis the most essential element in any vehicles. It makes use of to stop the vehicle and to control the movement of the vehicle. Mostly, either disc brakes or drum brakes are used. A brake disc normally made of cast iron or ceramic is associated with the wheel or the axle. To stop the wheel, friction material used as brake pad is constrained mechanically, hydraulically against the two sides of the disc. Friction makes the disc slow or stops the wheel. After a long overview in market and concentrating different parameters, a disc brake from Activa aviator is placed over drum for its better cooling efficiency because of uncovered contact surface, simple assembly, uniform wear in disc, better anti fading character, less weight and occupies less space. The dimensions of the disc are 200 mm external diameter and 10 mm thickness. There are two kinds of calliper accessible. One is a fixed type and the other is a float type. Fixed type of calliper is utilized in the disc in both back and front wheels to stop the vehicle. Fixed calliper has a good performance but it is costlier than the floating type calliper. The calliper has a piston diameter of 30 mm. Activa Aviator calliper and DOT 3 brake oil are used in the vehicle. Its cost is less and has a great performance.

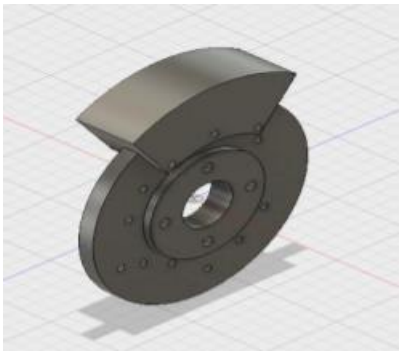

Figure 2 Brake disc and caliper

C. Suspension (Double Wishbone type):

Mounting In vehicles, a independent type double wishbone (upper and lower A-arm) suspension is used. It has two wishbone shaped arms to locate the wheel. Every wishbone or arm has two mounting joints, one is mount with the chassis and the other is mount with the knuckle joint. The shock-absorber and coil spring mount to the wishbones to control vertical up and down movements.



Figure 3: Suspension

D. Steering System:

Steering is the component used to turn the vehicle while cornering. The fundamental aim of steering is to guarantee that the wheels are pointing in the ideal directions. This is normally accomplished by a progression of linkages, tierods, pivots and gears. The control of vehicle is done by the steering system. It gives directional changes to the moving vehicle. To fulfil this condition, the inner wheel must turn through a more prominent angle than the outer one; if not tire wear is greatly increased. While taking a turn, each wheel must move on an arc and these arcs ought to have a common centre. In the steering system, the rack and pinion mechanism is used. For perfect

steering, all the four wheels revolve around an instantaneous centre. For this reason inner wheel needs to turn more than the outer wheel. To accomplish this condition, Ackermann steering mechanism is utilized. It comprises of a four bar chain having turning pairs. The stub axles are connected together by two short track arms and a tie rod. In this solar based vehicle, four bar linkage mechanism is used. Purpose for this is to take sharp turns on the track rapidly. So by using this system driver has the straight forward to control wheels on time. Steering ratio of 9:1 is used which implies on pivoting steer wheel at 9° which turns the wheels by 1°.

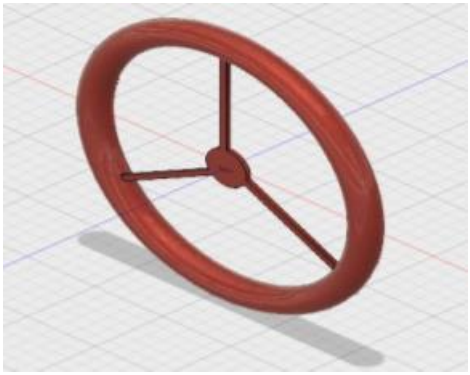

Figure 4 Steering wheel

E. Transmission (Drive chain)

The power train is used to transmit the power of the engine to the wheels and tyres. At the point when a vehicle keeps running on a track, it encounters an obstruction drive from outside the vehicle. It is known as a running resistance of the vehicle on a track. On the off chance, a driver needs to keep its speed consistent and needs equivalent capacity of power. Running resistance yet needs more power for increasing speed resistance. All endeavours are made to make the power transmission as an effective and reliable as could be expected under the circumstances.

IV. METHODOLOGY

At the point when the electrically operated throttle pedal is throttled, the controller controls and transmits required current and voltage to the engine. The required measure of current is from batteries which are charged from sunlight by solar panels. The solar panels get sun's radiation and charges the batteries. The solar panel comprises of photovoltaic cells which observes heat from daylight i.e. sunlight and changes over it as current. The engine shaft rotates and make the drive shaft rotates. The drive shaft rotates the wheel and vehicle moves. There is no emission and it is an Ecofriendly vehicle. When the vehicle is needed to stop, brake pedal is pressed which is associated as an arrangement with master cylinder and thus related with the calliper to stop the vehicle. The calliper impels the brake pad and it will stop the disc to rotate which is connected with the wheels

of the vehicle. Forward and reverse switch is utilized to run the vehicle in forward and reverse movement. The kill switches are making use of to stop the vehicle ordinarily or if there should be arise and an occurrence of any crisis. It stops the general supply of current to the engine.

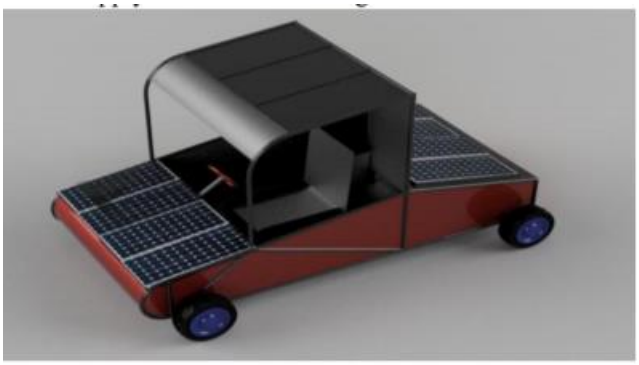

Figure 5 3-D Diagram of Solar car



Figure 6 Solar car

V. CONCLUSION

a. Solar vehicle is made with a single seat to run in the race track. b. The vehicle efficiency is high as the weight of the vehicle is very less. c. Solar vehicle can be available at low running and maintenance cost and it requires only more initial cost. d. High safety measures are considered while fabricating. e. Solar vehicles are used to make pollution free environment.

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FABRICATION OF SOLAR SEED SPRAYER

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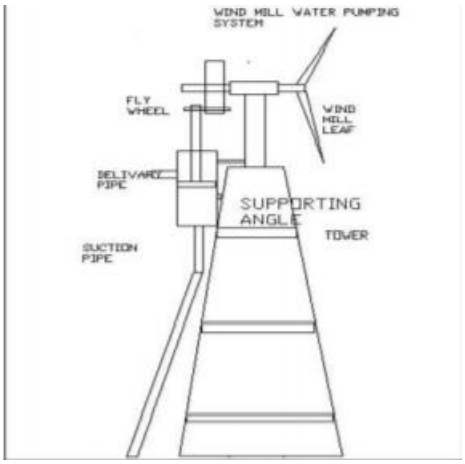
Abstract-.

Today's era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands, the farmers have to implement the new techniques which will not affect the soil texture but will increase the overall crop production. In this project, a=-n attempt has been made for the "Design and fabrication of solar seed sprayer machine". In this technique seeds in a hopper get sprayed by means of fan or blower directly to land without human effort. By this process the seed is feed to land at the time of plough. The main benefit of using this method is to reduce the time of seed to the land and reduced human effort. Usually, the manpower is needed for sowing a seeds by using this machine there is no need for human power. This system does not require any additional power source to run the fan, because here solar panel is employed as a power source. Key Words: Agricultural sector, Power source, Solar seed sprayer machine

INTRODUCTION

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. The government of India appointed a commission to assess the feasibility of increasing the crop productivity under prevailing Indian ecological conditions. In order to develop the standard of living of small farmers we should make the machines with low cost. Then only small farmers can implement the recent modern machines for farming purposes. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing, seed rate, seed to seed spacing and depth of seed - 089IJlacement vary from crop to crop and for different agricultural and climatic conditions to achieve optimum yields and an efficient sowing machine should attempt to fulfill these requirements. In addition, saving in cost of operation time, labor and energy are other advantages to be derived from use of improved machinery for such operations. A traditional method of seed sowing has many disadvantages. Our proposed "Solar seed sprayer machine" is used to sowing seed easily. In this project an attempt has been made to provide the low cost sowing machine and also it reduces the human effort. A. Problem Statement Seed sowing machine is a device which helps in the sowing of seeds in a desired position hence assisting the farmers in saving time and money. The basic objective of sowing operation is to put the seed and seed in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed.

Hence, there is a greater need for multiple cropping on the farms and this in turn requires efficient and high capacity machine



B. OBJECTIVES

1.To investigation of various types of seed sowing and spraying machine

2.Todevelopment of solar powered seed sowing and seed spraying machine.

3.Totesting of development of solar powered seed sowing and seed spraying machine in actual agricultural farm.

4.To extend the concept of Solar PVTechnology on “Solar Sprayers” as “Energy Alternate Devices”.

II. LITERATURE REVIEW

Our country faces the total loss of 33% of its economy from Weeds. The Losses are due to some of the following reasons, total loss of 26% from Crop Diseases, total loss of 20% from Insects and Worms, total loss of 6% from Rats. Has been Surveyed. Shrinking farm lands, acute labor shortage, decreasing income per acre of cultivation, and economic frustration are some of the key factors hurting a farmer's confidence in continuing farming. Weeding control is done by: mechanical weeding, thermal weeding: flaming, biological control, chemical control, and by farming pattern. It has always been a problem to successfully and completely remove weeds and other innocuous plants. Invariably, weeds always grow where they are not wanted. This work involved the design and construction of mechanical weeder, after discovering that tools such as cutlass and hoes require high drudgery,time consuming and high labour force. As a solution to these problems, mechanical weeder was designed and constructed. The mechanical weeder was made of two implements attachment i.e. the primary cutting edge which is in front to loose soil above and the secondary cutting edge which is behind to do cutting and lifting of weeds. The overall machine field efficiency was 98.67%. The Single Wheel Weeder being manufactured is the equipment, which is used for very special purpose when the weeding is required at narrow places or between rows. The blade is thin but very sturdy and

tough besides, it is very safe to use and offers zero threat of hurting to the user, Other than the wheel, there is nothing mechanical in this single wheel weeder but, it works wonderfully under the condition where it is put into. This hassle free equipment requires no special maintenance. It is necessary to design the weeder which minimize the human effort and provide efficient work output.

A. Scope

1.Maintain row spacing.

2.Proper utilization of seeds can be done with less loss.

3.Achive automation in agriculture field.

III. METHODOLOGY

First, we will design the Seed Sowing & Spray Pump system suitable to various agriculture application. we need to analyze Seed Sowing & Spray Pump system taking into consideration the applications and operational conditions. Then we will analyse the design in ANSYS for static and dynamic conditions. Theoretical: Theoretically we will compare basic and operational parameter of existing system with propose system.

IV Working Mechanism:

The Solar panel (specification: 10W, 12A, 10*12inch) will be placed at the top in the device and is supported by the frame, it is placed such that it comes right above the head of the farmer, providing him shade, like a cap. The frame will be designed such that, the panel along with the frame can be tilted/rotated to position the solar panel normal/perpendicular to the sun rays depending upon the position of the sun, in order to trap greater solar energy and increase the power generation. The panel traps the solar energy, converts it into electricity, which is then stored in a Battery (specification: 12V dc) placed at the bottom in the device on the frame. The battery provides the necessary electricity for the operation of the device. To control the supply of electricity to each part, Toggle switches are used. A Tank (specification: plastic, light weight of 10lts capacity) will be attached at the top of the frame. It is used to carry seeds or liquid viz. pesticides, fertilizers etc. Tank has 2 outlets. One of the outlets is connected to the outlet of blower; the other outlet is connected to the hose pipe. The battery runs the Motor (specification: dc, 2000rpm, high torque) placed at the center. The shaft of the motor drives the Air Blower (Specification: Diameter 9inch, Aluminum), which blows the air out at high speed through a hosepipe. To this hosepipe, the outlet of the tank is attached. Hence a partial vacuum is created at the tank outlet and the seeds or liquid fall down in the hosepipe and are sprayed by the action of the blower. A spray nozzle is fitted at the end of the hosepipe to spray the seeds/liquids uniformly. The rate of spraying the seeds or liquids is controlled by using control valves. A cap is inserted at the inlet of the blower to allow the entry on air only through this restricted opening. A pipe

is inserted in the cap and the other end of the pipe with a filter to avoid entry of dust into the blower is inserted inside the tank. From the outlet of the tank, another long pipe is drawn out, which will work as inlet for the vacuum cleaner. As the blower is operated, due to high suction pressure at the inlet of the blower, the dust particles 5 are sucked inside the tank. The filter prevents the dust particles from entering the blower and gets collected in the tank. The tank can be emptied later. A hollow shaft for grass cutter is supported by the frame. At the end of the handle, there is a 45deg. bend, to which a high rpm motor is attached. The electric wire connecting the motor and the battery passes through this hollow shaft. The shaft of the motor drives the Blades (specification: Nylon wire) which is used for grass cutting action.



V. Conclusion:

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding planning, designing, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries. 6 We are proud that we have completed the work with the limited time successfully. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities. Thus, we have developed a "Fabrication of Solar Seed Sprayer" which helps to know how to achieve great farm yield with simple mechanisms. The application of this machine is very high when compared to the cost of the machine. By using more such techniques, cutting costs, employing indigenous technologies, these devices can bring a revolution in the modernization of Indian farming.

Future scope:

The solar panel can be fitted with 4 light sensors. Thus depending upon the position of the sun, the panel will be tilted, such that the sun rays are incident normally (at 90deg) to the solar panel. With this the device would be even capable of trapping the solar energy at times when the intensity of the sun light is less (Example: Early morning, evening, during raining season etc.)

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FUEL THEFT PREVENTION IN MOTORCYCLES USING SOLENOID VALVE

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Abstract-

Fuel is one of the most widely-used sources of energy in the world today. Most fuels are natural substances such as petrol fuel, diesel, and natural gas, which are either extracted straight from the earth or produced by refining substances such as petroleum. Such important non-renewable fuels are pilfered by the people at different stages of fuel delivery process. In this paper, a Antipilferage and Antiadulteration System (AAS) has been developed to prevent the fuel from pilferage and adulteration. Increase in the incidence of fuel tankers pilfering and even adulterating liquid/fuel materials has prompted fuel companies to track and monitor the transport vehicles. The main intention of the AAS is to ensure the fuel safety. An experimental analysis is carried out using solenoid valve, flow sensor, electromagnet lock and GPS with the open source IoT platform. After these sensors get fitted in the fuel tanker, it monitors and controls the pilferage of fuel with the help of lids/valves during filling or emptying at the fuel stations. Electromagnetic lock helps in preventing adulteration. GPS will enroute the vehicles' path. All of this data is uploaded to the dashboard display using IoT technology. This solution will allow owners and managers of fuel companies to make informed business decisions, remote monitor tankers and prevent theft of fuel and goods.

Keywords – AAS, Pilferage, Adulteration, Electromagnetic lock, IoT, GPS, Solenoid valve, Fuel

I. INTRODUCTION

The energy produced by burning fuel has many applications, such as powering vehicles, ships, and airplanes as well as providing electricity for homes and buildings. The developments of automobiles have a significant role in modern civilization over the past few decades. Most of the vehicles like cars, motorcycles, buses, trucks etc. run by traditional transport fuels such as gasoline, octane, diesel etc. Furthermore, the fuel price over the past few years is increasing which may effect on the modern life. The vehicle may lose fuel in many ways such as leakage, cracking of fuel tank and fuel theft/pilferage. It may hamper both safety of life and economic loss. Fuel pilferage is a huge problem for many individuals as well as business owners with fleet of vehicle. So, the fuel loss or theft from the vehicle is an important issue in many countries in the world. Although there are many alarming issues, in this work, preference is given to the unanticipated issue of fuel theft from the transport vehicles. Most of the transport users are counting a loss of huge number of currencies because of this unusual fuel loss. This unexpected fuel loss has a great impact on the economy of a country. It is very alarming and undesirable issue for developing countries. Petrol and diesel theft is an international

problem [3]. Fuel theft has become a big problem for fleets around the world, and it is a real threat to the fleet's overall budget, as it can have a significant impact on the company's bottom line. Automation is mandatory to handle all type of systems. It is made possible by embedded design which is a combination of both computer and mechanical system, often with real-time computing constraints. In today's world, it is common to control most of the devices, by automation since it optimizes by reducing the size and cost of the product and increase the reliability and performance. Embedded systems are based on Microcontroller and their applications range from portable devices to large installations and it also extends to large complex systems. [2]

EXISTING SYSTEM

Rubayat Islam has described the automatic prevention of fuel theft using Ultrasonic sensor. It determines the fuel flow rate by measuring the distance of fuel level with respect to time. When the fuel flow rate or fuel consumption rate oversteps or falls behind the usual rate, then the sensor was activated which then sends a signal. After receiving the signal the GSM module sends a message to a specific number instantly by indicating that something is unusual so that one can immediately go into inspection.t1 is considered as the time taken for transmission of sound wave and t2 as the time taken for reflection of sound wave. So the average time taken as, t = (t1 + t2)/2. The velocity of sound in air is considered constant and that is taken approximately 332 m/s. The distance of the fuel surface from the ultrasonic sensor is calculated as, S= v*t. Ultrasonic sensor responses effectively within the range of 0.3~3meffectively. As some ripple occurs in liquid, the value given by the sensor fluctuates a little. So, one of the limitations of this approach is that this cannot be used for fuel reservoir fully filled with fuel. At least there should be some gap or level difference so that ultrasonic sensor cannot touch the liquid as the sensor is non-contact type. Proper calibration was needed to get reliable value from ultrasonic sensor.[4]

Naomi Somer Lepcha focused on the enhancement of the vehicle alarm security system via SMS. The system will manipulate a mobile phone to send SMS. Even though the SMS can be sent using the features available in the mobile, the objective was to activate the SMS sending by the mobile phone using external program connected physically to the mobile phone. Antitheft security system utilizes an embedded system designed with GSM to monitor and safeguard a car. In attempt of theft, the system sends text message to the car owner and at the same time starts up an alarm from the buzzer installed within the system. The safety of vehicles fuel is extremely essential for public so this went to notice due to the alarming rate at which vehicles fuel are being stolen in our country and with this design the vehicle can also be monitored irrespective of where it is parked , provided there is a GSM network coverage. So this model (theft detector) uses very few electronic components and looks very small and compact and can be mounted on vehicles easily. An interfacing mobile is connected to the microcontroller. When a person attempts fuel theft then the microcontroller commands the GSM

modem to send a text message as an alert to the vehicle owner and further an alarm is raised by the buzzer installed within the system. In this system the microcontroller AT89S52 is interfaced with SIM 900A modem to decode the message.[5]

P. Senthil Raja focused in the aspect to facilitate and enhance the vehicle's features such as speed, mileage and volumetric level of fuel by providing it with the detection of level and restrict illicit activities using sensor. It is implemented using Vehicle Area Network (VAN) and embedded design. The owner of the vehicle immediately receive a message when the fuel tank is opened by the operator or by a fuel traded and also the height of the fuel tank when opening and closing of the tank. The system uses Wireless based communication for monitoring the vehicle's position. A message is sent along with vehicle position and fuel level in the tank. This enables in identifying the level of fuel at different times whenever the tank is opened. Hence the larceners results rather than the fuel or to the vehicle theft by chance in the situation and provide the overall protection. The message are provided to the owner in relation to the fuel level in the vehicle in periodic manner and also avoids the other way to fuel theft of fuel tank fault detection system. The numeric lock system is to open authentication for the fuel in the vehicle fuel tank. The wireless technology will enable the vehicle owner, the vehicle with the mobile phone to monitor anywhere, anytime.[6]

Tatsuo Nakagawa et al (2013) describe a non-contact method for measuring liquid level by an opaque container is proposed. A millimeter-wave Doppler sensor is to detect by a target container developed, and measures the liquid level on the basis of the absorption of millimeter waves in the liquid. The feasibility of this method for clearly an air-liquid interface detecting hidden in an opaque container is confirmed experimentally. The non-linearity error of the measured liquid level within 0.5 mm. A capacitive sensor semi cylindrical mounted to a liquid container can measure liquid level, without coming into contact with the liquid, has, but its accuracy is not high, because the capacity of the distance between the container and the sensor is highly dependent. Optical sensors such as CCD cameras can measure fluid without the liquid with the image processing. However, to capture an image of the surface of the liquid, the container should be transparent, or the optical sensors should be introduced into the container. By the use of ultrasonic sensors, level can be calculated from the area between the sensor and the liquid surface. However, these sensors cannot be used for sealed containers. The principle of measurement is based on the absorption properties of a millimeter wave to a target liquid.

PROPOSED SYSTEM

The input block consists of electromagnet lock (i.e.) the inlet door indicator, Solenoid valve to control the flow of fuel, Flow sensor to measure the flow rate of the fuel. Also has an emergency switch that is used in case of erroneous situations. Arduino Mega 2560 is the controller which takes the inputs

and produces the digitized outputs. GPS is to track the vehicles path from source to destination. Node Mcu is in contact with open source IoT platform.

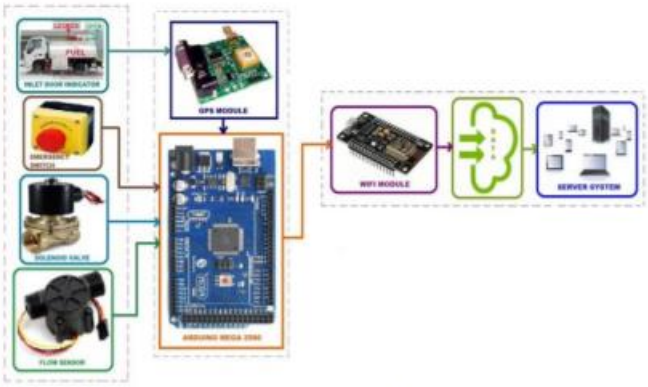

Figure 1: Block Diagram of Antipilferage and Antiadulteration System (AAS)

Figure 1: Block Diagram of Antipilferage and Antiadulteration System (AAS)

3.1 Working of AAS –

Initially the vehicle starts from its source i.e. fuel filling station .The vehicle moves towards the destination, once the tanker fuel is filled. Installation of physical parameters such as magnetic door lock, Emergency switch, Flow sensor, Solenoid value, GPS and controller with WIFI module should be fitted to the vehicle. Importantly, in case of emergency situations like fire accident or vehicle breakdown, intimation must be sent to the nearest service station. As the vehicles enroute path is monitored by GPS, this will intimate if the vehicle deviates from the desired path. As there is a magnetic door lock fitted to the tanker, this prevents from adulteration and pilferage. If there are any chances of occurring, then alert can be sent to the police station. Finally when the vehicle reaches the destination, the fuel gets deposited.



Figure 2: Working Principle of AAS

3.2. Use Case –

Initially, the tanker will fill the fuel from fuel filling station which is the source. The electromagnet lock is fitted at the inlet valve. Once the fuel is filled to the tanker, the valve gets locked. This lock can also be controlled via dashboard. As soon as the tanker reaches the destination, Solenoid valve is used to control the fuel flow. Followed by flow sensor which determines the flow rate of the fuel.

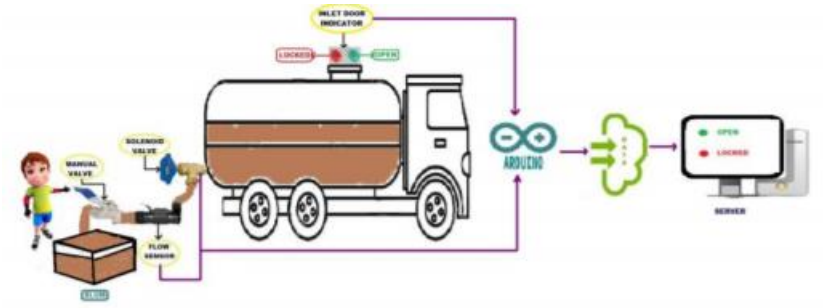

Figure 3: At fuel filling station

In this proposed system Phase I is designed to get the OTP entered into system which is to be verified and indicated their reserved seat with a LED indication. During this process the Controller get the OTP and its corresponding reserved seat number from the cloud-storage and is stored in the controller. When the booking is done the details are send to the cloud data base which stores it till the date of commence. After the due date the data is discarded. During boarding the data is verified by the system, when the passenger enter the data and the booking is confirmed.

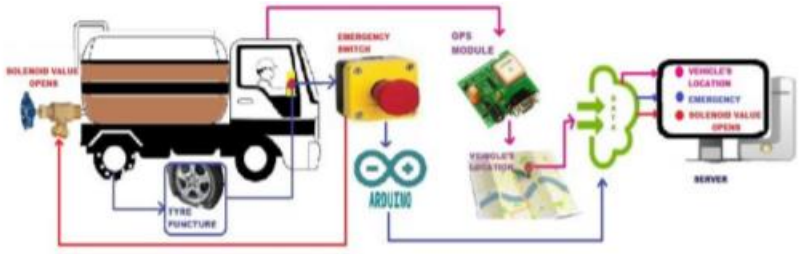

Figure 4: In case of emergency

IV. RESULTS

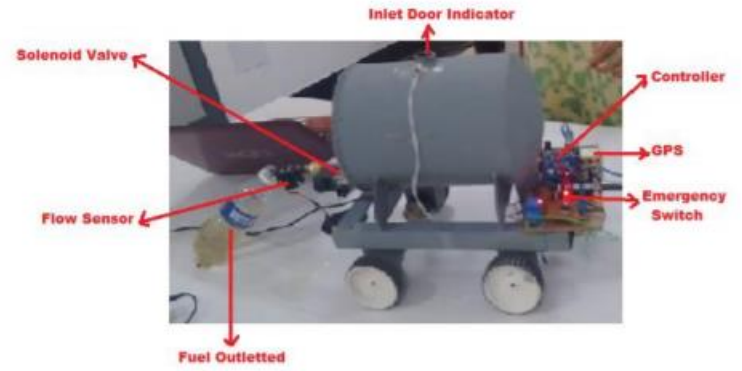

Figure 5 shows the working model of the AAS with the sensors, valves and GPS module.

The electromagnetic lock is fitted in the inlet valve, which can be controlled from the control room. Figure 6 shows the status of the inlet valve/ door on the display of the system in the control room.



Figure 6: Door status displayed on the system

The solenoid valve connected at the outlet of the fuel tank is used to control the fuel flow rate, which operated manually/ from the control room. Figure 7 shows the solenoid valve control.



Figure 7: Solenoid valve control

When the solenoid valve is open, the fuel from the tank is flow out. The valve can be opened manually in the case of emergency or in the intention of theft. To know this, the flow rate of the fuel is displayed on the system in the control room. The person from the control room can continuously monitor the flow rate and know the status.

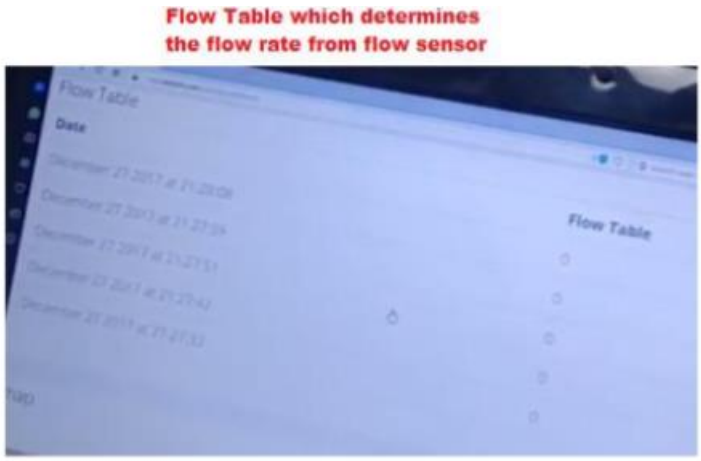

Figure 8 shows the flow rate table displayed in the control room.

Figure 8: Flow rate displayed on the system

The GPS module fitted in the tanker vehicle makes the person in the control room to track the location of the vehicle at any time. Figure 9 shows the vehicle tracking at the control room.



Figure 9: Tanker Vehicle tracking by GPS

V.CONCLUSION

The embedded devices in the environment for monitoring, enables self-protection (i.e., smart environment) to the environment. By deploying sensor devices in the environment, the environment might be brought into real life i.e. it can interact with human through the network. The proposed AAS is one of such embedded devices designed with electromagnetic lock, solenoid valves, flow sensor and GPS module. The AAS prevents the fuel pilferage and fuel adulteration. The flow rate sensed by the flow sensor at the outlet valve controlled by the solenoid valve makes the person at the control room to know the theft of fuel if the outlet valve is opened manually. The inlet valve of the fuel tanker is electromagnetically lock which avoids the adulteration of fuel. The GPS module is used to track the tanker vehicle at any instance of time from the control room.

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IMPLEMENTATION OF ARTIFICIAL EYE FOR INTELLIGENT LINE FOLLOWING ROBOT APPLICATIONS

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Abstract:

Implementation of new idea and new technology are the valuable gift to the recent generation. Utilization of new technology has shrunk the world and brought very easy within our reach. The expansion and growth of the ideas and concepts, are directly linked to the economic growth as well as development of the country. This paper presents microcontroller-based line following robot. Successful implementation on control is depend upon the logic utilization and with proper knowledge on the specific design model. Basically, a line following robot can easily follow the line as per instructions loaded in the controller.

Keywords: Microcontroller, LM358 comparator, IR sensor, DC motor, robot.

INTRODUCTION

Embedded system normally includes many advance technologies like interfacing, microcontroller hardware and automatic control and software and all different sensors working knowledge. Project based learning in the subject of embedded system which will help the students learning due to their interest and motivation Line follower robot where one can easily understand the hardware circuits and software implementation as well as the large applied to the system. Now a days in many institutions there is a competition between students as a robot racing , robot war and many more. During recent years robots are placed in hospitals as it can save time, also save the manpower, work any hostile environment and conditions with good efficiency [1]. 8051 is very good microcontroller which is used for controlling the robot to follow the exact line position [2]. Robot is intelligent programmed to follow the desired path to perform a task in military, construction, manufacturing units [3],[4]. Now a day‟s android apps are there to control button, voice and line and make very user friendly [5]. Now a day‟s to encourage students and for educational tool as to increase the confidence and ability to take innovative ideas to implement low-cost line follower robots are also available in the market [6]. Robots are also used for different services like drug delivery [7], to increase transportation line follower robot is highly essential [8] even it‟s advantages are more in industry revolution 4.0. Obstacle detection is also an important application of a robot [9]. Carrying cartage in a specific direction is also one application of line follower robot [10]. Importance of Microcontroller is

much more in all kind of field [11]. In this paper we describe the proposed procedure in section II, hardware and proto type implementation in section III and IV,

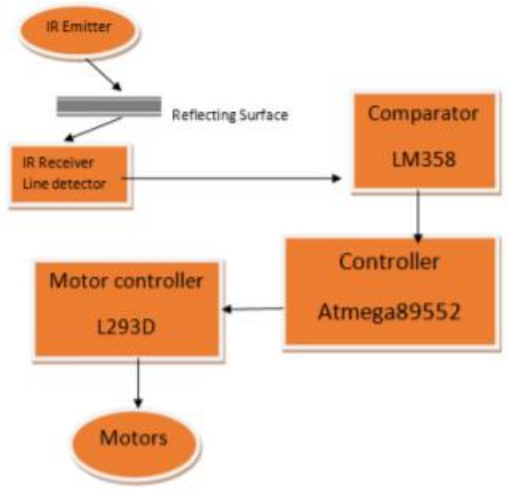
II. PROCEDURE FOR PROPOSED SYSTEM

A. Motor controller

To control current in the motor, the motor driver IC act like a current amplifier. L293D can have the capabilities to rotate the motor either forward or reverse direction or one can say clockwise and anticlockwise direction. Even it receives low current but it provides adequate amount to the DC motor.

B. Comparator

Comparator is used to compare with the threshold voltage accordingly it will act on the system. infrared sensor basically if anything comes in between transmitter and receiver then it immediately gives the output. Basically, comparator sends the desired signals to the controller, so that controller can take the exact action based on the received signal.



C. DC Motor

For proper movement of the robot two DC motors has been implemented and a castor wheel is attached.The reason behind caster wheel to make the easy movement of the robot. Motor driver IC will control the two DC motors. To control the overall line follower robot system ,here we used At89552 microcontroller is used. Also 10 volts DC supply can be provided by battery. As the proper block diagram is shown in figure 1. Basically we are using five IR sensors named as S1,S2,S3,S,S5. Out of this five S5 which will detect the path. In the back side we have implemented S1 to S4 four sensors out of that S1 and S4 used for angle or turn and whole thing can be controlled by microcontroller. Figure 2 shows the logic flow diagram of the line follower robot . As per this the „C" programming can be implemented.

III. POSIBILE ROBOT DIRECTION

Here we control the robot with specific mentioned line. Normally in manufacturing plant pick and placement or we can say pick and drop capabilities are used. To follow a specific location and keep them on required or desired location/place. For this a specific path to be taken for consideration for smooth performance. Using a feedback mechanism in control system there will be no chance of wrong movement. When there will be any sensed signal goes to the controller then it immediately gives to the motor driver IC for appropriate speed and voltage. A programming instruction is given to the robot so that as per the instructions it can turn right or left or move forward.

IV. PROTOTYPE IMPLEMENTATION

Before prototype implementation software verification is important. Because before implementing it should be properly run by the simulation, which is very important to find the silly fault in the coding or idea implementation. For this we are using proteus software and after proper implementation of motor driving direction, one can easily implement or drive further in hardware. Figure 9 indicates the proteus analysis of the output. Figure 10 and figure 11 as proto type implementation and final touch of the model.

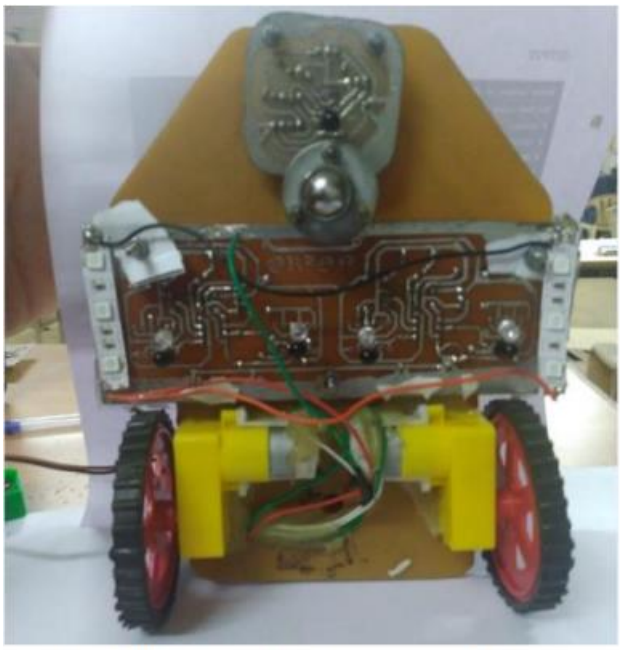


Fig. 10. Back side of the prototype Model

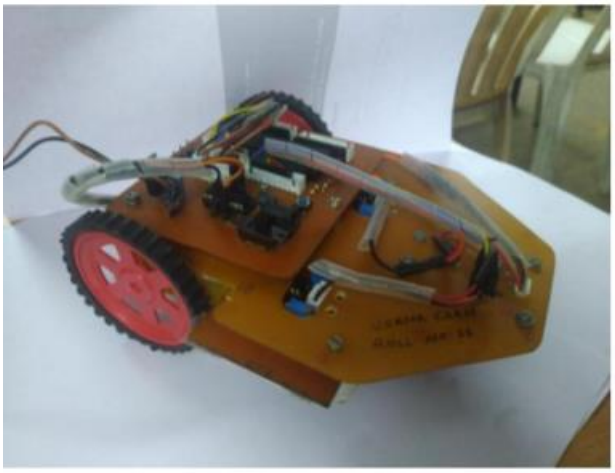


Fig. 11. Prototype implementation.

V. USEFUL APPLICATION

There will be automatic movement of the robot, once properly instruction set to the controller. Secondly if the prototype model will be successful then one can use real time implementation by assigning to the robot as some work and can sit as with no matter about that work. Microcontroller based model is also cost effective and due to it‟s simplicity it may be very good guidance in the shop floor in the market complex.

VI. RESULT AND DISCUSSION

The line or path following robot can implemented successfully. It runs over a specific path with the help of sensors and specific logic used in the controller. Initially it will take some time for PCB designing, printing and hardware debugging.

1) Big size robot can change the role play of worker like supplying material to the architectural high rise construction building.

2) The role also may change in hospital like supplying medicines to all the patients within the proper time. Even smarter robot can send the emails within the office and can also deliver the news paper, magazines, foods to the office workers in time.

VII. CONCLUSION

Now a day's health care systems greatly depend upon different robotic machinery for the cost and best accuracy point of view. The programming and interfacing was the master key during final stage and also successfully complete of this work. For perfect performance one should check the battery activities in the designed circuit properly.

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KINETIC ENERGY RECOVERY SYSTEM IN BICYCLE

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ABSTRACT

Kinetic Energy Recovery System (KERS) is a system for recovering the moving vehicle's kinetic energy under braking and also to convert the usual loss in kinetic energy into gain in kinetic energy. When riding a bicycle, a great amount of kinetic energy is lost while braking, making start up fairly strenuous. In this context the mechanical kinetic energy recovery system is used by means of a flywheel to store the energy which is normally lost during braking, and reuse it to help propel the rider when starting. The rider can charge the flywheel when slowing or descending a hill and boost the bike when accelerating.

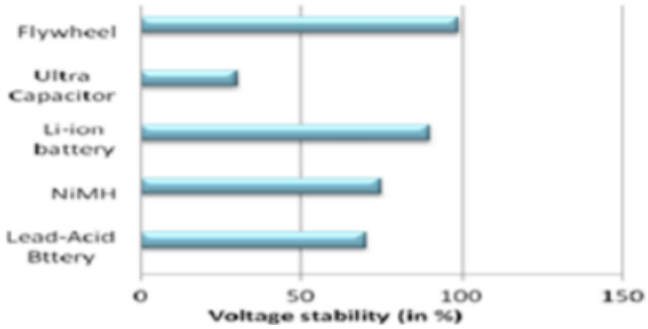
Keywords - Kinetic energy, bicycle, flywheel, energy recovery system.

1.INTRODUCTION

KERS is a collection of parts which takes some of the kinetic energy of a vehicle under deceleration, stores this energy and then releases this stored energy back into the drive train of the vehicle, providing boost to the vehicle. Kinetic energy recovery system store energy when the vehicle is braking and return it, when accelerating. During breaking, energy is wasted because kinetic energy is mostly converted into heat energy or sometimes sound energy that is dissipated into the environment. Vehicle with KERS are able to harness some of kinetic energy and in doing so will assist in braking. By a proper mechanism, this stored energy is converted back into kinetic energy giving the vehicle extra boost of power.

2. KINETIC ENERGY RECOVERY SYSTEM

A type of Regenerative braking is called KERS. KERS is an automotive system for recovering a moving vehicle's kinetic energy under braking. The recovered energy is stored in a reservoir (for example a flywheel or a battery or super capacitor) for later use under acceleration. Electrical systems use a motor-generator incorporated in the car's transmission which converts mechanical energy into electrical energy and vice versa. Once the energy has been harnessed, it is stored in a battery and released when required.



2.1 Types of Kinetic Energy Recovery System

There are different types of devices and forms in which the Kinetic energy lost while braking can be stored. They are:

1) Mechanical KERS

2) Electric KERS

3) Hydraulic KERS

4) Hydro-electrical KERS

Fig 1: Voltage Stability Graph

3. DESIGN REQUIREMENTS

There are many requirements that need to be met to produce a product that is both feasible and optimal. There are also some constraints, both geometric and engineering that also need to be satisfied. The following list describes these requirements and constraints:

3.1 Store energy while braking

This is the main requirement and the overall objective of the device and must be suitable to meet the rider's needs.

3.2 Return energy to start up

Once the energy is stored in the device, it is necessary to have a simple way to release this energy back to the user in positive way. This can be accomplished with an innovative chain drive system.

3.3 Must fit on a bicycle

This is one of the most difficult constraints to achieve and most important because we are dealing with such confined spacing. The objective is to fit the flywheel and accessories in the bicycle.

3.4 Lightweight

The importance of having a light weight design is driven by the rider's desire to have a bicycle that is more manoeuvrable and more portable. This is also a direct trade off with how much energy can be stored in the flywheel.

3.5 Inexpensive and affordable

This product must be able to make a profit and be desirable.

3.6 Safe to user and environmentally friendly

Safety is always a very important aspect whenever there is a consumer product.

3.7 Economical

The product economical and the products for this design must be cheaply available.

3.8 Reliable

It is important to have a product that is reliable and this requirement will affect the normal bicycling process and must be easy to use.

3.9 Manufacturability

In order to make anything economical, it needs to be manufacturability, hence the important of having a product that can be made easily and cheaply.

3.10 Aesthetically pleasing

This is not a requirement that needs to be taken heavily, but the design should always have nice look about it, because looks will persuade the rider.

3.11 Modular

Having a device that can be adapted to existing bicycles is essential to be added to the existing ones so that it's easier to adopt. This also can reduce other types of manufacturing costs.

3.12 Should not hinder normal riding

To have a successful accessory for a bicycle, the ride should not feel a noticeable change in the riding performance or in the normal riding motion. A device that impedes the normal riding experience would be considered undesirable.

4. COMPONENT USED

4.1 Fly wheel:

The flywheel has to be bored centrally in order to place a ball bearing so that flywheel can rotate over the axle. Also flywheel has to be selected so that the selected weight does not affect the bicycle physics and riding performance of the rider.

(a) Cast iron flywheel weighing 4.2kg.

(b) Radius of the flywheel is 122mm with thickness of 16mm.

(c) Maximum torque of 69NM @ 3500 rpm.

4.2 Clutch:

A clutch has to be provided so as to control the power delivery and release from the flywheel. This can be achieved by providing a clutch plate that is linearly moved to and fro by applying a lever mechanism incorporated with a spring assembly for providing return mechanism. Linear clutch movements have to be made possible. For this purpose, two cylindrical rods can be used. One end of each rod was variably cut. This variable length is female part of another. One part of this is fixed near the frame side. This can be achieved by welding the part. Another part is made rotator. This part can be rotated by applying force on it from lever via cable. This moves only partially over fixed one and firstly this is hold in position by a spring arrangement. (a) Clutch plate of 10cm radius and thickness of 6mm is used.

4.3 Axle:

The axle has to be made so as to carry the flywheel and clutch units. The flywheel can be inserted after bearing is added to it and if variable diameter is provided on axle within mid-point the flywheel can be made to be inserted from one end and it automatically locks in the middle of the axle over which it rotates. Also the clutch units sequentially clutch plate and the fixed and moving rods along

with its mechanism can be mounted over the axle. An axel of 168mm length and 16mm diameter is used.

4.4 Sprocket:

Two sprockets have to be used. The gear ratio is to be taken in to account here. One sprocket with higher number of teeth (52 teeth) is to be selected and other having lesser number of teeth (13teeth). The larger sprocket is to be placed at the rear wheel end and smaller sprocket at the axle end. This is to ensure that we can provide larger flywheel rotations so that energy storage increases. The gear ratio of 1:4 is maintained.

4.5 Bearing:

The bearing will rest inside the flange and will be covered in oil. The purpose of the bearing is to take the torque load from the flange and not to transmit it to the end piece to allow for a successful clutch actuation. The bearing used for the bicycle belongs to 6200 series and they are single row, deep groove and Conrad type. Basic load rating is 2150lbs and is 1080lbs, basic load factor is 13.2, and limiting speed is 17000 rpm, bearing weight (approx.) 0.14lbs.

4.6 Steel pipe and U-clamp:

It is easy Steel pipe is produced by cold forming flat rolled steel into tubular shapes and electric-resistance welded into solid wall tubing. Controls during the cold forming to square or rectangular shapes prevent irregularities in structure or loss of physical properties across the weld area. Since it begins as a flat rolled product, the finished tube has a uniform wall thickness and equal strength throughout. to machine and fabricate, using all common machining and fabricating operations. It can be bent or drawn, flattened or flared, expanded or swaged, drilled or punched easily. It is easily mechanically joined or welded using all the commonly used practices. Because of ease of fabrication, and a surface suitable for painting or plating, Structural Steel Square and Rectangular tube has almost unlimited applications.

4.7 Roller chain:

All chains are classified according to pitch (the distance between centers of adjacent bearing pins), roller diameter and width between inner plates. Collectively, these dimensions are known as the gearing dimensions as they determine the form and width of the sprocket teeth.

5. FRAME MODIFICATION

The frame modification is the first part of the fabrication that has to be done. The frame has to be modified by adding steel tube of length 1m. The frame should have enough strength so as to carry the flywheel and the additional forces that comes to play. The modification should not hinder normal riding of the bicycle. Also the modified frame should have enough space in order to accommodate flywheel and clutch assemblies. The clutch lever is arranged to operate the clutch operation during the engaging and disengaging the flywheel rotation. The larger sprocket is fitted to the rear wheel to transmit the power to the flywheel and again recover it back. Chain of 1.2m length is used to transmit the power. This is shown in figure below.

(a) Frame width of 138mm.

(b) 3/4inch steel tube of 1m is used, weighing 0.7kg each.

(c) Radius of the wheel is 30cm.

6. KERS BICYCLE WORKING

A crank wheel connected to the rear wheels always rotates the clutch plate, connected in the flywheel axle. This is being achieved by using chain transmission at a specified gear ratio, crank to clutch sprocket helps us to increase the overall speed of flywheel. Now at a time when a speed reduction is required, clutch is applied which makes the contact between the clutch and flywheel. Then the flywheel starts rotating, also the speed of bicycle is decreased. Thus a regenerative braking system is achieved. On course energy is stored in flywheel. In case the brake has to be applied fully then after flywheel rotations clutch is disengaged and the brake is applied. Now when we again rides the bicycle during which we would apply clutches at this time as rear wheel rotation is lesser compared to fly wheel the energy gets transmitted from the flywheel to the wheels. Now also we can reduce the overall pedaling power required in course of overrides by having clutch fully engaged. Also situation arises such as traffic jam, down climbing a hill where we do not intend to apply brake fully. For such cases we can apply our smart braking system which would allow us to decelerate and allow us to boost acceleration after this during normal riding and distance that can be covered by pedaling can also improve. During normal rides situations may arise we need to reduce the speed without braking fully such as traffic jams, taking, turns etc. we can store the energy that would normally be wasted due to speed reduction by the application of clutch. When the clutch is engaged that time due to initial engage the flywheel rotation consumes energy which would result in speed reduction thus a braking effect. After some instances the energy is being stored in the flywheel this can be reused by the engage of clutch plate and energy transfer from the flywheel occurs whenever the rotation is high

enough to rotate rear wheel. Thus if sudden braking is applied then we can disengage the flywheel connections so that flywheel energy is not wasted and going to take ride the speed of rear wheel is null and hence engage would help in returning the energy from the flywheel to rear wheel. While riding downhill we always use braking for allowing slowdown. This is the best case where we can store maximum amount of energy in our flywheel. The flywheel can be engaged for full downhill ride and after all for some distance we need not ride the bicycle which would be done by the flywheel. This is the main advantage area of KERS bicycle.

7. WEIGHT AND PERFORMANCE

Normally energy stored in the flywheel is directly proportional to the weight and radius. Hence increase in weight proves to improve the performance. But as we know that the maximum safe weight that can be used is limited due to frame properties and rider compatibility. And also after some extent the radius can't be increased and the energy storage thus seems to be limited to some particular extend. This is also because of the fact that the total running speed is being reduced due to weight. Energy storage capacity increases with increase in weight but limitation seems to be the speed driving the flywheel. And performance of system is directly linked with the energy stored. Thus a graph can be plotted between performance and weight. Optimum value lies between 4 and 8 kg.

8. CONCLUSION

KERS system used in the vehicles satisfies the purpose of saving a part of the energy lost during braking. Also it can be operated at high temperature range and are efficient as compared to conventional braking system. KERS system has a wide scope for further development and the energy savings. The use of more efficient systems could lead to huge savings in the economy of any country. Here we are concluding that the topic KERS got a wide scope in engineering field to minimize the energy loss. As now a day's energy conservation is very necessary thing. Here we implemented KERS system in a bicycle with an engaging and disengaging clutch mechanism for gaining much more efficiency. As many mating parts is present large amount of friction loss is found in this system which can be improved. Boost is reduced because of friction

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Motorized Grass cutting machine

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Abstract

The automating lawn cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting without the need of any human interaction. The grass cutter and vehicle motors are interfaced to an 8051-family microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected. On obstacle detection the ultrasonic sensor monitors it and the microcontroller thus stops the grass cuter motor to avoid any damage to the object/human/animal whatever it is. Microcontroller then turns the robotic as long as it gets clear of the object and then moves the grass cutter in forward direction again.

Keywords: micro controller, lawn cutter, ultrasonic sensor, solar panel, motor drivers

I.INTRODUCTION

Grass cutter machines have become very popular today. Most common machines are used for soft grass furnishing. This project aims at developing the Grass cutter operation and construction. The main parts of the Grass cutting machines are DC motor of 75HP capacity, relay switch for controlling motor, Battery for charging it through solar panel. It is placed in a suitable machine structure. The motor have 18000 rpm and it is connected to the electric supply by the use of a roll of wire. The motor rpm increased by the help of gears. Motor controlled by an electric switch for easy operation. The tempered blades are attached in this machine. The raw materials mainly used are GI sheet, motor, switch, wheel, wire, aluminium sheet, square pipe, paint, insulating material and other standard item like nuts, bolts and reverts. The machines required for manufacturing includes welding machine, grinding machine etc. Working principle of the grass cutter is providing a high-speed rotation to the blade, which helps to cut the grass. The blade will get kinetic energy while increasing the rpm. The cutting edges are very smooth and accurate. Also Electric Grass Cutting Machines are much easier to be used in garden, lawn and grass fields. In order to enhance the beauty of home- lawns and gardens, Grass cutting machines are the best available option in the industry. With the help of a lawn mower which is a machine with revolving blades to help us cutting lawns at even length, people can easily maintain and beautify their lawns and gardens without any hassle. Now-a-days, there are plenty of options starting from the simplest push along mower to the most advanced electric grass cutting

machine. According to world energy report, we get around 80% of our energy from conventional fossil fuels like oil (36%), natural gas (21%) and coal (23%). It is well known that the time is not so far when all these sources will be completely exhausted. So, alternative sources should be used to avoid energy crisis in the nearby future. So introduce solar energy for the machine process to work. A solar panel is a large flat rectangle, typically somewhere between the size of a radiator and the size of a door, made up of many individual solar energy collectors called solar cells covered with a protective sheet of glass. The cells, each of which is about the size of an adult's palm, are usually octagonal and coloured bluish black. Just like the cells in a battery, the cells in a solar panel are designed to generate electricity; but where a battery's cells make electricity from chemicals, a solar panel's cells generate power by capturing sunlight instead. They are sometimes called photovoltaic cells because they use sunlight ("photo" comes from the Greek word for light) to make electricity (the word "voltaic" is a reference to electricity pioneer Alessandro Volta). As small engines became more powerful, a new type of lawn mower that could cut larger and longer swaths of grass became more popular. Instead of cutting grass like scissors cut paper as a reel mower does, the rotary mower spins a horizontal blade around fast enough to cut the grass as it hits it. The blade sits within a casing called a deck, which keeps the grass and other objects from flying in all directions when struck. Typically, the deck rides on four wheels, with a motor sitting on top of it and a bag attached to it to collect the cut grass. The basic version of a rotary mower has a handlebar attached to it that the operator stands

behind and pushes to make it move forward. Self-propelled versions have a transmission that turns the wheels using the power of the motor.

Solar Energy:

Solar energy is very large, inexhaustible source of energy. The power from the sun interrupted by earth is approximately 1.8/10MW, which are many thousands of times larger than the present consumption rate on the earth of all energy sources. The quantum of energy India's land area receive from sun is equivalent to 15,000 time sits consumption requirement (500 billion kWh) as projected for 2004. In addition to its size, solar energy has two other factors in its favor. Firstly, unlike fossil fuels and nuclear power, it is an environmentally clean source of energy. Secondly, it is free and available in adequate quantities in almost all parts of the world people live. But there are some problems associated with its. The real challenge in utilizing solar energy is of and economic concern. One has to strive for the development of cheaper methods of collection and storage so that large initial investments required at present in most applications are reduced, solar energy in India. A large amount of solar radiation fall on India and for most of the country very few days are without sunshine. India lies within the latitude of 7 N to and 37 N with annual average intensity of solar radiation as 500 to 600 cal/cm/day with more such insulations available in arid and semi-arid regions. Average solar radiation falling on India in arid and semiarid regions is 7.5 K w h/m/day. Solar energy 5× 10 K w

h/year potential to meet basic energy needs of teeming millions who live in rural India. Solar energy is an important, clean, cheap and abundantly available renewable energy. The sun radiates heat and light. The heat, light received from the sun supports the environment on the earth through the following well known natural effects

. - Temperature balance on the earth.

- Photo-synthesis by biological plants production of oxygen and organic materials, production of organic chemicals and bio-mass.

- Wind due to unequal heating of water, land surfaces.

- Heating of ocean water: ocean thermal energy (OTEC).

- Waves in ocean: ocean wave energy.

- Tides in ocean:

ocean tidal energy (due to gravitational forces) The sun produces enormous amount of energy of heat and light through sustained nuclear fusion reactions. The solar energy received on the earth in the form of radiation is used for heating and producing an electrical energy. Among the non-conventional sources of energy solar energy is the most promising. Hence our project is based on the solar energy conversion to mechanical energy to run a grass cutter.

II. LITERATURE SURVEY

The self- powered design objective is to come up with a mower that is portable, durable, easy to operate and maintain. It also aims to design a self-powered mower of electrical source; a cordless electric lawn mower. The heart of the machine is a battery-powered dc electric motor. It is also useful method for our lawn mower. It is similar to our lawn cutter using display[3].

For designing of Automatic Lawn Cutter, we referred various literature, papers etc. The review of previous method used to give below: In this lawn mower uses an solar based energy source, which is easier to use, more advantageous comparing to other energy source especially for gas based source of power. This is useful to our project [4].

In this hydrogen-based lawn mower, the advantage of powering a lawn mower by hydrogen rather than by gasoline is mainly ecological. We not used this for our lawn cutter because it is very old method and many overcome produced from this type lawn cutter [6].

III. BLOCK DIAGRAM

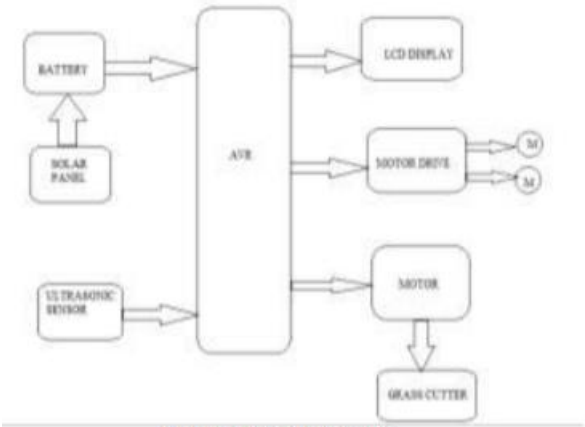

Fig. 3.1: Block diagram

Block Diagram Explanation:

Solar panel receives solar energy from the sun and it converts solar energy into electrical energy by photovoltaic principle. Electrical energy is then stored in the battery. The battery used here is rechargeable battery, the vehicle can be powered on either by using solar energy or by using external power supply. Here 12v supply is converted into 6v which is enough to power on and working of our lawn cutter. Ultrasonic sensor is the eyes of lawn cutter. It is a Tran's receiver, it will detect the obstacles present in front of it by receiving echo signals and take deviation until obstacles is cleared. The grass cutter and vehicle motors are interfaced to a microcontroller that controls the working of all the motors. That is when the obstacle is present the blade should stop rotate and after the obstacle clears the blade should rotate again. It should also take right deviation when obstacles is present so to take right deviation motor 1 should be made forward direction and motor 2 should be made reverse direction. 2*16 LCD display is used, initially it will display initialization message when we power on the vehicle soon after it will display protect title. Once it receives the signal from RF transmitter then vehicle starts moving in forward direction at that time the distance between sensor and obstacle is calculated and that value is displayed using LCD display.

The RF module as the name suggests operates at radio frequency. The corresponding frequency range varies 30khz and 300Ghz. The digital data is represented as variation in the amplitude of carrier wave, this kind of modulation is known as amplitude shift keying. The transmitter or receiver pair operated at a frequency of 434Mhz. an RF transmitter receiver serial data and transmits it wireless through RF through its antenna connected at pin number 4. The transmission occurs at the rate of 1Kbps-10Kbps. The transmitted data is receive by an RF receiver operating at the same frequency as that of the transmitter. The RF module is often used along with a pair of encoder/decoder; the encoder is used for encoding parallel data for transmission feed, while reception is decoded by a decoder.

Transformer – steps down high voltage AC mains to low voltage AC. Rectifier- converts AC to DC but the DC output is varying. Smoothing- smoothness the DC from varying greatly to a small ripple. Regulator- eliminates ripple by setting DC output to a fixed voltage

IV. RESULTS

We are successfully completed this project that is automatic lawn cutter. The robotic vehicle will mow in forward direction automatically to cut the grass uniformly and also calculate the distance of obstacle. If any obstacle is present, it takes deviation towards right direction. After the obstacle is cleared the vehicle moves forward direction automatically to cut the grass.



V. CONCLUSION

This lawn mower will meet the challenge of environmental production and low cost of operation since there is no cost for fueling. A lawn mower has been developed for the use of residences and establishments that have lawns where tractor driven mowers could not be used. The machine's capacity is adequate for its purpose. The machine has proved to be a possible replacement for the gasoline powered lawn mowers. We are developed "Automatic Lawn Cutter" by using keypad and LCD display and for this we are using battery hence it works Automatically.

VI. FUTURE SCOPE

In future we can implement lawn cutter by specifying the area that is to be mown and also the height of grass as per the requirement.

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MULTI-PURPOSE MACHINE

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Abstract –

This Thesis deals with development and fabrication of "MULTI PURPOSE MACHINE". This machine is designed for the purpose of multi operations i.e. drilling, hacksaw cutting and shaping operations. This machine performs multipurpose operations at the same time with required speed and this machine is automatic which is controlled or operated by motor which is run with help of current. This machine is based on the Scotch Yoke Mechanism. This model of the multi operational machine may be used in industries and domestic operations, which can perform mechanical operations like drilling, cutting and shaping of a thin metallic as well as wooden model or body.

Keywords - Multipurpose Machine, Scotch Yoke Mechanism

I. INTRODUCTION

Multi-purpose machine as a research area is motivated by questions that arise in industrial manufacturing, production planning, and computer control. Consider a large automotive garage with specialized shops. A car may require the following work: replace exhaust system, align wheels, and tune up. These three tasks may be carried out in any order. However, since the exhaust system, alignment, and tune-up shops are in different buildings, it is impossible to perform two tasks for a car simultaneously. When there are many cars requiring services at the three shops, it is desirable to construct a service schedule that takes the least amount of total time.

1.1 SCOTCH YOKE MECHANISM

The Scotch yoke is a mechanism for converting the linear motion of a slider into rotational motion or vice-versa. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part. The shape of the motion of the piston is a pure sine wave over time given a constant rotational speed.

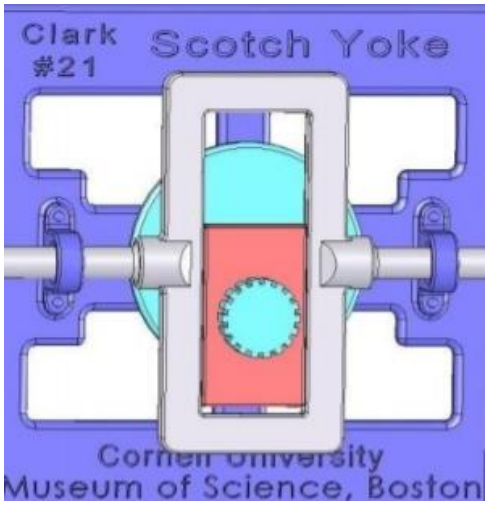

Figure 1: scotch yoke mechanism representation

1.2 CONSTRUCTION

The scotch yoke mechanism is constructed with iron bars. Here the crank is made of some length and the yoke is also made using the same material. It is noted that the minimum length of the yoke should be double the length of the crank. The crank and yoke is connected with a pin. Iron bars are welded to both sides of the yoke to get the reciprocating motion. The yoke with the iron bars is fixed on the display board with the help of c clamp. Now the crank is welded to the end of the shaft of the motor. Now the pin on the crank is connected to the yoke. The pin used to connect yoke and crank is a bolt.

1.3 WORKING PRINCIPLE

When the power is supplied to the 12v Dc motor, shaft and crank attached to the shaft start rotating. As the crank rotates the pin slides inside the yoke and also moves the yoke forward. When the crank rotates through in clockwise direction the yoke will get a displacement in the forward direction. The maximum displacement will be equal to the length of the crank. When the crank completes the next of rotation the yoke comes back to its initial position. For the next of rotation, yoke moves in the backward direction. When the crank completes a full rotation, the yoke moves back to the initial position. For a complete rotation of crank the yoke moves through a length equal to double the length of the crank. The displacement of the yoke can be controlled by varying the length of the crank.

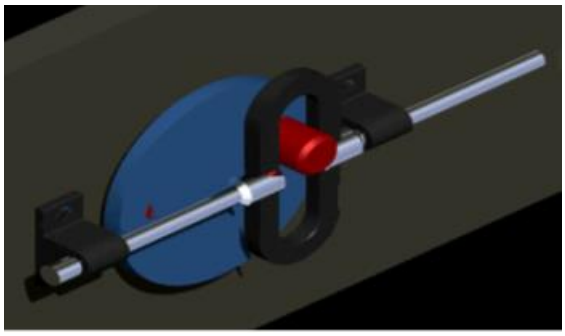

Figure 2: working of the mechanism

1.4 RADIAL ARM DRILL PRESS

A radial arm drill press is a large geared head drill press in which the head can be moved along an arm that radiates from the machine's column. As it is possible to swing the arm relative to the machine's base, a radial arm drill press is able to operate over a large area without having to reposition the workpiece. This saves considerable time because it is much faster to reposition the drill head than it is to unclamp, move, and then re-clamp the workpiece to the table. The size of work that can be handled may be considerable, as the arm can swing out of the way of the table, allowing an overhead crane or derrick to place a bulky workpiece on the table or base. A vise may be used with a radial arm drill press, but more often the workpiece is secured directly to the table or base, or is held in a fixture. Power spindle feed is nearly universal with these machines and coolant systems are common. Larger size machines often have power feed motors for elevating or moving the arm. The biggest radial arm drill presses are able to drill holes as large as four inches (101.6 millimetres) diameter in solid steel or cast iron. Radial arm drills are specified by the diameter of the column and the length of the arm. The length of the arm is usually the same as the maximum throat distance. The Radial Arm Drill pictured in this article is a 9-inch column x 3-foot arm. The maximum throat distance of this drill would be approximately 36", giving a swing of 72" (6 feet).



Figure 3: Radial arm drill press

1.5 HACKSAW

Hand-held hacksaws consist of a metal arch with a handle, usually a pistol grip, with pins for attaching a narrow disposable blade. Ascrew or other mechanism is used to put the thin blade under tension.The blade can be mounted with the teeth acing toward or away from the handle,resulting in

cutting action on either the push or pull stroke. On the push stroke, the arch willflex slightly, decreasing the tension on the blade, often resulting in an increased tendency of the blade to buckle and crack. Cutting on the pull stroke increases the blade tension and willresult in greater control of the cut and longer blade life A hacksaw is a fine-tooth saw with a blade under tension in a frame, used for cuttingmaterials Such as metal. Hand-held hacksaws consist of a metal frame with a handle, and pins for attaching a narrow disposable blade. A screw or other mechanism is used to put thethin blade under tension. A power hacksaw (or electric hacksaw) is a type of hacksaw that is powered by electric motor. Most power hacksaws are stationary machines but some portablemodels do exist. Stationary models usually have a mechanism to lift up the saw blade on thereturn stroke and some have a coolant pump to prevent the saw blade from overheating.



Figure 4: hacksaw

II. LITERATURE SURVEY

We have done a survey regarding cutting, shaping and drilling machines, from that we came to know that these machines can perform only single operation at a time so that we found a problem in that machine that we cannot perform all three operation in single machine. From this survey only we got an idea to develop a multi-purpose machine. In this survey we had met with few machines and the operators who operate those machines. The machines are namely cutting machine, shaping machine and drilling machine. By seeing those three different machines, we noticed that they occur a huge space for their working. And those three machines are operated with skilled workers. We have done a survey with those workers who operate those machines. From their words we came to know that these three different machines need three different types DC motors of different volts for their working. And they said these machines also need high maintenance and manpower. From the data details which we gathered from the people who deals with this drilling machine, shaping machine and cutting machine we came to a point that the operation of these three different machines are usually carried out individually and it requires three different motors for their functioning. Theseoperations are also required of skilled operators and more man power.



Figure 5: shaping machine:

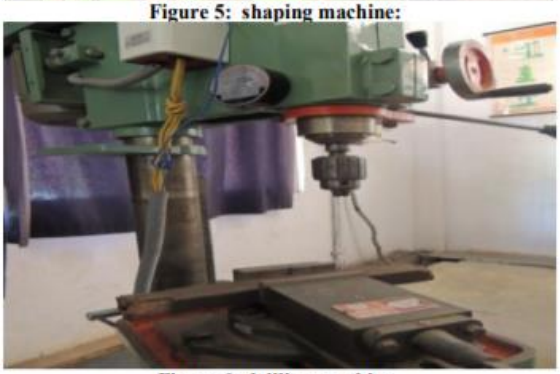

Figure 6: drilling machine

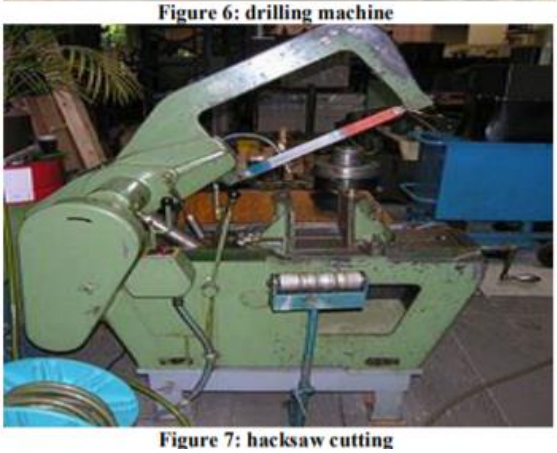

Figure 7: hacksaw cutting

The above three figures (Fig 5, Fig 6, Fig 7) shows shaping machine, drilling machine and cutting machine respectively. To make the working operations easier we planned to assemble these three different machines in to a single machine. This assembled machine can be called as a multipurpose machine, in which we can do all three operations like cutting, drilling and shaping at a same time from a single DC motor. The use of multipurpose machine makes the work easier and reduces the manpower. It can also be automated and the speed can be regulated.

III. PROBLEM DEFINITION

3.1 PROBLEM STATEMENT:

To design and development of MULTI PURPOSE MACHINE, a structured which is designed for the purpose of MULTI-OPERATIONs i.e., DRILLING, CUTTING & SHAPING.

3.2 PROBLEM IDENTIFICATION:

This machine perform multipurpose operation at same time with required speed & this machine is automatic which is controlled or operated by motor which is run with the help of current. This machine is based on the Scotch Yoke mechanism. This model of the multi-purpose machine may be used in industries and domestic operation which can perform mechanical operation like drilling, cutting & shaping of a thin metallic as well as wooden model or body.

IV. METHOD OF DEVELOPING MULTI PURPOSE MACHINE

4.1 CONCEPT 1

In the very first concept the use of crank and slot mechanism which was not effective as it doesn't give complete rotation and the length of the stroke is also less, which won't be much enough to cut or shape when a work piece of higher dimensions are used. Thus use of crank and slot mechanism was not useful for this machine so we denied the use of it.

4.2 CONCEPT 2

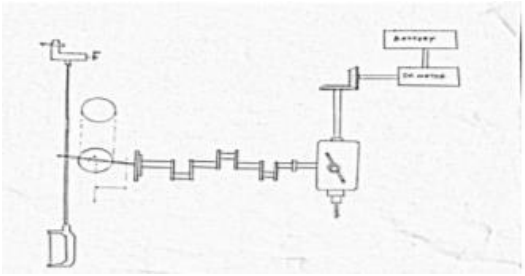

Figure 8: concept 2 In

the second concept we changed the crank and slot mechanism to Scotch Yoke Mechanism, which gives complete rotation and sufficient stroke length to preform our operation, and we have used crank shaft to transmitte power D.C motor to shaper and cutting machine.

4.3 CONCEPT 3

In the third concept we changed crank shaft to simple shaft again, as the crank shaft does not give proper allignment and creates more vibration to the system. Use of simple shaft has helped us to reduce the vibration of the complete device to its half.

4.4 BLOCK DIAGRAM

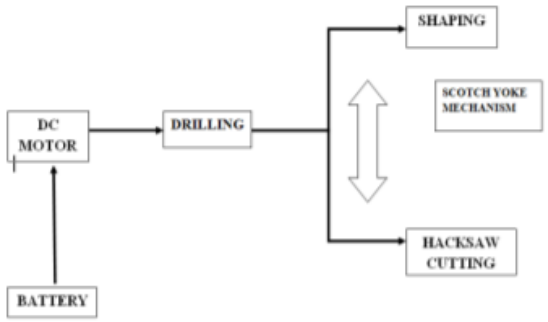

Figure 9: block diagram of multi-purpose machine

From the block diagram we can see that a DC motor is connected to a battery, with the help of this battery the DC motor is rotated. The bevel gear which is attached to the motor also starts rotating. And when the bevel gear rotates the drilling machine which is connected to it starts to work. From the drilling machine a shaft is connected to the cam mechanism which is used to reciprocate the cutting and shaping machine. V.

2D DIAGRAM OF MULTIPURPOSE MACHINE

2D computer graphics is the computer-based generation of digital images—mostly from two-dimensional models (such as 2D geometric models, text, and digital images) and by techniques specific to them. The word may stand for the branch of computer science that comprises such techniques, or for the models themselves. 2D computer graphics are mainly used in applications that were originally developed upon traditional printing and drawing technologies such astypography, cartography, technical drawing, advertising, etc. In those applications, the two-dimensional image is not just a representation of a real-world object, but an independent artifact with added semantic value; two-dimensional models are therefore preferred, because they give more direct control of the image than 3D computer graphics (whose approach is more akin to photography than to typography). In many domains, such as desktop publishing, engineering, and business, a description of a document based on 2D computer graphics techniques can be much smaller than the corresponding digital image—often by a factor of 1/1000 or more. This representation is also more flexible since it can be rendered at different resolutions to suit different output devices. For these reasons, documents and illustrations are often stored or transmitted as 2D graphic files. 2D computer graphics started in the 1950s, based on vector graphics devices. These were largely supplanted by raster-based devices in the following decades. The PostScript language and the X Window System protocol were landmark developments in the field.

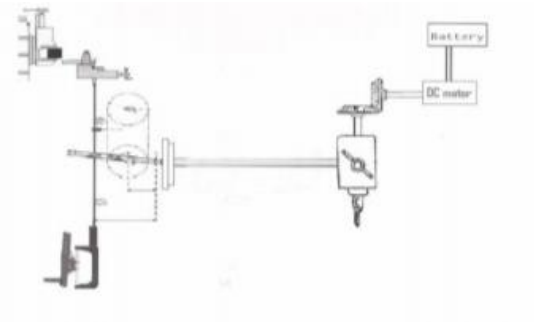

Figure 10: 2D view

5.1 3D DESIGN OF MULTIPURPOSE MACHINE

3D modeling is the process of developing a mathematical representation of any threedimensional surface of object (either inanimate or living) via specialized software. The product is called a 3D model. It can be displayed as a two-dimensional image through a process called 3D rendering or used in a computer simulation of physical phenomena. The model can also be physically created using 3D printing devices. Models may be created automatically or manually. The manual modeling process of preparing geometric data for 3D computer graphics is similar to plastic arts such as sculpting. New concepts in 3D modeling have started to emerge such as curve-controlled modeling that emphasizes the modeling of the movement of a 3D object instead of the traditional modeling of the static shape. 3D modeling software is a class of 3D computer graphics software used to produce 3D models. Individual programs of this class are called modelling applications or modellers.

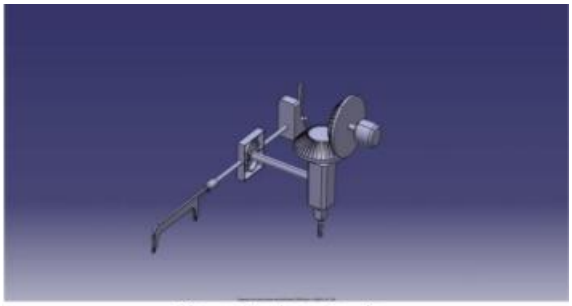

Figure 11: Angular view

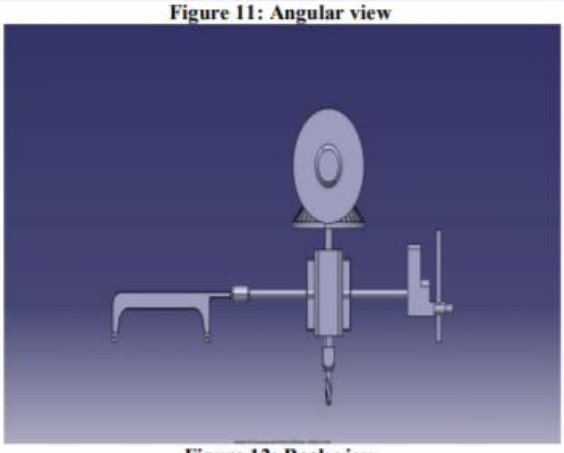

Figure 12: Back view

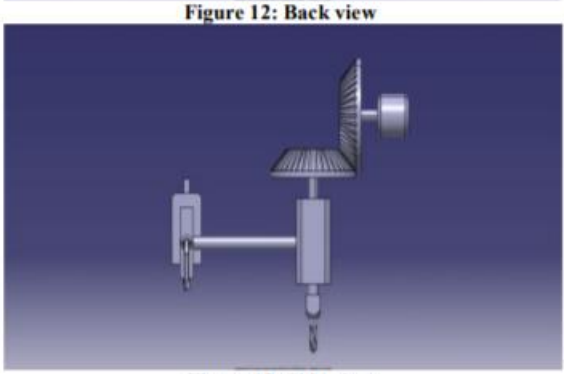

Figure 13: Side view

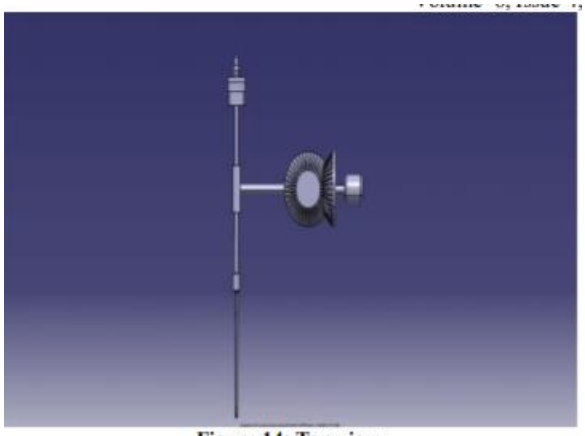

Figure 14: Top view

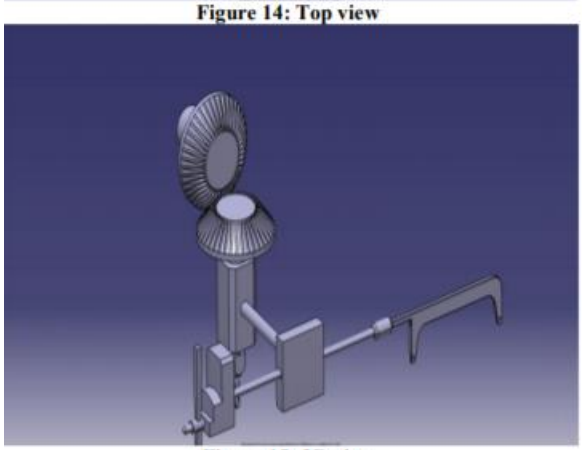

Figure 15: 3D view

Fabrication is a value added process that involves the construction of machines and structures from various raw materials. A fab shop will bid on a job, usually based on the engineering drawings, and if awarded the contract will build the product. Large fab shops will employ a multitude of value added processes in one plant or facility. These large fab shops offer additional value to their customers by limiting the need for purchasing personnel to locate multiple vendors for different services. The raw material has to be cut to size. This is done with a variety of tools. The most common way to cut material is by Shearing (metalworking); Special band saws designed for cutting metal have hardened blades and a feed mechanism for even cutting. Abrasive cut-off saws, also known as chop saws, are similar to miter saws but with a steel cutting abrasive disk. Cutting torches can cut very large sections of steel with little effort. Burn tables are CNC cutting torches, usually natural gas powered. Plasma and laser cutting tables, and Water jet cutters, are also common. Plate steel is loaded on a table and the parts are cut out as programmed. The support table is made of a grid of bars that can be replaced. Some very expensive burn tables also include CNC punch capability, with a carousel of different punches and taps. Fabrication of structural steel by plasma and laser cutting introduces robots to move the cutting head in three dimensions around the material to be cut. Machining is a trade, in and of itself, although Fab shops will generally entail a limited machining capability including; metal lathes, mills, magnetic based drills along with other portable metal working tools After the weldment has

cooled it is generally sand blasted, primed and painted. Any additional manufacturing specified by the customer is then completed. The finished product is then inspected and shipped.



Figure 16: Unassembled bevel gear arrangement for drilling process



Figure 17: Bevel gear arrangement and drilling machine



Figure 18: Slot during welding

CONCLUSION

Multi operations are performed at same time. our machine is used in return stroke mechanism also. All operations are performed in single motor. Size is compact therefore it requires less space. It is time saving. Less man power is required.Low manufacturing and maintenance cost. The operations which are discussed like cutting, shaping and drilling are usually carried individually and it requires

three different motors for their functioning. These operations are also required of skilled operators and more man power. The machine which we designed here can perform multi operations i.e.; drilling, hacksaw cutting and shaping operations simultaneously at same time with a single motor.Use of simple shaft has helped us to reduce the vibration of the complete device to its half.

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PNEUMATIC AUTO FEED DRILLING MACHINE

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Abstract:

Today most of the industries are trying to make improvement in their production processes as well as relevant machinery to improve the productivity along with the automation. Drilling, taping, boring etc. are such operations which are most frequently used in small and large scale industries. Most of the industries uses the conventional method says hand tapping, drilling, boring. This conventional method is very time consuming process, less accurate and includes higher labour cost, and ultimately leads to less productivity. So there is a scope to develop the machine for various operation which would overcome all the problems faced by the conventional process. So we are going to develop the portable pneumatics machine which will make the use of compressed air for it operation less human involvement as which is used in hand tapping, drilling, boring. Key words: Pneumatic gun, Universal, Drilling

INTRODUCTION

We had chosen the user defined project (UDP) for our final year project. We are decided our topic to develop the automatic multi-operational portable machine say like tapping, drilling, grinding, reaming, and other relative operation. This will make use of compressed air (pneumatic mechanism) for its operation. We will trying to develop the portable machine which will easily handle and cover a maximum working area from one station and make it more flexible to working easily. As a small industries the machine and operation method use for drilling, tapping and other similar process is not economically and eco friendly. As we know that drilling machine use the electricity as there power source these machine have many limitation like it is not flexible and not moveable, consume more floor area and main problem is that it need continuous electricity which increase the cost of production. The tapping operations are performed by use of convention tap or hand tap. during operation it is necessary with a hand tap to periodically reverse rotation to break the chip formed during the cutting process, thus preventing effect called crowding that may cause defect. In convention method, main problem causes during the tapping operation for big job industries and complex job these causes are created defect on tap tool, increasing operational lead time, inaccuracy of thread geometry, more production cost and more labour cost.

II. WORKING PROCEDURE

Pneumatic multi-operation machine makes use of compressed air obtained from compressor passes through pressure regulator & then passes through pneumatic gun. In pneumatic gun air exerts a axial

spinning force on the spindle located inside the tool head which causes the drill tool to rotate inside the work piece with required RPM.

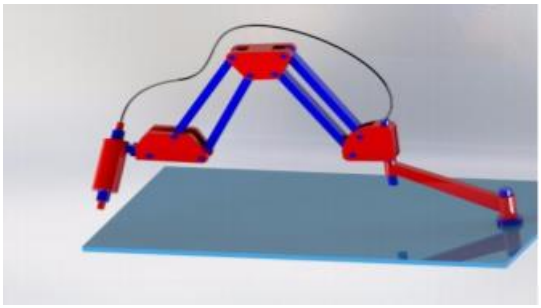

Fig. 1: Concept Design

III. METHODOLOGY

A. Step 1: Part collection After some survey from market finally we bought pneumatic gun, pressure regulator, pipes, wheels for table & adaptor at the reasonable price.



Fig 2: Pneumatic Gun



Fig 3: Pressure Regulator



fig 3: Connecting pipe

B. Step 2: Define Joints We defined joints which are used for relative motion of arms & also to rotate gun in 360 degree. We designed mainly three types of joints such as ball joints, pin joints & rotational top head. We can switch to an automation by using servo motor in the defined joints for future scope.



Fig 4: Joints

C. Step 3: Design arms or linkages We made arms or linkages having material of mild steel with help of fabricator. We can use telescopic arms to extend the work envelope of pneumatic drilling machine for future scope.

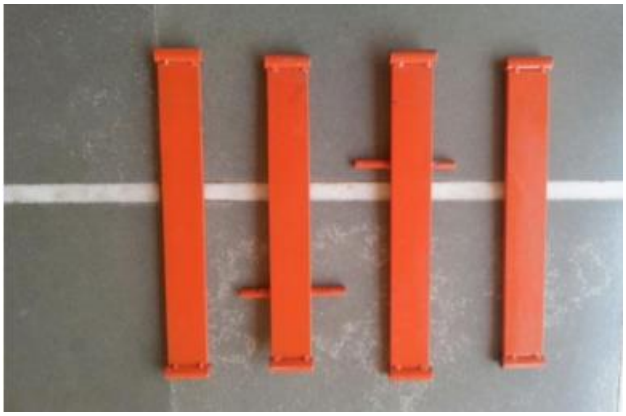

Fig 5: Arms or linkages

D. Step 4: Fabrication of table We made supporting table to sustain the load of pneumatic drilling machine by mounting it on the table. We provide wheels to the table to provide the portability to the machine.



Fig 6: Supporting table

E. Step 5: Assembling of component After collection & designing of all parts we go for the final assemble to give the final touch to our machine. Finally we assembled all the components in the one single unit and made universal drilling machine to justify our project title "DESIGN & DEVELOPMENT OF UNIVERSAL PNEUMATIC DRILLNG MACHINE".



Fig 7: Partial Assembling



Fig 8: Final assembly

F. Step 6: Fabrication of table We did some experiment by drilling the material as wood, aluminium & cast iron using the appropriate tool & air pressure. The experiments in the image shows the drilling of the workpiece. The other operation such as tapping, boring, grinding, thread cutting can also Performed by our machine.

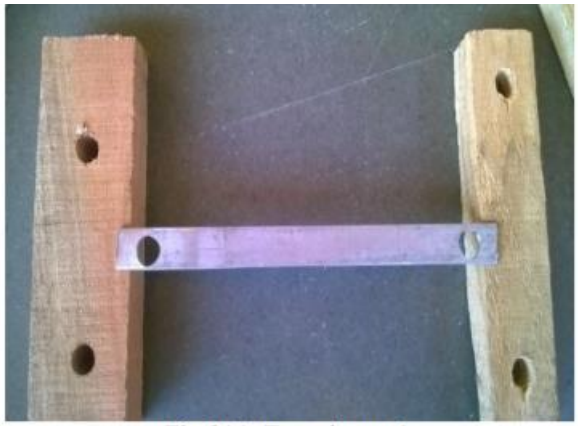

Fig 9(a): Experiment 1

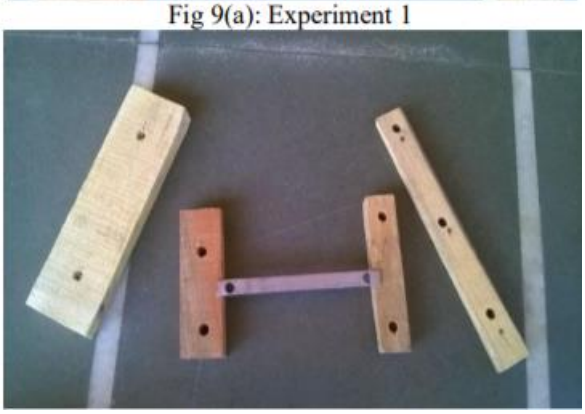

Fig 9(b): Experiment 2

V.FUTURE SCOPE

a use servo motor in our machine to provide the automation by giving auto feed.

- We can use telescoping arm to increase the working envelope of the machine to reach in any direction easily.
- We can use hydraulic system or hydraulic lubrication to operate the machine in smooth manner without including the less fatigue of man power.

VI. CONCLUSION & SUMMARY

- Due to the various problems faced by conventional operation processes such as Poor thread finish, more time consumption, frequent tool breakage and many more. So, we have decided to design the machine which will make use of compressed air as a power source.
- Above is the Future model of pneumatic machine on which the tapping ,drilling, boring etc operation is achieved by Pneumatic system and it eliminates all the problem faced by conventional operation process.
- This pneumatic multi-operation Machine is to be presented for increasing their productivity as well as quality of job. It also gives the detailed description of machine mechanism and their different main

parts of machine. In this we are defining different process parameters like spindle speed (rpm), cutting feed rate, cutting force, torque and power for their efficient working of operation.

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Quick Lifting Jack with Gear Arrangement

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Abstract

This project work titled **"**FABRICATION OF QUICK LIFTING JACK WITH GEAR ARRANGEMENT**"** has been conceived having studied the difficulty in lifting the any type of light vehicles. Our survey in the regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in lifting the vehicles for reconditioning. Now the project has mainly concentrated on this difficulty, and hence a suitable device has been designed. Such that the vehicle can be lifted from the floor land without application of any impact force. The fabrication part of it has been considered with almost case for its simplicity and economy, such that this can be accommodated as one of the essential tools on automobile garages.

Keywords: frame, Handle, lifting rod.

INTRODUCTION

This device the quick lifting jack with gear arrangement for automobile garages has been developed to later the needs of small and medium automobile garages, who are normally man powered with very minimum of skilled labors. In most of the garages the vehicles are lifted by using screw jack. This needs high man power and skilled labours. In order to avoid all such disadvantages. This, motorized hydraulic jack has been designed in such a way that it can be used to lift the vehicle very smoothly without any impact force. The operation is made be simple that even an unskilled labour can handled, by just demonstrating the working of the motorized hydraulic jack once.

Literature Review

Screw type mechanical jacks were very common for jeeps and trucks of World War II vintage. For example, the World War II jeeps (Willys MB and Ford GPW) were issued the "Jack, Automobile, Screw type, Capacity 1 1/2 ton", Ordnance part number 41-J-66. This jacks, and similar jacks for trucks, were activated by using the lug wrench as a handle for the jack's ratchet action of the jack. The 41-J-66 jack was carried in the jeep's tool compartment. Screw type jack's continued in use for small capacity requirements due to low cost of production raise or lower it. A control tab is marked up/down and its position determines the direction of movement and almost no maintenance. The virtues of using a screw as a machine, essentially an inclined plane wound round a cylinder, was first

demonstrated by Archimedes in 200BC with his device used for pumping water. There is evidence of the use of screws in the Ancient Roman world but it was the great Leonardo ad Vinci, in the late 1400s, who first demonstrated the use of a screw jack for lifting loads. Leonardo‟s design used a threaded worm gear, supported on bearings, that rotated by the turning of a worm shaft to drive a lifting screw to move the load - instantly recognizable as the principle we use today. We can't be sure of the intended application of his invention, but it seems to have been relegated to the history books, along with the helicopter and tank, for almost four centuries. It is not until the late 1800s that we have evidence of the product being developed further. With the industrial revolution of the late 18th and 19th centuries came the first use of screws in machine tools, via English inventors such as John Wilkinson and Henry Medley The most notable inventor in mechanical engineering from the early 1800s was undoubtedly the mechanical genius Joseph Whitworth, who recognized the need for precision had become as important in industry as the provision of power. While he would eventually have over 60 British patents with titles ranging from knitting machines to rifles, it was Whitworth's work on screw cutting machines, accurate measuring instruments and standards covering the angle and pitch of screw threads that would most influence our industry today. Whitworth's tools had become internationally famous for their precision and quality and dominated the market from the 1850s. Inspired young engineers began to put Whitworth's machine tools to new uses. During the early 1880s in Coaticook, a small town near Quebec, a 24- year-old inventor named Frank Henry Sleeper designed a lifting jack. Like ad Vinci's jack, it was a technological innovation because it was based on the principle of the ball bearing for supporting a load and transferred rotary motion, through gearing and a screw, into linear motion for moving the load. The device was efficient, reliable and easy to operate. It was used in the construction of bridges, but mostly by the railroad industry, where it was able to lift locomotives and railway cars. Local Coati cook industrialist, Arthur Osmoses Norton, spotted the potential for Sleeper's design and in 1886 hired the young man and purchased the patent. The Norton‟ jack was born. Over the coming years the famous "Norton" jacks were manufactured at plants in Boston, Coati cook and Moline, Illinois. Meanwhile, in Alleghany County near Pittsburgh in 1883, an enterprising Mississippi river boat captain named Josiah Barrett had an idea for a ratchet jack that would pull barges together to form a „tow‟. The idea was based on the familiar lever and fulcrum principle and he needed someone to manufacture it.

That person was Samuel Duff, proprietor of a local machine shop, together, they created the Duff Manufacturing Company, which by 1890 had developed new applications for the original "Barrett Jack" and extended the product line to seven models in varying capacities. Over the next 30 years the Duff Manufacturing Company became the largest manufacturer of lifting jacks in the world, developing many new types of jack for various applications including its own version of the ball bearing screw jack [3].

It was only natural that in 1928, The Duff Manufacturing Company Inc. merged with A.O. Norton to create the Duff-Norton Manufacturing Company. Both companies had offered manually operated screw jacks but the first new product manufactured under the joint venture was the air motor-operated power jack that appeared in 1929. With the aid of the relatively new portable compressor technology, users now could move and position loads without manual effort. The jack, used predominantly in the railway industry, incorporated an air motor manufactured by The Chicago Pneumatic Tool.

MAIN COMPONENTS

- FRAME
- BEVEL GEARS
- HANDLE
- LIFTING ROD
- BEARING

WORKING PRINCIPLE

The quick lift jack is a device used for lifting heavy loads by the application of much smaller force. The working principle of a quick lift jack may be explained with the help of Fig. Consider a two bevel gears arrangement.

Quick lift jacks and much other technological advancement such as automobile brakes and dental chairs work. Handle is used to rotates the bevel gear arrangements. Jack arrangement i.e. lifting rod will be fixed to bevel gear. Clockwise rotation of handle, jack will rotates upward motion and anti clockwise rotation of handle, jack will rotates downward motion.

ADVANTAGES

•Quicklift ofvehicles.
•Lowmanpowerusing.
•Low-cost automation.
•Maintenance cost is verylow.
•Easytoinstall
• Less in weight

APPLICATIONS

• Implementation in automobiles.
• Lifting four-wheeler vehicles.
• Implementing in industries for lifting machines

Conclusion

In this research, a novel design for a lifting jack driven by a quick-return crank mechanismand gear drive has been designed and fabricated. The design equations for gear selection, gear driveratios and mechanism forces have been derived from its geometry. Kinematic analysis has beenperformed. A design example has been given for illustrating the design process. The detailedworking diagram has been explicitly explained equally. To verify the feasibility and accuracy, aprototype has been made, and then an experiment has been conducted. The proposed mechanism iscapable of increasing capacity; reducing input effort; saving cost of operation and requires simplemaintenance compared to conventional lever lift mechanisms of lifting jacks. The experimentalresult shows that Very little effort (5.280N minimum and 102.76N maximum) and torque (0.597Nmand 51.38Nm maximum) is required to lift a load using the modified screw jack compared with theclassical method which requires effort of 127.4N and torque of 135.04Nm. Also, the time requiredto lift a car using the modified method is lesser (2.025s) compared to the time required to lift sameweight of car using the traditional method (4.094s). Conclusively, the modified design provides agood alternative to the lever lift mechanism as other existing conventional lifting jacks require moreeffort, capacity, power generating sources and maintenance cost. The proposed quick lifting jackprototype was made up of a gear drive and a quick-return crank mechanism.

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RF Based farmer friendly Agricultural Robot with motorized shovel control System with automatic seed dispensing system

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ABSTRACT:

This paper strives to develop a robot capable of performing operations like automatic ploughing, seed dispensing. It also provides manual control when required and keeps tabs on the humidity with the help of humidity sensors. The main component here is the AVR Atmega microcontroller that supervises the entire process. Initially the robot tills the entire field and proceeds to ploughing, simultaneously dispensing seeds side by side. The device used for navigation is an ultrasonic sensor which continuously sends data to the microcontroller. On the field the robot operates on automated mode, but outside the field is strictly operated in manual mode. For manual control the robot uses the Bluetooth pairing app as control device and helps in the navigation of the robot outside the field. The field is fitted with humidity sensors placed at various spots that continuously monitor the environment for humidity levels. It checks these levels with the set point for humidity and alerts the farmer. The alerting mechanism is GSM module that sends a text message to the farmer informing him about the breach in set point. The farmer then responds via SMS to either switch on the water sprinklers or ignore the alert. The water sprinklers, if on, bring down the humidity level thus providing an ideal growing environment to crop.

KEYWORDS: Movement, Agricultural robot, Arduino, Robot Architecture.

1.INTRODUCTION The project implements different parts of seed sewing machine which will be useful for the cultivation business to move towards automation. The farming business has dependably been the establishment of India's supported development. As the number of inhabitants in India keeps on developing, the interest for deliver develops also. Subsequently, there is a more prominent requirement for different editing on the ranches and this along these lines requires effective and high-limit machines. Motorization of the Agricultural business in India is still in a phase of earliest stages because of the absence of learning and the inaccessibility of cutting edge instruments and hardware. In conventional methodologies seed sowing is done by conveying physically, opening wrinkles by a furrow and dropping seeds by hand. The system is utilized for sensing, monitoring, controlling and for communication purpose. The System block diagram shown in fig 1.Different sensors are used to detect the various parameters of the soil like moisture. Depending upon the sensors output the Microcontroller will take the necessary action. The moisture sensor output will help to determine

whether to irrigate the land or not depending upon the moisture content. Along with moisture sensor the temperature sensor output can also be taken into consideration while irrigating the land. If the moisture content of soil is very low and the temperature is very high then there is need of irrigation for plants, but the time for which irrigation will be provided is different for different temperature range.

II. Proposed system

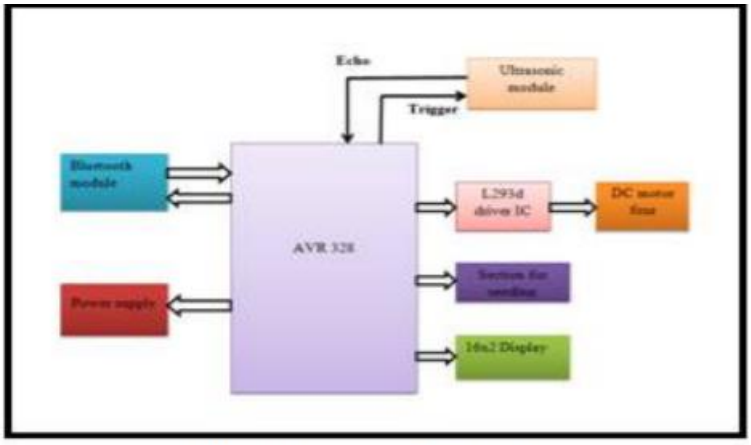
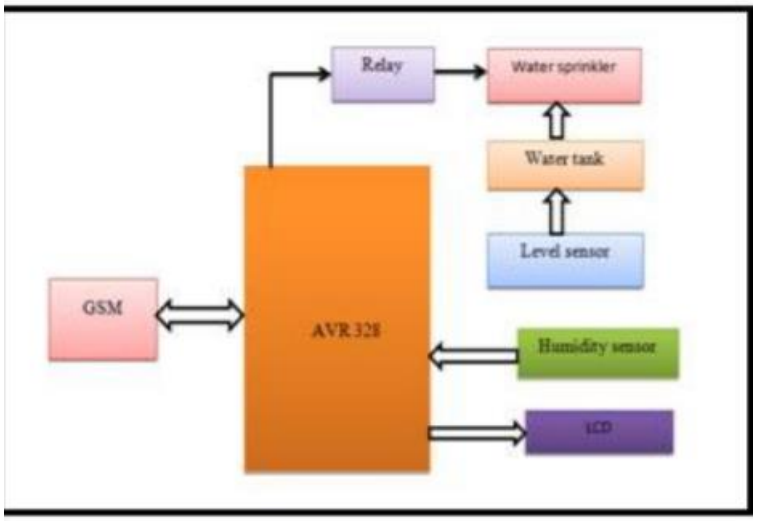


Fig.1.Block diagram of Robot Section



A. Block Diagram Explanation:

2.1 Field Section

1) AVR Microcontroller:

The AVR has Harvard Architecture where program and data memory are separately placed with an 8-bit RISC single chip microcontroller. It is the heart of the agricultural robot here. It is one of the first microcontroller families to use on-chip flash memory for program storage while other controllers used programmable ROM, EPROM or EEPROM. RISC-Reduced Instruction Set Computing, this is a CPU designed strategy based on the insight that simplified instruction can provide higher performance. AVR is most appropriate for battery powered appliances. The main advantages of using this ATmega32 are its 8-bit high performance with low power consumption and that it is based on enhanced RISC architecture with 131 powerful instructions of which most of the instructions execute in one machine cycle.

2) Ultrasonic Sensor:

This is the HC-SR04 ultrasonic ranging sensor. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-SR04 module includes an ultrasonic transmitter, a receiver and a control circuit. There are only four pins that you need to worry about on the HCSR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground).

3) Motor Driver IC (L293D):

L293D is a dual H-bridge motor driver, i.e. by using one IC we can control two DC Motors in both clock wise and counter clockwise directions. The L293D can provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. IC is designed to drive inductive loads such as dc motors, bipolar stepping motors, relays and solenoids as well as other high-current or high-voltage loads in positive-supply Applications. The main purpose is for driving purpose.

4) DC motor:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances.

5) Relay: The electromechanical relay is an output device which comes in whole host of shapes size and design and has many uses and application in electronic circuits. In this project the relay switch has a coil which is driven by the npn transistor. The coil of the relay switch gets energized due to the

collector current of the transistor according to that switch gets on and off to control the water sprinkler.

6) Humidity Sensor: Humidity is defined as the presence of water in air. The amount of water vapour in air can affect human comfort as well as many manufacturing processes in industries. The presence of water vapour influences various physical, chemical and biological processes. In agriculture, measurement of humidity is important for plantation protection, dew prevention, soil moisture monitoring etc.

7) Bluetooth Module

Here Bluetooth is used as a basic universal Remote control for Bluetooth enabled serial devices such as Bluetooth modules connected to the microcontroller. It is a short-range wireless networking technology and is used to link (or pair) two devices, such as smart phones and headsets, cameras and printer Ms, and keyboards and computers, it is sometimes called a cable-replacement technology. Both devices must support Bluetooth in order to be paired, if they do, though paring the paring is designed to happen automatically, with little to no user interaction. The Bluetooth module used here is a HC-05 based on SPP support. HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. In our idea we have made use of blue tooth Control App available on Android as controlling software more like a remote control for the manual operation of the robot.

2.2 Seeding Section

The robot has to plant the seeds after every 10cm; it will have to stop after every 10cm. This can be done by turning off the dc motors. Once the robot stops the mechanism attached to the robot will be used for planting the seeds. This mechanism consists of a funnel containing the respective seeds which will be clamped to a hinge attached to motor. There is a plate below the funnel with an indentation in the corner. Note that there is no space between the funnel and the disc below so the seeds would not slip out. Also the disc is smooth to avoid friction between funnel and disc.

IV.CONCLISION

The main focus of this system is its Automatic way of sowing the seeds. The seeds are been sowed in a proper sequence which results in proper germination of seeds. This automatic way of sowing seeds using a robot reduces the labour requirement. Here the wastage of seeds is also been reduced to a greater extent. This system has been developed for the sowing of seeds in an automatic way. Here with the help of a robot the seeds are been dispensed in the soil in a proper sequence hereby reducing the wastage of seeds. This robot will help the farmers to do the farming process efficiently.

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SEEDING MACHINE

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ABSTRACT:

The paper aims on the design, development and the fabrication of the robot which can dig the soil, put the seeds, leveler to close the mud and sprayer to spray water, these whole systems of the robot work with the battery and the solar power. More than 40% of the population in the world chooses agriculture as the primary occupation, in recent years the development of the autonomous vehicles in the agriculture has experienced increased interest. The vehicle is controlled by Relay switch through Bluetooth technology using mobile. The idea of applying robotics technology in agriculture is very new. In agriculture, the opportunities for robot-enhanced productivity are immense - and the robots are appearing on farms in various guises and in increasing numbers. We can expect the robots performing agricultural operations autonomously such as ploughing, seed sowing, mud closing and water spraying. **KEYWORDS**: ATMEGA16 Microcontroller, L293D, Relay, Battery, RF Module, LCD, Motors, LED, Solar panel.

1.INTRODUCTION

This project work described here is quite useful in the agricultural fields. The project aims on the design Agricultural Robot for Spraying water, seeding, Mulching and cutting operation". More than 42% of the total population in the world has chosen agriculture as their primary occupation. In recent years, the development of autonomous vehicles in agriculture has experienced increased interest. This development has led many researchers to start developing more rational and adaptable vehicles. In the field of agricultural autonomous vehicles, a concept is being developed to investigate if multiple small autonomous machines would be more efficient than traditional large tractors and human force. These vehicles should be capable of working 24 hours a day all year round, in most weather conditions and have the intelligence embedded within them to behave sensibly in a semi-natural environment over long periods of time, unattended, while carrying out a useful task. There are a number of field operations that can be executed by autonomous vehicles, giving more benefits than conventional machines. The idea of applying robotics technology in agriculture is very new. In agriculture, the opportunities for robot-enhanced productivity are immense - and the robots are appearing on farms in various guises and in increasing numbers. We can expect the robots performing agricultural operations autonomously such as ploughing, seed sowing, mud closing and water spraying. Watching the farms day & night for an effective report, allowing farmers to reduce the environmental impact, increase precision and efficiency, and manage individual plants in novel ways. The applications of

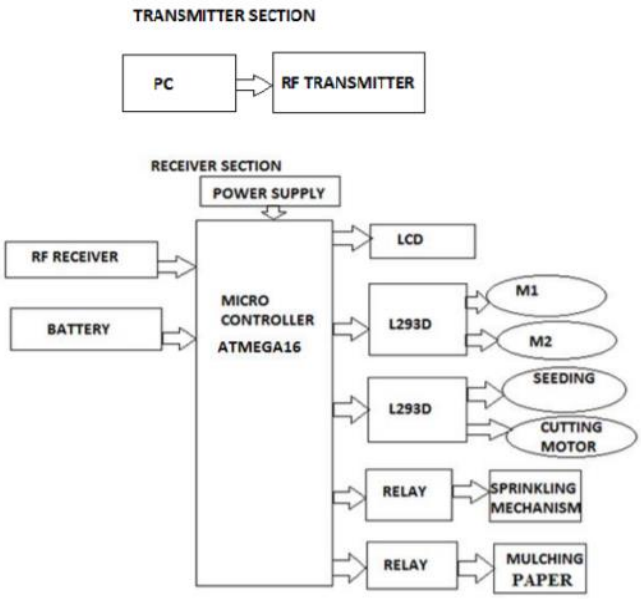
instrumental robotics are spreading every day to cover further domains, as the opportunity of replacing human operators provides effective solutions with return on investment. This is especially important when the duties, that need be performed, are potentially harmful for the safety or the health of the workers, or when more conservative issues are granted by robotics. Heavy chemicals or drugs dispensers, manure or fertilizers spreaders, etc. are activities more and more concerned by the deployment of unmanned options.

2. LITERATURE SURVEY

In agriculture the use of robots enhances the productivity and reduces the human effort and cost. The automation of various agricultural activities by robots are envisioned. It has been described that the present robot can perform better and can automate more than one work simultaneously. This robot can be effectively used by the farmers. In future this robot can be enhanced with some more cognitive capabilitiesand also to take appropriate actions even in the absence of the farmers. It can be induced with human interaction and also learning from experience, given by Blackmore, S.(2007). “A systems view of agricultural robotics”.[4]. Central to this idea was the proposal of theimplementation of the PFDS and PADS, and their strong interaction. The PFDS is primarily used for relaying spatial accuracy information for machinery navigation, while the PADS are used to communicate the agronomy information about, and requirements of, the crop, given by R. Eaton, R. Eaton, J. Katupitiya, S D Pathirana (2008), “Autonomous farming: Modeling and control of agricultural machinery in a unified framework”,[5].

3. PROPOSED SYSTEM

In the field of agriculture, various operation are performed. For example, grass cutting, cultivation, seed sowing, water sprinkling, mud closing. workers should require strength and skill for the working. Fig. shows the platform of an agricultural robot designed on the basis of the design concept of open architecture. Robot structure is divided in to threesection, first is embedded section second is battery section and last one is water tank. A portable PC or smartphone, motor controllers and other control components are placed in the front cabin and a camera is fixed in front of it for capturing the front images. The rear cabin can be used for storage boxes to store some materials such as seeds, water and fertilizers. The driving devices include DC motors and wheels. According to the needs of operations and control, the driven method of the platform can be chosen.



3.1 Elements of block diagram are as follows:

1 Grass cutting operation:

A grass cutter is a machine utilizing one or more revolving blades to cut a grass surface to an even height. The height of the cut grass may be fixed by the design of the mower, but generally is adjustable by the operator, typically by a single master lever, or by a lever or nut and bolt on each of the machine's wheels. The blades may be powered by muscle, with wheels mechanically connected to the cutting blades so that when the mower is pushed forward, the blades spin, or the machine may have a battery-powered or plug-in DC motor.

2 Seed sowing operation:

A sheet metal hopper box is used for Seed storage. We have provided 3 holes to the main wheel shaft, where the Storage box is placed above it. The main wheels are powered by DC motor which is regulated by a Relay switch and is controlled by a remote controller. As the motor is switched on, the wheels tend to rotate and rotation of shaft makes the seeds fall on the cultivated filed.

3 Mud closing and leveling operation:

A Sheet metal Plate is used as mud closer and leveler. The sliding mechanism is used for leveler up & down movement. The Leveler is powered by a DC motor which is regulated by Relay switch and controlled by a remote controller. As the leveling plate moves downward to the ground level, the mud is closed in the sowed soil.

4 Cultivating operation:

A DC Motor coupled with the screw rod is used. The power for motor is regulated by relay switch. The screw rod rotates and the nut welded to the cultivator slides between the screws of the screw rod. As the cultivator is lowered down, soil is digged up to 1.5 inches. The direction of motor rotation can be controlled by remote controller for up and down movement of the cultivator.

5 Water spraying operation:

A water container is used for water storage. A water pump is used for pumping water to the water sprayer. The water flows to the sprayer through pipe. The power for pump is regulated by a toggle switch

4. ADVANTAGES

- Reduce the workload on the farmer and as it is easier to operate.
- The former need not spry in the hot sun, he can operate the device while standing in a cooler place.
- By the development of these robots' lot of manual labour will also be decreased and the farmer life will save from chemicals

5. APPLICATIONS

- Agricultural robotics is the use of automation in bio systems such as agriculture, forestry, and fisheries.
- It is replacing the conventional techniques to perform the same tasks, with efficiency.
- Applying automation to agriculture has helped create several advancements to the industry while helping farmers save money and time.

6.Result:



7. CONCLUSION

The robot for agricultural purpose an robot is a concept for the near the performance and cost of the product once optimized, will prove to be work through in the agricultural spraying operations. We

have been successful in developing a robot whose construction is enough to withstand the challenges of the field. We are sure that once this concept is presented in a manner suitable to Indian market, it will differently help in bringing down the 15% molality rate found in the Indian formers associated with the agricultural spraying operation

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SHOCK ABSORBER

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Abstract –

Shock absorber is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. In a vehicle, it reduces the effect of traveling over rough ground, leading to improved ride quality, and increase in comfort due to substantially reduced amplitude of disturbances. In this work suspension system is designed and a 3D model is created using CATIA V5 R21. The model is also changed by changing the thickness of the spring. Structural analysis and modal analysis are done on the shock absorber by varying different spring materials. Spring materials are Spring Steel, Phosphor bronze, Beryllium Copper and Titanium alloy. To validate the strength of the model, the structural analysis on the helical spring was done. The analysis is done by considering loads, bike weight, and single, double riding. Modal analysis is done to determine the displacements for different frequencies for number of modes. Finally comparison is done for different materials to verify best material for spring in Shock absorber. Modeling is done in CATIA and analysis is done in ANSYS.

Keywords: Static, Transient Dynamic, Buckling, CATIA V5 R21, ANSYS.

I.INTRODUCTION

A shock absorber or damper is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. Pneumatic and hydraulic shock absorbers commonly take the form of a cylinder with a sliding piston inside. The cylinder is filled with a fluid (such as hydraulic fluid) or air. This fluid-filled piston/cylinder combination is a dashpot. The shock absorbers duty is to absorb or dissipate energy. These are an important part of automobile suspensions, aircraft landing gear, and the supports for many industrial machines. Large shock absorbers have also been used in structural engineering to reduce the susceptibility of structures to earthquake damage and resonance. A transverse mounted shock absorber, called a yaw damper, helps keep railcars from swaying excessively from side to side and are important in commuter railroads and rapid transit systems because they prevent railcars from damage station platforms. In a vehicle, it reduces the effect of traveling over rough ground, leading to improved ride quality, and increase comfort due to substantially reduced amplitude of disturbances. Without shock absorbers, the vehicle would have a bouncing ride, as energy is stored in the spring and then released to the vehicle, possibly exceeding the allowed range of suspension movement. Control of excessive suspension movement without

shock absorption requires stiffer (higher rate) springs, which would in turn give a harsh ride. Shock absorbers allow the use of soft (lower rate) springs while controlling the rate of suspension movement in response to bumps. Damp the motion of the upspring weight up and down on the springiness of the tire. Since the tire is not as soft as the springs, effective wheel bounce damping may require stiffer shocks than would be ideal for the vehicle motion alone. Spring-based shock absorbers commonly use coil springs or leaf springs, though torsion bars can be used in tensional shocks as well. Ideal springs alone, however, are not shock absorbers as springsonly store and do not dissipate or absorb energy. Vehicles typically employ springs and torsion bars as well as hydraulic shock absorbers. In this combination, "shock absorber" is reserved specifically for the hydraulic piston that absorbs and dissipates vibration.

There are a number of different methods of converting an impact /collision into relatively smooth cushioned contact.

- Metal Spring
- Rubber Buffer
- Hydraulic Dashpot
- Collapsing safety Shock Absorbers
- Pneumatic Cylinders
- Self-compensating Hydraulic

3.2 DESIGN OF BOTTOM MOUNT

Draw a circle with 160mm diameter and 150mm diameter, thickness 20mm, rectangle length 80 mm

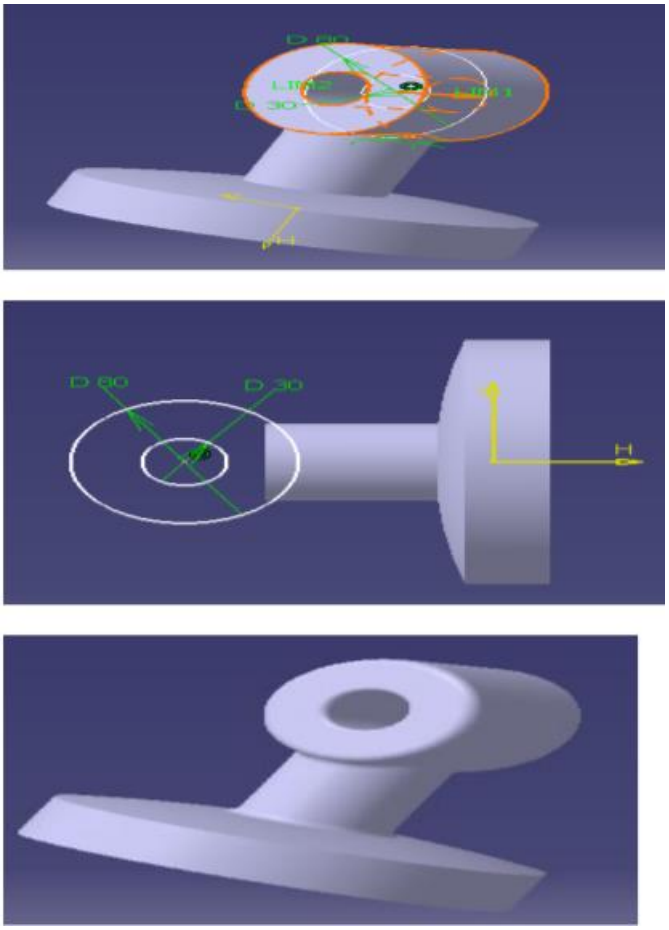


Fig.3.2. Design of bottom mounts

3.3 Design of oil Pad D

raw a circle of 80 mm diameter, length of 180 mm, the helix of pitch 15 mm, a circle of 20 mm diameter, depth 150mm.

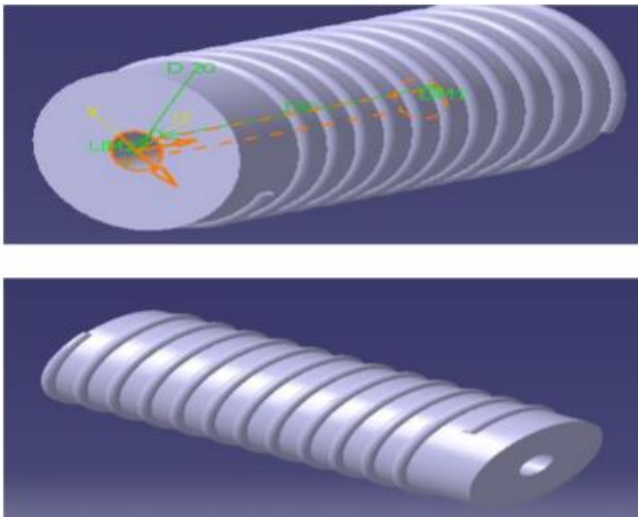


Fig.3.3. Design of oil Pad

3.4 Design of Rod Draw a circle of 20 mm diameter, 300 mm length, a pitch of 50 mm and height of 400 mm

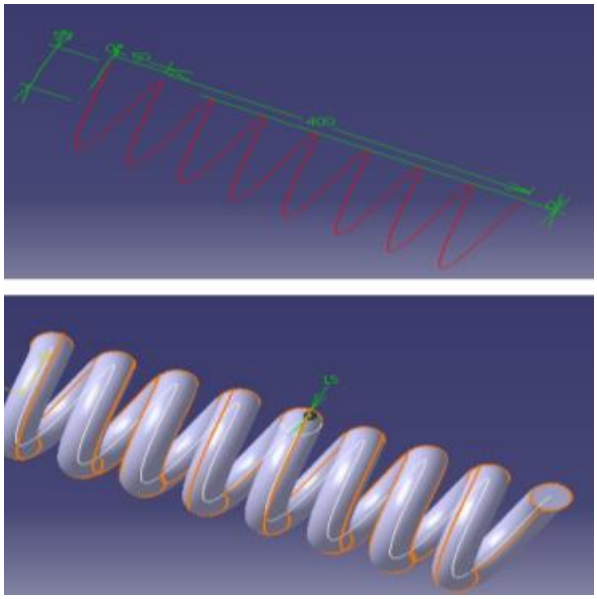


Fig.3.4. Design of oil Pad

3.4 Assembly Module

- In the Assembly module of CATIA insert all the existing such as upper mount, lower mount, strip rod, spring and oil Pad.

- Assemble it step by step by using different tools like coincide, offset, and contact constrain, Manipulation, Smart Move and Etc…. As shown in below.

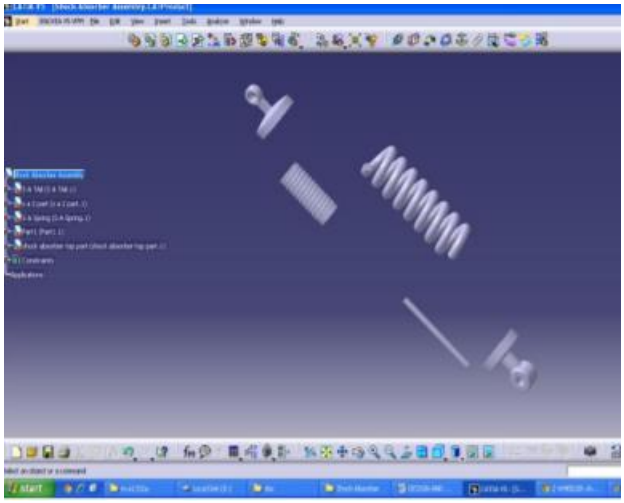


Fig.3.5 different engineering materials present in CATIA V5 R21.

IV.INTRODUCTION TO ANSYS

Finite Element Analysis is a numerical method of deconstructing a complex system into very small pieces (of user-designated size) called elements. The software Implements equations that govern the behavior of these elements and solves them all; creating a comprehensive explanation of how the system acts as a whole. These results then can be presented in tabulated or graphical forms.

4.1. STEPS IN FINITE ELEMENT ANALYSIS:

STEP 1:

First the domain is represented as finite elements. This is called descritization of domain. Mesh generation programs called processors, help in dividing the structure.

STEP 2:

Formulate the properties of each element in stress analysis. It means determining the nodal loads associated with all element deformation stress that is allowed.

STEP 3:

Assemble elements to obtain the finite element model of the structure.

STEP 4:

Apply the known loads, nodal forces in stress analysis. In stress analysis the support of the structure has to be specified.

STEP 5:

Solve simultaneous line algebraic equations to determine nodal displacements in the stress analysis.

STEP 6:

Postprocessors help the user to sort the output and display in the graphical output form. A typical finite element model is comprised of nodes, degrees of freedom, elements material properties, externally applied loads and analysis type. The finite element method is a numerical analysis technique for obtaining approximate solutions to a wide range of engineering problems.

4.2. ASSUMPTIONS IN FEA

The four primary assumptions, which must be considered in any Finite element based solution, be itstructural, electromagnetic, fluid flow or manufacturing simulation is:

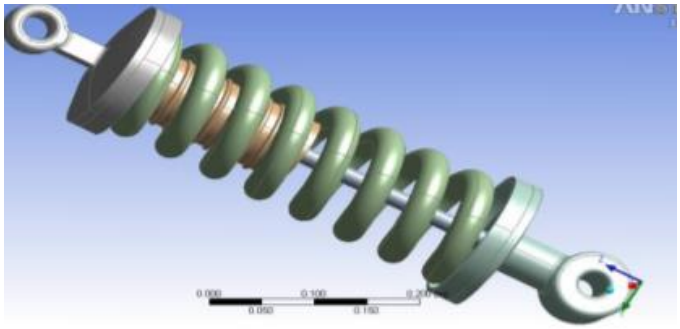
1. Geometry

2. Material properties

3. Mesh

4. Boundary conditions

• Import the model in to the geometry section of the ANSYS work bench as shown below.



V. RESULTS AND DISCUSSION

In this project the helical spring of a shock absorber by using 3D parametric software CATIA. And also the analysis was performed by using ANSYS is a general purpose finite element analysis (FEA) software package. To validate the strength of the model, the structural analysis on the helical spring was done by varying different spring materials like steel, titanium alloy, copper alloy and Phosphor bronze Modal analysis is done to determine the displacements for different frequencies for Number of modes. The maximum displacements and stress intensities of the respective materials are given below. To validate the strength of our design, we have done structural Analysis.

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Performance of Improved FIR filer using FPGA	Dr.K.Rajendra Prasad	ECE	International Journal of Recent Technology and Engineering (IJRTE)	2019	2277-3878	https://www.ijrte.org/	https://www.mrecacademics.com/NAACDocument/20210512194343-Performance%20of%20Improved%20FIR%20filer%20using%20FPGA%202019-20.pdf	Scopus
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Shankaranand Jha Ritesh Kumar Santosh Kumar Choudhary	-	Effect of physical parameters on the drain characteristics of Double gate MOSFET incorporating Quantum Mechanical Effects	International Conference on Recent Advancements in Engineering and Management (ICRAEM-2020)	October 2020	doi:10.1088/1757-899X/981/3/032012	YES	IOP Publishing

Implementation of Low Power Optimizing Chien Search Usage in the BCH Decoder

D. Manaswi, Vijaya Durga Ravva, Swapna Thouti

Abstract—In this a new power-saving chien search (CS) structure is proposed for parallel Bose-Chaudhuri-Hocquenghem (BCH) Decoder .The CS assumes a huge hobby in distinguishing the regions of blunder in illness based absolutely decoding, but brings about an vast misuse of entire calculation control utilization. in this proposed engineering, the manner in the direction of looking for the parallel portrayal of the lattice is decayed in degrees. The preliminary step is gotten to each cycle, however the subsequent boom is actuated without a doubt while the initial step is strong, this can result in top notch energy sparing. proper right here a probable improvement is displayed in a segment procedure to keep away from a diffusion within the postponement of the easy way. Exploratory aftereffects of the proposed two-broaden shape for the BCH (8752, 8192, forty) code that spares half of electricity usage contrasted with a commonplace structure of the show.

Keywords:Bose–Chaudhuri – Hocquenghem (BCH) codes, Chien search (CS), low power, two-step approach.

I. INTRODUCTION

Interchanges and potential frameworks for incredible mistake alternate codes are implemented to get well the adulterated code phrases, Bose-chaudhuri-Hocquenghem (BCH) code [1],

[2] is the most usually done due to its great blunder treatment execution and moderate system multifaceted nature is one of the mathematical signs and symptoms. Twofold BCH code is a strong nation stockpiling such in advance [3], [4] and optical fiber correspondence frameworks [5], the majority of the applications and the endless hobby for excessive through placed disentangling has been walking ever larger

blunder treatment ability of numerous systems.first-class the great computational restriction of high thru placed and strong mistake adjustment is inescapable, alongside the ones lines, seems to be increasingly huge strength sparing shape of the BCH translating. through and large, a BCH decoder to address the bits T on the pinnacle of the three essential squares, to be specific, the sickness recall (SC), the essential factor-state of affairs illuminating (KES) has, and Chien are looking for (CS) [1], [2]. Getting a code phrase for a given R (x) Compute issues SC 2T and KES (X) using the issues of the blunder locator polynomial Λ. At extended remaining, the blunder is E (X) Λ assets (X) CS dictated thru the calculation is predicated upon on the locating. In a parallel BCH decoder, CS vital purpose pressure of intensity utilization and whole strength utilization [6] and can take in to a half of. numerous examinations have exhibited the capability to lower the strength utilization of CS proposed systems. Early give up of the techniques delivered in [6] and [7] After locating a blunder in the beyond to take out excess calculations. A further blunder counter is augmented even as a mistake is determined, and the counter KES drawbacks determined in the CS is killed suits. BCH decoder dealing with few mistakes proper off the bat in the execution of the normal and a hit treatment, but, when the electricity sparing little inconsequential mistake revision capability. [8], is a little by little feasible technique all together polynomial decrease (POR) whilst the error became observed inside the blunder locator polynomial of the proposed alternate. Locator polynomial request every in turn, errors are distinguished by the usage of using the decay and in the long run finally ends up 0. POR [8] right now, grade by grade close down hardware related to a polynomial trouble makes it outlandish for the CS. POR for sequential BCH decoders are fruitful, be that as it can, in mild of the truth that it's far hard to apply the device of complicated polynomial replace parallel format. similarly increasingly more, most of the people of the past energy sparing calculations, which encompass early surrender, [6], [7] and the POR [8], contingent upon the scenario of the errors. for example, if shortcomings toward the give up of the time period of the code, as because of intensity investment price range is noteworthy that inside the begin of errors. in this concise, we have were given any other approach, that is parallel to the CS proposed tiers of disintegration. on the manner to method each one of the preliminary step, however the preliminary step to get to the subsequent stage may be actuated really at the equal time as a miles much less victory. The proposed two-improve technique [9] this is adroitly comparative. the 2-boom method, while all is stated in finished, prompt a variety in the number one manner deferral and postponement, the misfortunes may be illuminated truly by means of making use of a powerful pipelined engineering. under no circumstances like beyond designs [6] - [8], paying little respect to the error, the place of the proposed improvement of the energy utilization may be spared. superior correspondence framework for conveying the sign from the supply to the aim purchaser with the resource of a correspondence channel is executed to move information. all of the code words encoded, encoder, which produces numerous code phrase. Even as it turns into a code for the actual affiliation of statistics encoded. memories of errors and statistics debasement is a vital

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trouble in the channels. Disarranges which have an impact on at least one of the reminiscence cells of radiation-actuated sensitive mistakes, for instance, were regarded to exchange their characteristics. wonderful kinds of disappointments reason lasting damage, for instance, the tool will in no way all over again deliver the right facts. In case of disability to assure that the facts is not ruined, mistake modification codes (ECCs) are broadly carried out in reminiscences [1]. To function some extra equality bits to check each reminiscence ECCs word in order that blunders are identified and remedied. The proposed framework is largely solid channel .Parity portrays the greater bits of memory for its capability to decrease information debasement. There are extraordinary charges offered via way of the ECC encoding and interpreting hardware. multiple channel to transport the information to be encoded and decoded as take a look at from it moreover impacts the circuit get rid of. In maximum instances, in moderate of the fact that a massive wide type of the method of the encoding, disentangling rate is substantially greater unpredictable and ECC [1] .traditionally single mistake, twofold blunder region (SEC-DED) codes used to at ease memories are limited [3]. Be that as it is able to, the records sign mistake have turn out to be decided and amended within the proposed framework for multi-byte. This perspective in reality due to the fact the postponement within the exhibition of RS code pix in the quantity of bits of reminiscence modules and gadgets whilst the suits can be exceptionally desirable for the channel, a tool that may be adjusted disappointments. fact be knowledgeable, the principle motive is generally used to make certain the RS codes A code word for a selected polynomial coefficient of the polynomial, the generator polynomial g (x). Reed-Solomon blunder remedying codes (RS codes) to transmit a large show off of ability mistakes developing from mistake to reestablish information from a plate and records correspondence frameworks carried out for functionality. There are varieties of errors even as the bits spilling out of 1 problem to a few exclusive, they may be prone to change in view of the erratic impedance. change the dominion of the obstruction sign. From 1 to zero or 0 to greater bits of statistics consistent with unit of hetero 1.Reed Solomon code method that the cycle has transformed right right into a regular non-paired rectangular code. Repetitive encoder flag and message signs and symptoms and signs are included into the object utilizing the generator polynomial. Decoder mistake region and energy are determined the usage of a similar generator polynomial. At that factor the revision is carried out to the were given code. Reed-Solomon coding, similarly to statistics stockpiling and healing frameworks (commotion channel damage) ahead blunder adjustment of a type applied for statistics transmission.

II. WRITING SURVEY

An big wide variety of mistakes, for the reason that they may cope with the mistake redress depicted in this paper essentially memory devices, the memory is implemented for the programs important to the more element motive decodable codes. Be that as it could, the exhibition of the reminiscence they need to have a first-rate effect the deciphering time. specialised measures, in reminiscence gadgets turn out to be big

additionally, more and more great mistake revision codes are required. Euclidean geometry to defeat the troubles on this paper as they utilize more and more modern-day codes. the ones codes can cope with numerous mistakes, but greater frequently than not requires complicated decoders. Sequentially with the lion's percentage cause unraveling hardware can be performed in a number one, however it calls for big stretches of interpreting. reminiscence, that could be a considerable parameter for the doorway to the framework can collect the time. Increment the scale of the code, so most of the expansion in the hour of interpreting the disentangling rationale (completed sequentially), N cycles required. EG-LDPC code, the code word is carried out on this approach (Euclidean geometry - Low Density Parity test), there may be a dominant detail One Step tremendous judgment Decodable code. It uses the calculation to test the code. There may be not some issue to test the calculation, however code word is associated with a numerical incentive to be transmitted. The collector at that issue receives the code phrase towards the finish of the numerical dispositions related to the blunder id is an exam of some numerical charge.There. The approach is something however hard to actualize utilising modern-day-day device. This technique is more opportunity for translating. certainly because the power utilization and the requirement for the district are immoderate. One degree is to understand the inadequacies of most of sequentially MLDD sequential tool makes use of accurate judgment decoder. [2] In this text, the author of the uproarious channel (Additive White Gaussian Noise) within the sight of PSK and FSK balance techniques Reed Solomon code (RSC) of the bit blunder charge (BER) on execution research clarifies. in this paper, 32-FSK (recurrence bypass keying), PSK (diploma flow keying) law coded correspondence framework is performed for the reenactment. however the usage of Monte Carlo reenactment and be counted quantity of the tempo of BER MATLAB/SIMULINK is finished the usage of the device. The outcomes are indicated using BERTOOL. so as to analyze the exhibition of the rectangular length is consistent, we've got got taken an alternate code charges. next to getting acclimated with the arrangement and tendencies of forward blunder adjustment codes, mistake discovery and rectification codes depicted in this area are contrasted with a few. Hamming code - a Hamming encoder bits of equality bits are embedded into the message. The equality bits and equality bits of information to decide the numerous blends to pressure a hard and fast

equality. The blends are everyday equality check decoder. The equality bits are set by means of way of the decoder. The aggregate of what might be in comparison to the error region is resolved. okay, that precise piece of information this is being flipped. Hamming code in a comparable mistake code. in the occasion that any of the endeavored trade of twofold mistakes can be incredible.

• Berger code - Unidirectional Berger code blunder region

code. it may surely grow to be aware of a mistake in either '1' flipped '0' or 'zero' flipped '1', but it implies a comparable code. '1' are supposed to differentiate mistakes with a "zero", what is probably as compared to the message, at that aspect the message is sent with the aid of way of the quantity of 0s and flipped over. The introduction of the '0' plan '1', a blunder message, what is probably in assessment to the quantity of 1s and sent alongside the message, virtually as at the same time as it flipped. As indicated via the decoder to get the paired 0s or 1s appears at the amount of a similar plan. Lopsidedness between the 2 shows a blunder. it's far relied upon to be implemented in which the error is unidirectional.

• a huge code word within the code has continuously been a steady weight, regular weight code. It way that a legitimate code expression of a tough and fast style of 1s. on this way, any range demonstrates a blunder. numerous mistakes can counteract each one-of-a-type as a essential but possible method for encoding it.

• Code of Ann M - An encoder message out in a M-M significant sort of 1s of each a n bit code is mapped to a phrase. A M-1s within the code message bits which can be utilized to change the quantity of bits delivered to the amount of greater M. It contains of all the M bits of the message in any 1s '1' will. it is likewise a fulfillment as an extended manner due to the fact the code of coding charge.

• Erase Code - to delete the blunder implies which you realise earlier of time from the past revel in of its location. Deletion code is to have the choice to cope with such errors. it's miles as of now observed out that this form of code isn't always required inside the decoder circuit deficiency locator. In reality to

right a blunder inside the decoder is decided via estimating the eraser.

• low-thickness equality check code - the low thickness equality take a look at code is a straight away square code. The message square is modified proper right into a code restrict thru duplicating the exchange community. The name alludes to the low thickness and coffee thickness alternate network. this means the amount of 1s inside the alternate community much less. it is a first-rate deal of coding gain, however the encoder and decoder

configuration is involved, the terrific code is careworn. Predominantly implemented for digital Video Broadcasting.

• speedy code - it's miles a convolutional code.

Convolutional encoding, encoding regular. it is characterised with the resource of the (n, ok, l) n the quantity of bits contribution to the fast code, good enough and l is the amount of yield bits is the reminiscence of the encoder. Translating takes region in tiers. The number one degree can be a hard and touchy translating mission unraveling. that is an excellent blunder rectifying capability, because of this that there may be no coding addition. The precept drawback is that it has a low coding fee and excessive dormancy. Henceforth it isn't suitable for a few programs. satellite correspondence idleness because of separation, yet furthermore the least inside the more dormancy is excessively high. therefore it's far at the entire applied in satellite television for pc correspondence.

• Reed Solomon code - Reed Solomon code of a nonbinary rectangular direct cyclic code succession. Repetitive encoder flag and message symptoms are included into the item making use of the generator polynomial. Decoder mistake place and stress are decided using a similar generator polynomial. At that component the adjustment is applied to the had been given code. Reed Solomon code and fast codes, LDPC coding growth within reason low. Be that as it could, it is a completely excessive fee and low multifaceted nature of coding. ultimately it's miles much less luxurious for some, packages, on the side of ability and transmission.

III. REED-SOLOMON CODES

A Reed-Solomon (RS) code depicted in a paper in 1960, Reed Solomon blunder adjusting code is a rst [9]. for the reason that that point they are CD-ROM, far flung correspondences, place interchanges, DSL, DVD, superior tv software. RS encoding of the statistics is usually direct, but the disentangling of the Nineteen Sixties and different massive e ciency stepped forward via

Berlekamp, tedious [2, 5, 6, 8]. RS absolutely over the most contemporary-day couple of years, it has have end up out to be viable with the resource of using the immoderate-transmission functionality data to check. Gatherings of bits instead of each piece in turn, that it's far a motion from the Hamming code of RS ERS. we're the gatherings of digits call "(the symbols" or Co cients ") is. inside the event that a digit is sans blunder in the general public of its bits are with out mistake because it were. as an example, if a eight-piece character in a variety of, and a similar mistake in three bits of pantomime we're primary is harmed.

at the off hazard that we need to deliver a adequate digit plaintext message, RS will ship n = precise sufficient + 2s digits, and guarantee that the proper message may be reproduced at the opposite give up if there are much less than s undermined digits. A case of

generally applied parameters: okay = 223, s = sixteen, n = k+2s = 255, allowing to address 16 undermined digits out of each 255 digit parcel. even as all is stated in carried out, the quantity of bits in a digit and the parameters n and s are tuned

to streamline on your software. A CD-ROM can cope with a burst of as much as 4000 continuous mistakes.

IV. PROPOSED -STEP CS ARCHITECTURE& RESULTS

in the proposed engineering paraell CS is decayed int steps.The p-parallel CS appears at p blunder positions simultaneously, every genuinely definitely one of which creates a double grid of one x m talking to a Galois concern (GF) detail via registering

$$Y(\alpha^{wp+i}) = \sum_{j=1}^{t} \mathrm{FFM}_{ij} = \sum_{j=1}^{t} \Omega_j A_{ij} = [\Omega_1\ \Omega_2 \cdots \Omega_t] \begin{bmatrix} A_{i1} \\ A_{i2} \\ \vdots \\ A_{it} \end{bmatrix} \quad (5)$$

wherein I extending from 1 to p. The CS will appears at and comes to a selection the nearness of a mistake while Y (αwp+i) is 1, wherein αwp+i is a foundation of the blunder locator polynomial.The precept concept originates from the manner that the nonattendance of errors is ensured if a few bits ofY (αwp+i) aren't equivalent to the ones of 0(m−1:1)1(zero).within the GF of measurement m, the multiplicative character detail, αzero or α2m−1, is characterised as 1, i.E., 0(m−1:1)1(zero), all the extra correctly For the scenario of GF(24), for instance, no nearness of errors is ensured if Y (αwp+i)(three:2) _= 0. Like this -increase method is applied for early detection.This wil brings about amazing power sparing.

duplicate effects:

CS low energy, contingent upon the dimensions of the world of improvement of the proposed diploma numerous setups, and blunders adjustment ability of the flat trouble contrasted with commonplace development. on the working recurrence of 2 hundred MHz for all of the CS obstructs with a one hundred thirty-nm CMOS innovation is, and similarly possibly blunder model [7], [8] acquired recreations control utilization. all of the more honestly, V errors BCH (n, exact sufficient, t) flag, the ordinary piece of a separation among neighboring mistakes n/V model, all the code word had been given is from a similar mistake takes vicinity on the identical time as the reference is adulterated.

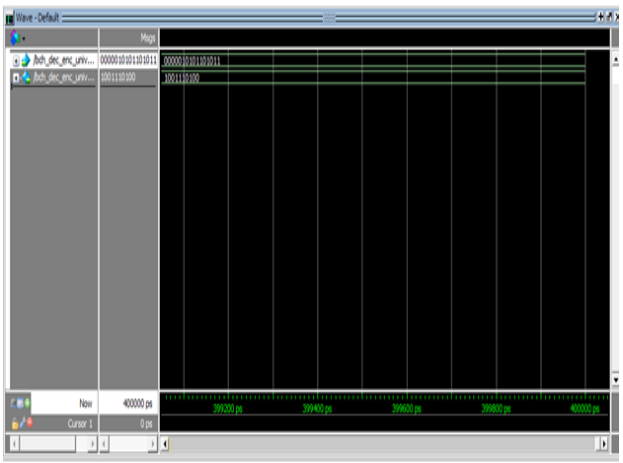

Fig: Chien search based BCH codes

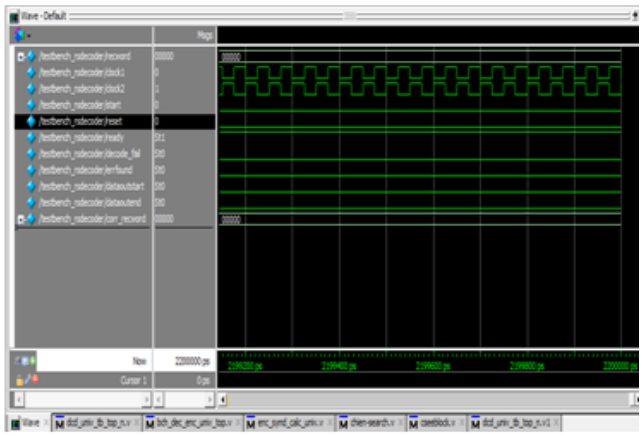

Fig: Chien search for RS decoder

SEC-RS code testbench waveforms shown in below two figures

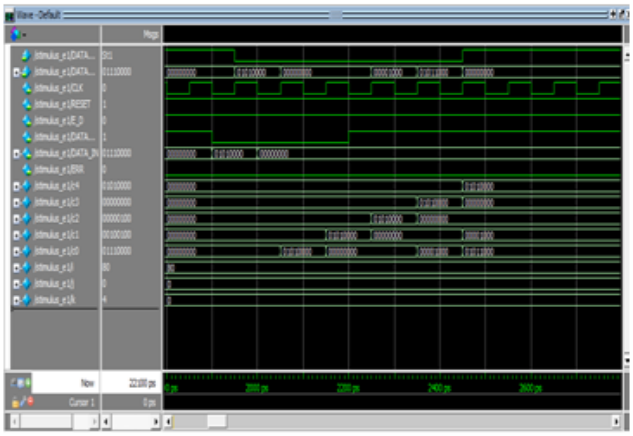

Fig. The size of the field in the first step of the bit width of 4 and shows the effect of energy saving ratio.

For cheap examination, most of the people of the BCH codes to illustrate the pace of zero.ninety 3 is mounted and appeared in Fig 8. Set the flat aspect. four, the proposed increment in the length of the arena of development seems to be plenty increasingly more massive due to the development, and few bits are good sufficient in electricity funding price range increment. for example, BCH for the proposed -develop shape (8752, 8192, 40) GF (214) forty nine.three% power, investment rate range over the code FFM fractional beginning of the initial 4 MSBs may be prepared. except, Figs. five and 6 stage blunder exchange trouble and delineate the way it impacts the effectiveness of depth sparing. the quantity component builds, the power investment price range and the flat factor of view percent in the direction of 1/2 than the power sparing share of eight. it is blunder remedy capability is freely installed to be immersed at the same time as. In figs. 3-6, we gauge a stability amongst energy funding fee variety and irrespective of the reproduction, a disentangled strength model (nine) may be done as a decent

gauge. because of the more cushions are tended to in phase III, the proposed development of a roughly 10% enlargement in tool multifaceted nature.

stop:

thru using diminishing get right of entry to to the second segment of the ordinary CS to carry out noteworthy strength investment price range is decayed in levels. Blunder paintings beneath a comparable ownership, the a good deal much much less energy the dimensions of the CS in the development thing in various arrangements, and error rectification capability of the extent problem contrasted with traditional development. From the trial effects, the proposed improvement of a half of of of decrease in power utilization contrasted with the not unusual level CS seem. strength sparing degree aspect or increment the scale of the sector will become an increasing number of tremendous. Reed-Solomon codes, as an instance, the proposed -boom CS moreover applies to different without delay rectangular codes.

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An Advanced Design of Pseudo Random Discrete Time Even System for Fault Detection

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Abstract

In this paper, the design of pseudo random discrete time even system is implemented to increase the speed of the system. Here sufficient conditions are given to implement the estimator. Pseudo random multiple input signals are given to DES. The main intent of this proposed pseudo random discrete time even system is to increase the speed and produce efficient result in terms of delay and area. The discrete time even system will take multiple signals and perform its operation. The adaptive MISO (multiple input and single output) controller will controls the speed of the system. Self-tuning regulator will tune the multiple inputs and give the single output. Hence, from pseudo random single output block, the output is obtained. Compared to the existed system, the proposed pseudo random discrete time even system gives effective output.

Keywords: *MISO (Multiple input ingle output), Discrete time even system (DES), pseudo random discrete time even system (PR-DES).*

1. Introduction

The fault diagnosis is the feature of complex DES (Discrete Event Systems) in every manufacturing systems and reliable control systems coordinating large. Hazardous situations and unnecessary risks to humans within system are eliminated during the operation of DES and maintains the production rate [1]. There are different method and approaches to address the location in DES. Fault detection problem depends upon discrete event models and techniques of artificial intelligence. For modeling formalism, finite automata (FA) and Petri nuts (PN) are used in last approaches. There are many proposals, their worked on addressing of fault diagnosis depends upon FA models. Among these the concept of diagnosability of DES is used to develop the diagnosis procedure.

The designing of diagnose is proposed in that works: for online diagnosis, from DES model deterministic FA is derived. Even though proposed techniques are efficient but these are applicable to small size systems. In these techniques, if the size of system increases then FA models to be large models. There are number of works on DES diagnoses that uses PN, to handle the drawbacks of FA representation [2]. The features of this work are exhibiting concurrency, clearer graphical descriptions of DES and sound mathematical support. By using PN online fault detection technique was proposed and this technique depends upon monitoring of the number of tokens residing into P-semi flows.

To introduce the redundancy into the systems, PN model is used by C. N. Hadjicostis [6]. Settlement of additional new P-semi flows was done in this work. Due to this detects and faulty markings are isolated. Based on PN models, a method is proposed by S. Genc they performed analysis of fundamental FA. Reach ability graph is exhausted, this paper also based on PN models and interpreted PN (IPN) are used for modeling both, faulty

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behavior of the system and normal. Structural characterization of diagnosability is the previous result. Hence we propose a new and simple technique, to monitoring DES behavior IPN models are reduced. There is no longer need of DES model synchronization and partial information on marking is only used in this technique. We demonstrate the presence of monitoring model that depends upon the diagnosability property of the system model. To design the monitoring model new methodology is provided.

As there is failure in the context of diagnosis problem the Diagnosability problem is introduced. For large complex systems [3] in automatic controlling the important works are Failure detection and isolation. For accurate and timely diagnosis of system failures, it is necessary to design the systematic and sophisticated methods depend on reliability and performance of manmade systems. It receiving the failure diagnosis problem and consider as a wide variety of schemes and attention in literature was proposed. It includes:

1) Based on mathematic models, quantitative methods

2) Other expert systems and AI-based methods and

3) DES's (discrete-event systems) methods.

By the quantitative methods the Analytical model of the physical process is employed so that the sensor measurements with their predicted values are compared. By the knowledge of reasoning mechanisms and human experts the diagnostic systems to be produced based on the AI.

2. RELATED WORK

The several researchers investigate the Partial observation problems in discrete event systems (DES's) [4]. It is not possible to detail study the problem of diagnosability itself. The subject in several papers understands of observability with delay, invertability and observability. Diagnosability is the other problem for the reasons: by failure events partitioning, better results are occurred like failure type identification. There is a chance to occur multiple failures and existence of unobservable events. During diagnosis or normal operation, there is no need of detection or absence of locking- on technique.

In recent literature, the proposed topic is diagnosability and other approaches are discussed. The difference is noticed between diagnosability and other notations, after that i) Lin, shows the diagnosability in different approaches, state-based technique is proposed for diagnosability. His assumption is partial state information provides output function. Online and offline diagnosis are separate and it is addressed by him. If the system is to be diagnosed the normal operation can't be performed [5]. Observation of resulting outputs and sequence of test commands providing and drawing inference on set of possible states ate the steps in system diagnostic. The problem of off line diagnosis is equal to the verification problem. In the online diagnosis, the issuing of sequence of commands is the main aim if the system is in normal operation.

On the other hand in the off-line diagnosis, during the diagnostic process the uncontrollable events are made to check. In diagnostic system if there is a possibility of failure occurrence then an algorithm is given by author for the processing of diagnostic control or sequence of test commands. The above work is extended by Bavishi and Chong, DES"s testability is considered in this work.

A) To identify the set of sensors, testability is provided in given system.

B) By using fixed set of sensors, determination of informal partition of state space system to be done.

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The supervisory problem of the control with partial event observations and introduce a language-based definition of state and observability conditions for the existence of a solution to the supervisory control problem. These are in terms of observability and controllability of languages. There is no need of system state identification or unobservable occurrence determination when addressing of control problems and introduced the obsevability notation and it is different from problem of diagnosability. Observabilities of state machines: DES's obervability is presented [6].

By using Ramadge explicitly, for the discrete event systems the state identification problem is addressed. By using partial state observability, the system is designed through the output map. The problem is reconstructed the exactly state if every event occurred system and address the motivation for observability problem. To control synthesis and observer- state feedback technique is presented. In this different framework to be studied and do not compare to diagnosability problem. Different observability notation approved and their assumption is partial event observation without direct state observations [7]. There is a chance to current state determination at intermittent by using observable event records and separated by bounded number of events.

DES is represented as observer, state of the system estimations are provided by it after observable event occurrence. The observability problem with states and delay is addressed at the intermittent points the system to be observable. The diagnosability is same as event detection problem in our frameworks, when problem of state identification is observed then stronger notation in diagnosability. For the particular state or set of states, notations are not observable and at least one state will be existed which is identifiable at intermittent points [8]. Failure states to be identified with delay is required in diagnosability.

Same requirements are not needed in normal states of system and arbitrary long sequence of events is executed because it is in normal operation. From the above we can say that the system to be still diagnosable by taking observation of failure of some of the systems observation if it is in the post-failure operation. No states are presented those are uniquely identifiable.

On the other hand the difference between diagnosability with delay and observability is explained. Hence unique identification is required not only for every failure state but also for every set of the partition. The system is designed as input-output state automation with partial state information studied through the output function and taken these output automation state into a special case where the input set is singleton. By using input-output automation state, current state observability and initial state observability are addressed by two kinds of observers those are classical dynamical observers and logic based dynamical observers [9]. The classical dynamic observer is defined as finite state automation; it takes for its inputs observed system behavior such as sequence of input-output pairs and sequence of state estimations are generated.

In the frameworks of predicate calculus, logic based dynamical system is designed. To generate the sequence of logic propositions, the observer explains the properties of system and adaptability is the feature for the system model changes. The observability is studied and the discussed observability is different in some characteristics. The determination of current state of system is assumed by authors. It is known for all future time [10], i.e., once the observer estimate converges to the true state of the system. Then it will thenceforth stay locked on and will always provide the correct system state as its output, for all observed input-output behavior

3. DISCRETE TIME ESTIMATOR

Dynamic system of the discrete time represents as fallows

$$X(k+1) = Ax(k)+Bu(k)+Dv(k) \quad (1)$$

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$$Y(k) = Cx(k) = [0 \quad 1]\, x(k) \tag{2}$$

Here U E 9P means the control, x E 3t" means the state, the system output is y E 9?' and VE ZK" means unknown and time varying disturbance input. In the given presents the system in (1) decomposed for

$$X(k+1) = \begin{pmatrix} A1 \\ A2 \\ A3 \end{pmatrix} x(k) + \begin{pmatrix} B1 \\ B2 \\ B3 \end{pmatrix} u(k) + \begin{pmatrix} D1 \\ D2 \\ D3 \end{pmatrix} v(k) \tag{3}$$

$$X = \begin{pmatrix} x1 \\ x2 \\ x3 \end{pmatrix} = \begin{pmatrix} y1 \\ y2 \\ y3 \end{pmatrix} \tag{4}$$

At this point a number of assumptions are to be made:

i) in (2)' it is assumed as a measurement equation.

ii) D (Disturbance distribution matrix) is in full rank.

iii) The outputs are more than number of unknown inputs.

The above said two assumptions are not restrictive and by third assumption with arbitrary rate of convergence the existence of asymptotically stable estimator will be proved. If the above conditions are satisfied, the discrete time estimator design will be summarized by the following theorem. If and only if the pair (&,,Xll] is completely observable then by using the following asymptotically stable reduced order U10 the estimation of state of the discrete time system in (1) & (2) can be done

$$w(k+1) = Fw(k)+Ey(k)+Lu(k) \tag{5}$$

Where

$$H=(\bar{A}_{13}-M\bar{A}_{23})+(\bar{A}_{11}-M\bar{A}_{21})(D_1-MD_2)D_3^{-1} \tag{6}$$

$$G = (\bar{A}_{12}-M\bar{A}_{22})+(\bar{A}_{11}-M\bar{A}_{21})M \tag{7}$$

$$F = (\bar{A}_{11}-M\bar{A}_{21}) \tag{8}$$

$$L = (\bar{B}_1-M\bar{B}_2) \tag{9}$$

$$E = [G \quad H] \tag{10}$$

$$\bar{A}_i = A_i - D_iD_3^{-1}A_3 = [A_{i1} \quad A_{i2} \quad A_{i3}] \text{ for } i= 1,2 \tag{11}$$

$$\bar{B}_I = B_i - D_iD_3^{-1}B_3 \text{ for } i = 1,2 \tag{12}$$

From the following Algebraic matrix riccati equation and discrete solution, the estimator's gain is determined.

$$P = \bar{A}_{11}P\bar{A}_{11}^T-\bar{A}_{11}P\bar{A}_{21}^T(R+\bar{A}_{21}P\bar{A}_{21}^T)^{-1}\bar{A}_{21}P\bar{A}_{11}^T+Q \tag{13}$$

$$M = \bar{A}_{11}P\bar{A}_{21}^T (R + \bar{A}_{21}P\bar{A}_{21}^T)^{-1} \tag{14}$$

The equation is reachable when Q is selected. State estimation represented as

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$$\hat{x}(k) = \begin{pmatrix} \hat{x}_1(k) \\ y(k) \end{pmatrix} = \begin{bmatrix} I \\ 0 \end{bmatrix} w(k) + \begin{bmatrix} N \\ I \end{bmatrix} \quad (15)$$

$$N = [\, M \quad (D_1 - MD_2)D_3^{-1} \,] \quad (16)$$

4. FAULT DETECTION AND ISOLATION

With same output equation in [2] the special form in the system are considered, in the model of linear system take the account for actuator failure

$$x(k + 1) = Ax(k) + Bu(k) + Bv(k) \quad (17)$$

By last term there is possibility of design of different soft and hard actuator failures and notify that the actuator failures are detected during the estimator's transient by assuming no failure takes place. At time k to find estimate of v the estimate of the state is used at time k+1 and k, let us assume B is in full range and represented as

$$\hat{v}(k) = (B\tau\, B)\text{-}1B\tau[\hat{x}(k + 1) – A\hat{x}(k)\text{-}Bu(k)] \quad (18)$$

Vector 8 is monitoring. The shape of failures are identified and detected, all components of 9 bust be zero or closed to it in normal operation. Consider the effect of sensor failures by considering following system description, the signals corresponding to actuator failure when any component of 8 becomes non zero

$$X(k+1) = Ax(k) + Bu(k) \quad (19)$$

$$Y(k) = Cx(k) + Kf(k) \quad (20)$$

Here for sensor failures the unknown vector is described by f and as

$$f(k +1) = Aff(k) + \eta(k) \quad (21)$$

it is shown

Here q means unknown and A contains Eigen values inside the unit circle.

5. PSEUDO RANDOM DISCRETE TIME EVEN SYSTEM

The below figure (1) shows the block diagram of pseudo random discrete time even system. In this pseudo Random multiple signals, Discrete time even system, adaptive MISO controller, self tuning regulator and pseudo random single output. The main intent of this proposed pseudo random discrete time even system is to increase the speed and produce efficient result in terms of delay and area. The pseudo random multiple signals will give multiple input signals to the discrete time even system. The discrete time even system will take multiple signals and perform its operation. The adaptive MISO (multiple input and single output) controller will controls the speed of the system. Self-tuning regulator will tune the multiple inputs and give the single output. Hence, from pseudo random single output block, the output is obtained.

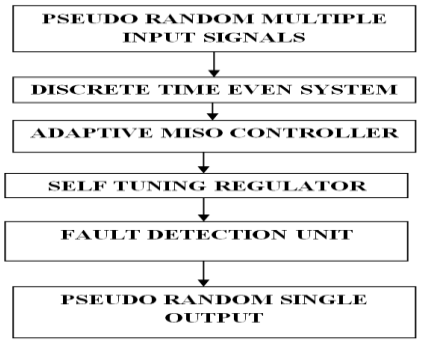

Fig. 1: PSEUDO RANDOM DISCRETE TIME EVEN SYSTEM

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For simulating truly random sequences which are said to be pseudorandom (PR) are generated by deterministic algorithms. A sequence of pseudorandom numbers in the unit interval [0, 1) is pseudorandom sequence. A discrete-time system is a device or algorithm that, and on a discrete-time signal called the input signal or excitation it operates according to some well-defined rule, and another discrete-time signal called the output signal or response are produced.

For wireless communications where at the source (transmitter) there is a possibility of using multiple antennas and the technology is called an adaptive MISO (multiple input, single output). For the purposing of optimizing data speed and to minimize errors the antennas are combined. The destination (receiver) has only one output. The constant voltage level is maintained automatically by a system called Self tuning regulator. On one side of a magnet shunt the circuit has a primary and on the other side the tuned circuit coil and secondary. Here tuning process is performed automatically without any instructions.

In particular, by the set {0, 1, ..., p − 1} the elements of the finite field Fp of p elements for a prime p are represented, and through a sequence (xn) over Fp satisfying yn = xn/p as a sequence of PRNs, say (yn) they arrive. In this case as a pseudorandom number generator the sequence is called. For randomness of PR sequences the various quality measures are in use. According to the type of problem where PR sequences are needed the hierarchy among them varies and it should be noted. Hence in the systems there is a possibility of obtaining the single output.

6. RESULTS

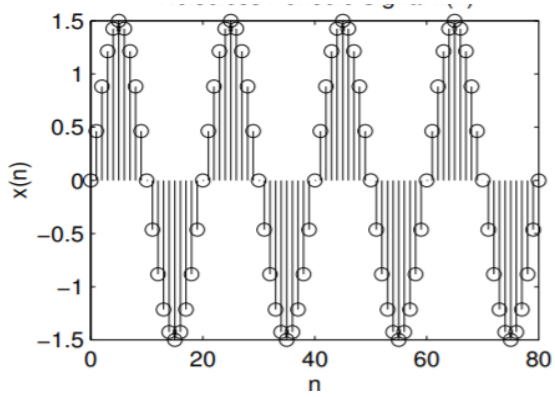

Fig. 2: INPUT SIGNAL

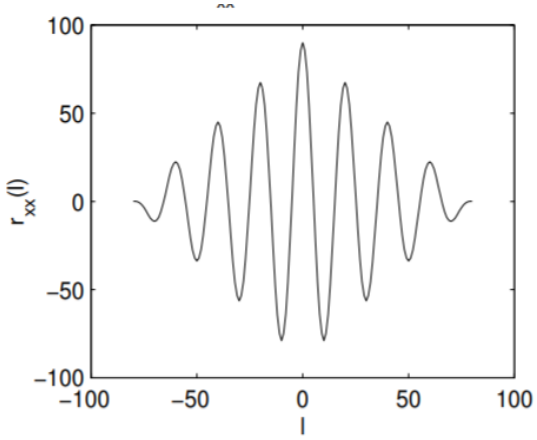

Fig. 3: PSEUDO RANDOM DES SIGNAL

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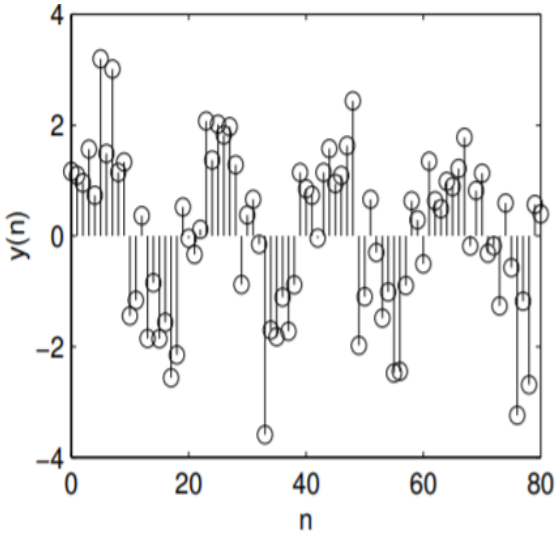

Fig. 4: FAULT DETECTED SIGNAL

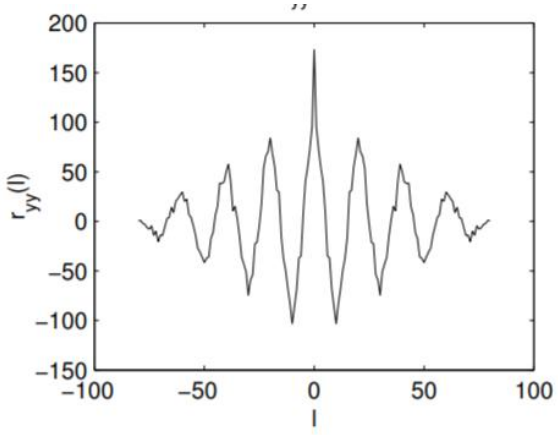

Fig. 5: PSEUDO RANDOM SINGLE OUTPUT SIGNAL

7. CONCLUSION

In this paper, the designing of pseudo discrete time estimator was proposed; it is possible to give the accurate estimation for the dynamical system state which is determined by unknown disturbance. For the presence of such estimator the condition is required that is the outputs are equal or more than number of unknown inputs. In fact by the designer the convergence regulator rate is decided. In this paper the assumption is the outputs are more than number of unknown inputs. Because of the designing of different faults as unknown inputs for estimator the existence condition is not satisfied. Though, the noisy measurement systems and location of estimator poles are the important function in quality of estimates. Hence the proposed system gives effective output compared to exist one

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Performance of Improved speed pipelined floating point multiplier Architecture

Rajendra Prasad.K

Abstract*:Multiplier is a hardware component which usually covers an important chip area and must be reduced to create lots of functions in which multiplier frames shape an essential structure, including digital signal processing (DSP) systems and analytical approaches. The benefit of floating point representation across a fixed point (and integer) view is that a wider range of values can be represented. Since floating point numbers are stored in sign-magnitude type, the multiplier also requires unwritten integer numbers and standardization. The multiplier with the algorithm Revised Booth and save adder is one way to speed up the multiplier. The algorithm of Revised Booth reduces the number of incomplete products to create and is regarded as the quickest algorithm of propagation.

Keywords:Radix4 Booth Multiplier, Booth Algorithm, Partial Products Generation, Signed-Unsigned Multiplication

I. INTRODUCTION

Multiplication of digital computing systems is an important arithmetic operation. The multiplication process involves actually making partial products and then applying certain partial products to the final product. The multiplier speed therefore reduces the number of partial product and the adder speed. As the multipliers have an important impact on the system's performance, several high-performance algorithms and architectures are suggested. Floating point is a way of representing numbers and arithmetical applications in computer systems, ranging from simple computers to computers. The word floating point was taken from the idea that prior to the actual decimal point there is no fixed number of digits; that is that the decimal point can float. Although there are interpretations in which the number of digits, called fixed-point representations, are placed before and after the decimal point. In particular, depictions of floating points are slower than representations of fixed points but can accommodate a larger range of numbers [1]. In digital signal processing (DSP) technologies, such as video and communication systems, high speed Booth multipliers and pipelined Booth multipliers are used [2].Since mathematics with floating points saves a lot of computing power, many microprocessors come with a chip, which is called a floating point unit, specialized on floating point arithmetic performance. The mathematical coprocessors and numeric coprocessors are also called FPUs. Floating point units areextensively included in a dynamic range of technological and engineering applications.

This requires the development of faster arithmetic circuits of floating points.The division of floating points is much like the multiplication of integer. Even though floating points numbers are stored in sign-magnitude type, only unsigned integer numbers and normalization need to be handled by multipliers. Integer multiplier with the algorithm Modified Booth and save adder is one way to increase multiplier speed.

The algorithm of the modified Booth decreases the number of partial products to be produced and is known as the fastest algorithm. Several other studies have been carried out on multiplier architectures including arraying, parallel and pipeline multipliers, showing that pipeline processing is the most widely employed way to reduce digital circuit propagation delays.In this paper a design has been suggested for a fast floating point multiplier compatible with the IEEE 754 single precision specification. In order to achieve a generic design, the hardware description language of Verilog was utilized for the design of the complete multiplier unit, since it represents an enormous productivity improvement for circuit designers.

The main contributions and organization of this paper are summarized as follows: In section 2 we describe backgrounddetails of different multiplier methods adopted by the authors. Section3 discusses the proposed work. Section 4 deliberates results and discussions. Finally, in section 5, we concluded the paper.

II. BACKGROUND WORKS

In [3], the authors present an efficient implementation of an efficient Radix-4Booth 3:2 compressor configurable multiplier for both the 32 bit signed and non-signed numbers and the arithmetic floating point. Multiplication is always used in various uses of research and signal processing. Multipliers comprise one of many systems most important components. It delivers a dynamic arithmetic power, increased performance accuracy and high speed and low area usage. The model often bypasses the swapping activity of then functional output ranges dynamically. The redundant circuit can therefore be deactivated effectively, growing energy consumption and can running pace. The proposed multiplier design therefore outperforms the conventional multiplier in terms of area and speed efficiency. On the FPGA Spartan-6 XC6SLX9 board, the suggested multiplier model was introduced.

In [4], the researchers proposed a new solution to BCD multipliers. The primary focus of the architecture proposed is the generation of partial products and simultaneous binary operations on two-digit columns. 11-digit multipliers for the production of a partial products are applied explicitly without any software translation by 4-bit binary multipliers. The binary results of the 1×1-digit

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multiplications are organized into the 2-digit partial products based on the column based on the most recent their two-digit positions. For the partial reduction of products, a binary decimal compressor architecture is built and used. In streamlined BCD 6-LUT adders, these diminished partial components are substituted. Parallel binary tasks and the enhanced BCD adder lead to better performance and less energy consumption. The suggested solution to Xilinx Virtex-5 and Virtex-6 FPGAs were applied with focus on increasing critical path delays.

In [5], the researchers used FPGA as an active enforcing method, but the development barrier encountered many times is constrained in capital. Optimizations seems to be the way to design big circuits, particularly the entire chip system (SOC) or chip network (NOC) on this device. There are so many ways to improve multipliers, with some improvements to conventional methods as well as their application and testability on FPGA. This paper shows the implementation of the 3x3 unsigned integer switch and add multiplier fixed-point finite duration by implementing such functional improvements The revised version leads to fewer use in the Lookup Tables (LUTs) and less delay because of lower logic levels than traditional techniques.

III. PROPOSED WORK

Fig.1 shows a single-accuracy representation of the binary format in IEEE 754, consisting of 1-bit of a sign (S), an 8-bit exponent (E) and a 23-bit fraction (M or Mantissa). An additional bit is applied to the fraction to form the significand. If there is one exponent in the MSB greater than 0 and less than 255, then the sum is said to be a fixed integer, which defines the real number by an eq.(1).

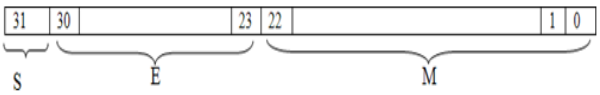

Fig.1. IEEE single precision floating point format [6]

$$Z = (-1^{S}) * 2^{(E\text{-}Bias)} * (1.M) \quad (1)$$

Where $M = m_{22}\,2^{-1} + m_{21}\,2^{-2} + m_{20}\,2^{-3} + \ldots + m_{1}\,2^{-22} + m_{0}\,2^{-23}$; Bias = 127.

Multiplication

This unit multiplies the unsigned significand and places the decimal point in the multiplication product. The consequence of the multiplication of significand is considered the intermediate product. The unsigned significand multiplication is performed on 24-bit. Multiplier output should also be treated in order to avoid impacting the entire performance of multipliers. The Carry save multiplier architecture of a 24×24 bit is used because it has progressive speed and a simple architecture. In the transmission carry save multiplier, the transmission bit is diagonally passed down (i.e. the transmitting bit is propagated to the next stage). Partial products are produced by ANDing and moving together the inputs to the correct adder. Carry save multiplier has three primary phases: The first phase is a half-adder range. The intermediate steps were complete adders. The middle step number is equivalent to the length minus two. The final stage is a range of ripple carry adders. This stage is called the phase of vector fusion as shown in Fig.2.

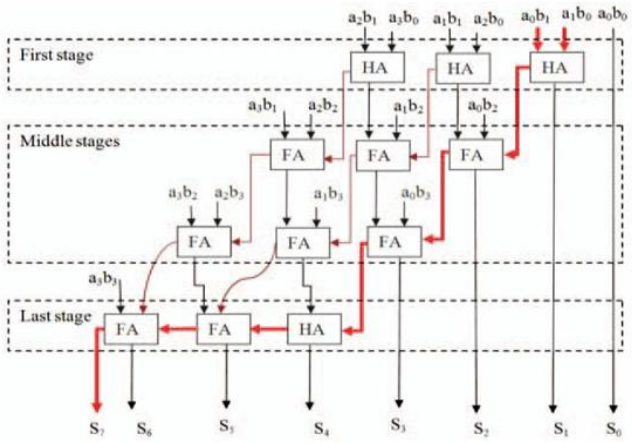

Fig. 2. 4x4 bit Carry Save multiplier [6]

Normalization:

To order to have a leading "1" to the left of the decimal point, the effect of the value multiplication (i.e. to bit 46 on the intermediate product) has to be uniform. Because the inputs are standardized, the intermediate product has the lead at bit 46 or 47.

***Floating Point Multiplier diagram*:**

Fig.3 displays the floating point multiplier block diagram. The hidden bit is appended to the manta and multiplied by the transportable save multiplier. Eventually, the outcome is averaged and the output measured.

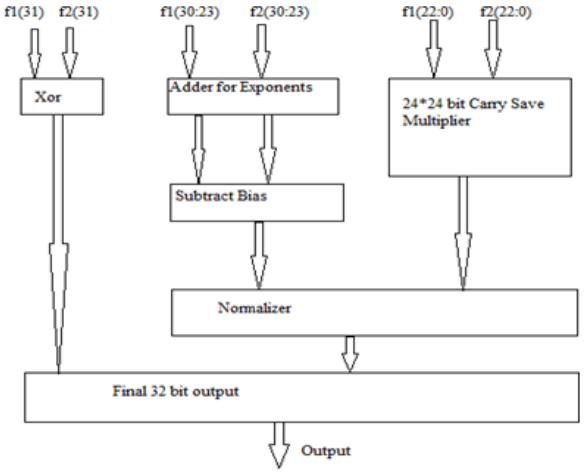

Fig.3. Floating Point Multiplier Architecture

Booth multiplier

Multiplication is a numerical procedure which is an appended method by which a number of times are applied to an integer. A number (multiplicand) will be applied to itself a number of times to create a value (product) according to a different number (multiplier). To accelerate up the transition, it is divided into the following stages:

Generation of partial products:

The Radix-8 modified algorithm is used to generate the partial products. In particular, the higher the radix, the more partial products generated that are required to quantify the component in less cycles. High radix recoding has therefore become more and more widely used in modern high speed arithmetic units and single chip multipliers. Since the multiplier and multiplier are 24-bits, 8 partial products are generated in this algorithm.

Radix-8 Modified Booth's Algorithm

Recoding expanded to 3 bits at a time-4 bits overlapping each band. Radix-8 recoding is much like Radix-4 algorithm but we now use quartets of bits rather than triples. As a consequence, a multiplier based on radix-8 yields less partial products than a radix-4 multiplier, but the estimation of every other partial product is much more complicated. A partial component referring to an x=+3 encoding involves the estimation of 3x and therefore a total addition. Every quartet is codified with the Table.1 as a signed integer.

Table 1. Signed-digit and its equivalent quartet value

Quartet value	Signed-digit value	Quartet value	Signed-digit value
0000	0	1000	-4
0001	+1	1001	-3
0010	+1	1010	-3
0011	+2	1011	-2
0100	+2	1100	-2
0101	+3	1101	-1
0110	+3	1110	-1
0111	+4	1111	0

Partial Product Reduction

As it is clear that multiplier blocks revealed that a small number of supplements were needed to multiply a data sample with several constant coefficients. However, carry save adders are a better choice for high-speed applications than carrying propagation adder. 8 Partial products are produced using the Algorithm for Radix-8 Modified Booth. The compressors were divided by 4:2.

Carry save Adder

A Carry-Save Adder is only a set of one-bit full adders, without any communication. The key use of a carry-save adder is to measure partial products in integer multiplication. Compressors 4:2 are used as additional hold recover. It is made up of two 3:2 (full adders) compressors in the series and includes 4 XOR delays as shown in Figure 2. This compressor is suitable for the introduction of partial products due to its frequent interconnection. The structure of the 4:2 compressor compresses five bits of partial products into three. Originally two 4:2 compressors are used to reduce the amount and hold of the set of 4 partial items each. These last four partial items from the two 4:2 compressors are further decreased to manufacture and hold the final number. The compressor 4:2 consists of 2 complete adders. The last carry is protected and therefore named the carry save adder. The 4:2 compressor delay is the same as for 4 XOR gates.

Final Stage Carry Propagate Adder

Ripple Carry Adder:

The ripple carry adder is used by inserting a partial material from the carry save adders to achieve the full total and the effect. It generates a logical loop with several total adders to connect N-bit numbers. -full adder joins a C_{in}, which is the prior adder C_{out}. This form of adder is an adder with ribs, since each bit "adds" to the next adder. In the final stage, the 48-bit sum and the output obtained from the partial product accumulator are added to give the mantissa product. This unsigned adder often introduces the exponent of the first output into the exponent of the second input and excludes the incomplete portion (127) from the supplement result (i.e. A_exponent + B_ exponent-partial). The value is considered the intermediate exponent

IV. RESULTS AND DISCUSSION

In this section results are discussed using Xillinx Design suite with Modelsim simulator is used.

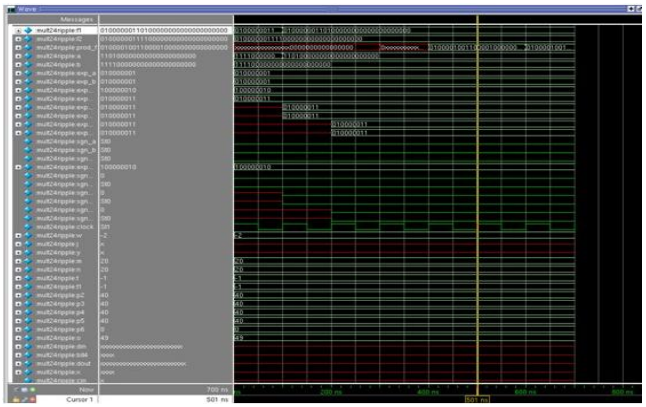

Fig.4. Simulated output of 5-stage Pipelined Floating Point Multiplier

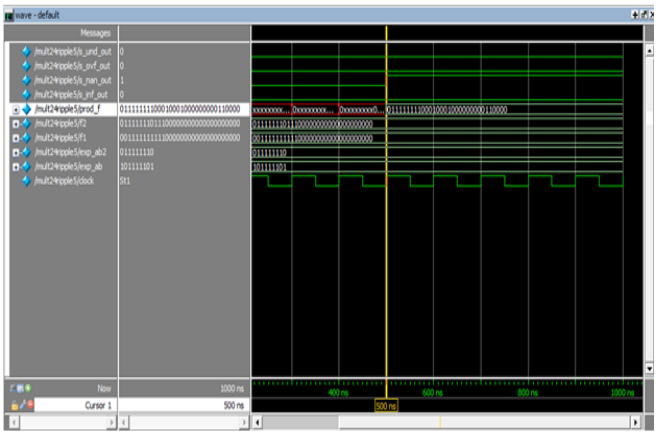

Fig.5.Simulated output of Floating Point Multiplier with exceptions

V. CONCLUSION

The booth multiplier technique increases energy and logic region utilization considerably more with a minimal delay than traditional architecture. It leads to high efficiency by addition of pipeline phases, but at the expense of area and energy. Booth's Recoding Strategy can be used for partial products generation. The Algorithm of the Radix-2 Booth, Radix-4 and Radix-8 revised Booths for the processing of partial products was related. Because the multiplier and multiplicand consists of 24-bit, 8 partial products are produced using Radix-8 Modified Booth's Algorithm. The use of carry save adders reduces these 8 partial products. Furthermore, Ripple Carry Adder reduces the partial products acquired by carrying saving additives. The result of the significance (intermediate product) multiplication is normalized to be a leading "1" just to the left of the decimal point.

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Design of Image Steganography using M-BAT Optimization

Conference Paper *in* International Journal of Recent Technology and Engineering · November 2019

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Design of Image Steganography using M-BAT Optimization

Srinivas Reddy.T

Abstract:*This paper devotes itself to the study of secret message delivery using the cover image and introduces a novel steganography technique based on bat algorithm. To maintain the same quality even after extraction of the image at the receiving end of the system, we used a data encryption standard approach integrated with wavelet transform for preserving high security. Also to increase the embed capacity modified BAT technique is used that results in high PSNR and low MSE values. With the help of modifications to exploitation, swarm initialization and Torus gives rise to (M-BAT) for fast convergence rate. All the simulations are carried with Matlab 2017a and its evaluation parameters are related with other traditional techniques.*

Keywords:**Steganography;** ***Des; M-Bat Optimization***

I. INTRODUCTION

Today, there is a lot of communication via the Internet. Sensitive information vulnerable to intruder eavesdropping. Both cryptography and steganography are used to protect secret information to assure confidentiality of data.But, through authentication, a third party can see that all sides interact anonymously and the encoded text can be quickly noticed [1]. As previously mentioned, steganography gives an extra protective layer that essentially integrates the media. By fact, the directory used where the information are covered is named "Cover File" and the folder is alluded to as "Stego Subject" with a secret message. The basic structure of steganography is shown in Fig.1.Due to high density [2] of pixels in the image, data can be hiding in it with highly secure and quality with the help of a cover image, so it is best suited for secure communication applications. The technique of image steganography is widely used as protected information for hidden communication. Military organizations copy the right security, such as marking, [3]. Steganography strategies are categorized into two groups: space domain and domain frequency techniques. In the space domain, the encoding of data is concealed explicitly on the object pixel values, and objects are transformed in the frequency domain and transformed coefficients are hidden [4]. As mentioned previously several spatial techniques are available in the literature that is supposed to be applied for secure communication of data.Although the global search is widely used in optimization techniques, they are inflexible with the exploration of data, the local search is replaced for balancing it.

Thus we have created an expanded version of BA named the modified bat algorithm (MBAT) to increase the exploration efficiency.For the authenticity of the new M-BAT methodology, nine well-known reference evaluation features equate with the initial BAT. The PSNR in decibels (dB) is calculated between the original cover image and the corresponding stego image in order to evaluate the functioning of the suggested M-BAT algorithm.

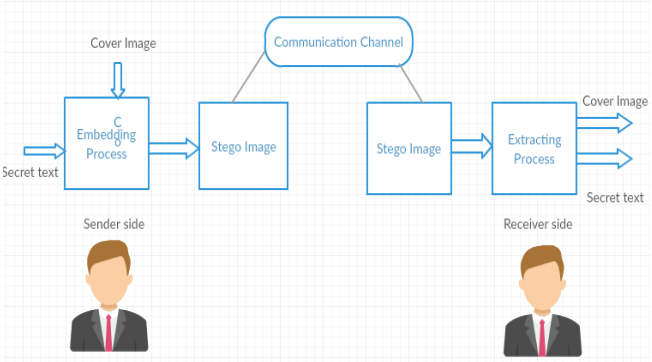

Figure 1. General Steganography mechanism

The mean square error (MSE) is first calculated to calculate the PSNR. The lower PSNR value means that MSE between the original image cover and the labeled picture is negligible and stego image quality is maintained, the original image cover can be restored without distortion after the hidden encoded message has been removed.

The main contributions and organization of this paper are summarized as follows: In section 2 we describe background details of optimizing algorithmstreatment. Section 3 discusses the proposed work. Section 4 deliberates results and discussions. Finally, in section 5, we concluded the paper.

II. BACKGROUND WORKS

In [6], the researchers initiated a research into the technique of cat swarm optimisation (CSO) in order to obtain the optimal or close optimal solution of the problem of stego-image quality. The secret data is covered in a cover image utilizing basic LSB replacement which drastically degrades the image quality. The findings show that the system suggested could achieve the desired resolution with less measurement time.

In [7] the researchers implemented a JPEG-steganography method that uses GA to solve the steganography image problem. This approach could incorporate secret data in the cover image to be RS-resistant.

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At the beginning, it uses the basic LSB replacement technique and covers key parts in the cover image. In order to maximize the safety against RS analysis, pixel values are detected by the GA when the secret data in the cover image are hidden by the LSB. Therefore, it is difficult to detect secret data by way of RS analysis. The results revealed that the resistance of the proposed steganalysis system offers greater performance and a good balance between protection and the subsequent stego-image quality.In [8], the authors adapts and uses basic Particle Swarm Optimization (PSO) as an optimisation technique to solve the problem of stego-image optimisation. The scientific results revealed that the PSO achieved better performance than other methods, including genetic algorithm.

BAT Algorithm:

Bat algorithm operates on microbats echoing and uses bats echo to search for food. It focuses primarily on three rules for the formulation of the bat: Firstly, all bats use echolocation to calculate the distance from the specific point. Secondly, due to the random nature of bats, they used to fly to the particular region maintaining a constant velocity, where its wavelength value varies concerning the time. So bats automatically when they see the target region regulate their wavelengths accordingly. Thirdly, rather than any other method, the researcher found that the intensity ranged from average to low as shown in Fig.2.

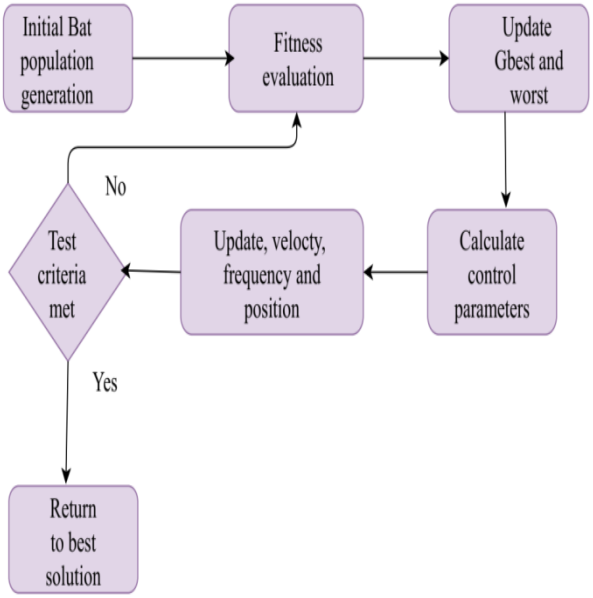

Fig. 2. Flow chart for standard bat algorithm

III. PROPOSED WORK

In the proposed system, mask the text information in the protection image using the modified 2-level DWT bat algorithm. In steganography, the hidden data is normally used to secure and authenticate the element, and each element needs to be encrypted and decrypted by the length of the characters. The cover image is broken into R, G, B planes after a gray image has been transformed. In these planes hidden objects are mounted. Suggested data or image hide concept for encryption and decryption using the DES algorithm. The cover image and hidden images are decomposed at *N*-level and certain DES-factor intensity components are mixed. Secret messages from the stego image are extracted. Again the data obtain forms the bit to last meaningful values and for user key authentication. An estimation of recovery values for MSE variables using PSNR. Development and execution of a plan explicitly to conceal messages in images is shown in Fig.3.

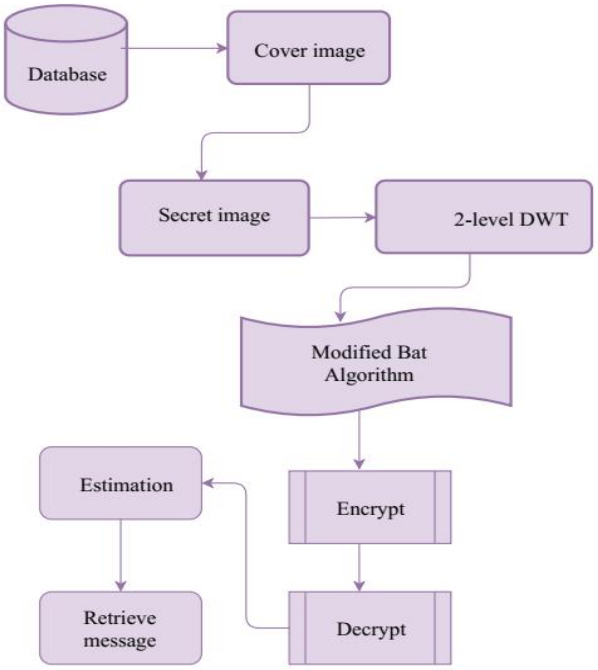

Fig. 3. Flow diagram of proposed model

Wavelet transform:

The wavelet transforms typical image data into a few large coefficients and many small magnitude coefficients are shown in Fig.4. Initially the process of wavelet transformation begins with the decomposing in to components either in to respective time domains or else frequency domains. In four different levels, image or signal are decomposed: approximation, vertical detail, horizontal detail and diagonal detail.

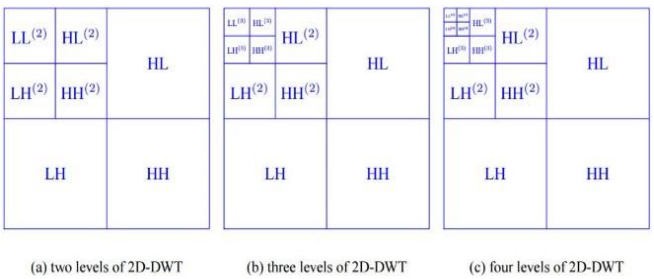

Fig.4. Overview of 2-level DWT scheme

The decomposition on the approximation coefficients is replicated to a point. Since details are not broken up at high levels and the small wavelet coefficients can be defined, the wavelet transformation is not suitable for rapidly validating images.

Modified BAT algorithm:

We made two major contributions to this report as stated above. Next, they created a new form of population initialization using a low differential series, which utilizes the Torus number pattern makes to initialize the random distribution correspond swarm.

Secondly, there is a flexible process for obtain the bat algorithms, thereby enhancing the parameters that are more essential for optimal convergence rate.

A. *Random Number Generator*

The primary requirement of available functions is to generate instant random number in which it is proportional to the respective constant distribution of probability function.

$$f(p) = \begin{cases} \dfrac{1}{q-r} \; for\, q < p < r \\ 0 \; for\, t \langle q \, or \, p \rangle r \end{cases} \qquad (1)$$

Where *q*and *r*supposed to be denoted as likelihood features.

B. *Unique Initialization Method Torus*

In this carried work, there is an efficient implementation for initialization of the population with TO-BA) low differences sequence, which employs quasi-random structure to initialize required Swarm.

C. *Modified Localsearch method*

Through relying on the local search process, they adopted the next change. In standard BA, swarm bats are permitted by using regional random walking through the current region to the new random region. It is clear that searching locally rather than globally patterns play an important role in assessing optimum local conditions.

IV. RESULTS AND DISCUSSION

For the correlation of stego images with cover output, the quality of a particular image test includes widely employed metric so-called PSNR measurement. As it is observed that the value of metric PSNR values to be high, then the difference between the original (no noise) and the blurred image is imperative. The major benefit of this metric is an easy calculation, but it represents notional value. A key feature of PSNR is, a slight spatial change in the image quality can lead to a large numerical distortion, however, if the deviation is localized in a particularly appropriate area, there will be no perceptual distortion, and the opposite is true.

$$MSE = \frac{\sum M,N[I_1(m,n) - I_2(m,n)]^2}{M \times N} \qquad (2)$$

Where,

$$PSNR = 10 \times log10\left[\frac{255^2}{MSE}\right] \qquad (3)$$

Where M and N are the numbers of pixels elements in respective matrix respectively. I_1 treated to be embedded image to be embedded and I_2 treated to be cover image.

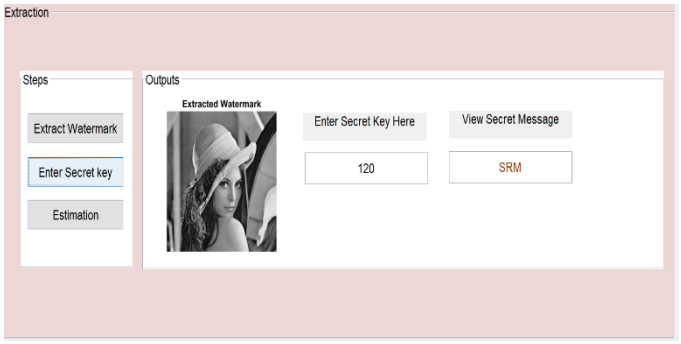

Fig. 5. Extraction Process



Fig. 6. MSE and PSNR Estimation Window

Table 1. Evaluation parameters of images

Image	MSE		PSNR in dB	
	Standard Algorithm	Proposed M-BAT	Standard Algorithm	Proposed M-BAT
Lena	0.0321	0.0114	43.6552	48.1392
Baboon	0.0058	0.0021	45.5203	50.0043
Boat	0.0331	0.0118	43.5624	48.0463
Honeybee	0.0195	0.0069	44.3317	48.8157

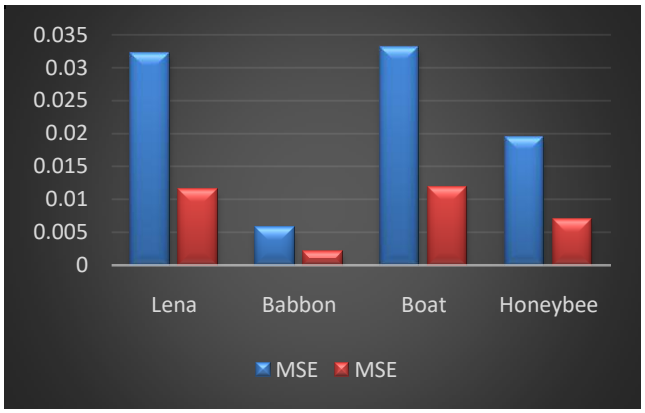

Fig. 7. Comparision of mean square error (MSE)

It is clear from the Fig.7 the MSE value is low for all the four images for propsed M-BAT as related to standard algorithm.

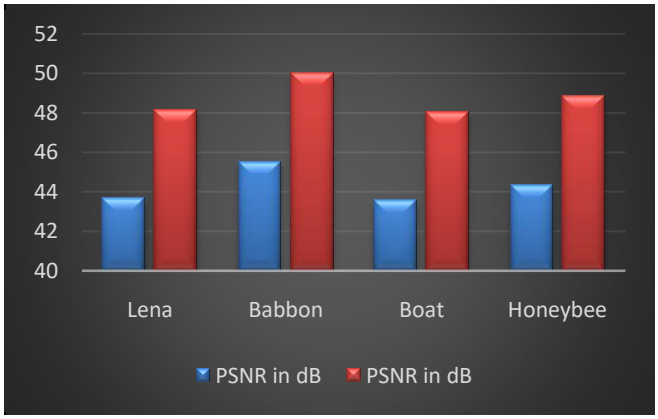

Fig. 8. Comparision of peak signa to noise ratio (PSNR)

It is clear from the Fig.8 the PSNR value is high for all the four images for propsed M-BAT as related to standard algorithm.

V. CONCLUSION

Steganography is the field of science in which the data can be hiding more securely in cover images in a robust manner. In this paper, there is an investigation of how data can be hidden securely and the proposed technique is related to the traditional steganography based on DWT in terms of image evaluation metrics such as PSNR and MSE. It can be observed that there is a dropping of MSE metric to nearly 45.6% and improvement of 11.12% in the PSNR values shows outperformance of the proposed technique. As DES supposed to use for authentication purposes and the M-BAT algorithm greatly improves hiding efficiency. The benefit of using DWT is that it provides a partial remedy over other transformations. PSNR is good, and MSE is much smaller than many current algorithms. This algorithm is also simpler, more stable and secure than other algorithms. Further work needs to be done to increase the computation time required without losing the quality of this system.

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Design of Parallel Self-Timed Adder with Recursive Research

Swapna Thouti

ABSTRACT---This speedy suggests a parallel single-rail self-coordinated snake. It relies upon on a algorithmic description for showing multibit twofold growth. The hobby is parallel for the ones bits that require now not trouble with any supply chain unfold. in the course of this way, the arrange achieves power execution over irregular quantity situations and not using a excellent dashing hardware or appearance-ahead sample. A proper all of the way right down to earth usage is given on a give up discovery unit. The execution is fashionable and doesn't have any pragmatic rules of excessive fanouts. A high fan-in door is wanted however nonetheless it really is ineluctable for kinky reason and is overseen by way of manner of associating the transistors in parallel. Recreations were finished creating use of AN commercial enterprise commonplace tool cabinet that ensure the common sense and prevalence of the projectedmethod over current nonconcurrent adders

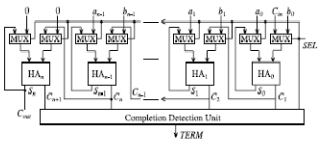
1. INTRODUCTION

Parallel increase is that absolutely the maximum excellent pastime that a processor plays. the larger a place of the adders had been supposed for synchronous circuits yet the fact that there's a stable enthusiasm for clockless/nonconcurrent processors/circuits. Nonconcurrent circuits don't count on any quantisation of some time. therefore, they maintain terrific capability for explanation shape as they're loose from some problems of regular (synchronous) circuits. On a primary stage, rationalization circulate in kinky circuits is limited with the help of a solicitation confirmation handshake convention to create up a pipeline without tickers. specific handshake obstructs for small elements, as an example, bit adders, are high-priced. at some stage in this way, it is certain sufficient and expeditiously overseen exploitation double rail convey proliferation in adders. A legitimate double rail convey yield further gives confirmation from a solitary piece snake sq.. therefore, nonconcurring adders are every supported on complete double rail coding all subjects thought-about (all the bigger formally utilising invalid show that utilizations emblematically correct purpose as important mathematician purpose) or pipelined hobby exploitation single-rail facts encoding and double rail deliver portrayal for affirmations. while these develops switch electricity to circuit plans, they similarly acquaint massive overhead with the ordinary case execution blessings of nonconcurrent adders. on those strains, a frequently effective optionally accessible technique is well worth of notion with the intention to trot out these problems. This elliptic affords a nonconcurrent parallel self-deliberate snake (PASTA) utilizing the calculation first of all projected. The set up of meals is state-of-the-art and uses zero.five of-adders (HAs) aboard multiplexers requiring negligible interconnections. at some stage in this manner, it is manner suitable for VLSI execution.

Free supply chain squares. The execution on this brief is one in every of a kind because it makes use of grievance thru XOR motive doors to include a solitary rail cyclic nonconcurrent serial snake. Cyclic circuits could also be additional plus effective than their non-cyclic partners. Then once more, wave pipelining (or excellent price pipelining) might be a way that will follow pipelined contributions earlier than the yields are balanced out. The projected circuit oversees programmed single-rail pipelining of the supply information sources remoted through engendering and mechanical phenomenon postponements of the doorways inside the circuit way. on those strains, it is sufficiently a solitary rail wave-pipelined approach and virtually specific on the subject of normal pipelined adders creating use of double rail coding to even as now not a doubt talk over with the pipelining of deliver signs.

2. HISTORY

There are a heap plans of double adders and that we middle right here round nonconcurrent self-coordinated adders. Self-deliberate alludes to purpose circuits that rely on moreover to skilled temporal order presumptions for the proper hobby.



ig. 1. General block diagram of PASTA.

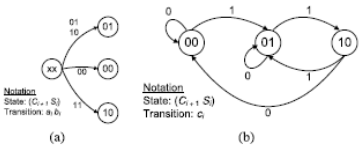


Fig. 2. State diagrams for PASTA. (a) Initial phase. (b) Iterative phase.

Self-coordinated adders will in all likelihood run faster discovered the center fee of for dynamic records, as early cease result police research will maintain a strategic distance from the necessity for the utmost demoralized state of affairs prepackaged defer component of synchronous circuits. they'll be as well delegated pursues.

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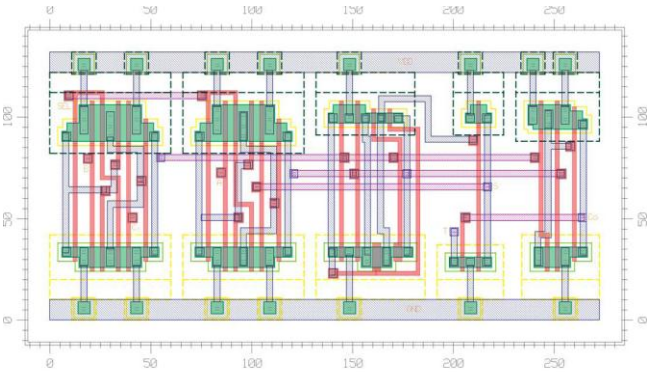
A. Pipelined Adders mistreatment single-Rail records secret writing ThenonconcurrentReq/Ack acknowledgement is used to empower the snake restrict at the same time as to set up the event of carry alerts. in the existence-sized majority of the times, a double rail deliver show is carried out for inside bitwise circulation of convey yields. these double rail sign will go to in in addition of 2 rationalization esteems (invalid, 0, 1), and in the course of this manner is used to provide bit-degree affirmation once a small amount pastime is finished. remaining consummation is detected while all piece Ack sign are gotten (excessive). The bring give up police research snake can be a case of a pipelined snake , that makes use of complete snake (FA) helpful squares adjusted fordouble rail carry. Then all all over again, a theoretical consummation snake is planned in. It makes use of intended direct quit reason and early accomplishment to pick out out the proper consummation response from numerous mounted defer lines. Be that due to the fact it could, the in advance forestall motive execution is luxurious owing to excessive fan-in conditions.

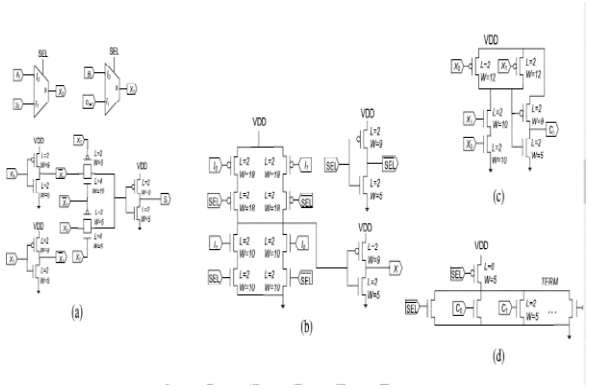
B. Defer Insensitive Adders mistreatment twin-Rail secret writing delay brutal (DI) adders are nonconcurrent adders that claim packaging requirements or DI sports activities. Thusly, they are ready to correctly paintings in distance of confined but obscure entree and twine delays. There are numerous variations of DI adders, as an example, DI swell supply snake (DIRCA) and DI deliver look-earlier snake (DICLA). DI adders make use of double rail secret writing and are common to make unpredictability. notwithstanding the very reality that double rail mystery writing copies the twine varied nature, they may even currently be used to make circuits in reality as powerful as that of the unmarried-rail variations using dynamic cause or nMOS merely systems. A version 40 transistors for each piece dicot genus snake is displayed in at a comparable time because the regular CMOS RCA utilizes twenty eight transistors. Like CLA, the DICLA characterizes bring proliferate, produce, and slaughter conditions referring to double rail mystery writing. They don't accomplice the carry flag during a series but as another sort out them in a stylish tree. during this way, they're equipped to conceivably art work quicker while there's long deliver chain. A moreover improvement is given from the belief that double rail secret writing cause will earnings by way of mistreatment subsiding of both the zero or one way. Double rail motive would love not think about that the two techniques may be assessed. on those traces, it's so much possible to any accelerate the deliver appearance-in advance hardware to ship bring create/deliver slaughter signal to any level in the tree. this will be mentioned and alluded as DICLA with velocity hardware (DICLASP).

Three fashion OF mealson this phase, the layout and speculation inside the returned of food is displayed. The snake to start out with recognizes 2 data operands to hold out halfadditions for each piece. consequently, it emphasizes using in advance created carry and totals to carry out half of-will increase in addition than as soon as until all deliver bits are devoured and settled at zero level. A. fashion of food the general engineering of the snake . The resolution contribution for two-input multiplexers compares to the Req acknowledgement sign and may well be a solitary zero to 1 improvement importance via SEL. it will principally opt for the actual operands throughout SEL = 0 and will change to grievance/deliver approaches in which for ensuing cycles creating use of SEL = one. The input way from the HAs empowers the numerous emphasess to keep until the fruition once all supply signal are given 0 characteristics. B. nation Diagrams , 2 country outlines are drawn for the underlying degree and therefore the unvarying amount of the deliberate engineering. every nation is spoken to with the assist of (Ci+1 Si) integrate wherein i+1, Si talk to try to to and entire characteristics, separately, from the ith bit snake sq.. for the duration of the underlying degree, the circuit merely options as a combinatory angular distance going for walks in predominant mode. it is obvious that owing to the employment of HAs in place of FAs, country (11) can not show up. for the duration of the unvarying stage (SEL = 1), the enter way via electronic device square is initiated. The bring adjustments (Ci) are permitted the equal wide selection of instances for positive to finish the rule of thumb. From the which means of primary mode circuits, the winning arrange can't be notion of as a primary mode circuit due to the fact the info yields can revel in many changes previous to returning the ultimate yield. it's one component however a Muller circuit working out of doors the important mode every as within, many modifications can occur.

3. IMPLEMENTATION& RESULTS

A CMOS utilization for the algorithmic circuit. For multiplexers AND entrees we've got implemented TSMC library utilization at a comparable time as for the XOR door we have used he faster 10 junction transistor execution counting on transmission entryway XOR to coordinate the postponement with AND doors. the top end result discovery is discredited to build up a functioning immoderate finishing sign (time period). this desires a large fan-in n-input NOR entree. for the duration of this indicates, AN elective steady conceivable pseudo-nMOS percentage male erecticle dysfunction configuration is implemented. successive set up. making use of the pseudo-nMOS set up, the finishing unit remains off from the high fan-in problem as each one of the associations are parallel. The pMOS junction transistor associated with VDD of





This percentage disfunction configuration is going regarding as a heap check in, transferral extra or much less static modern channel once some of the nMOS transistors are on on the same time. withal the Ci s, the negative of SEL sign is moreover covered for the term signal to assure that the finishing can not be coincidently have become on for the duration of the underlying self-control length of the real data assets. It similarly averts the pMOS draw up semiconductor unit from being continuously on. hence, static contemporary may additionally motion for the span of the specific calculation. VLSI format has likewise been dead for a modern cell situation utilising 2 metal layers. the look possesses 270 λ × one hundred thirty λ for one-piece transferral regarding 1.123 Mλ2 region for 32-piece. The draw down semiconductor gadgets of the fruits neck of the woods reason are enclosed into the single-piece layout (the T terminal) even as the draw up transistor is what is greater set for the whole 32-piece snake. it is sort of twofold the territory wanted for RCA and is implausibly but the massive majority of the area powerful prefix tree serpent, i.E., Brent–Kung snake (BKA).

4. SIMULATION OUTCOMES

On this neck of the woods, we have a tendency to gift enterprise outcomes for numerous adders exploitation Mentor images Eldo SPICE edition seven.4_1.1, going for walks on 64-piece UNIX degree. For usage of various adders, we've got utilised in fashion library executions of the critical doors. The custom adders, as an example, DIRCA/DICLASP are lifeless counting on their quality structures. before everything, we have a tendency to expose but the winning shape of alimentary paste will viably carry out twofold expansion for numerous temperatures and manner corners to approve the electricity to a decrease region accumulating and operational types. In Fig. four, the making plans graphs for plenty sincerely horrible and ordinary times examination to finest and normal duration deliver chain adjoin arbitrary records esteems are featured. The deliver spreads thru modern day piece adders kind of a heartbeat as apparent. The excellent-case almost about least length convey chain (not seemed right here) will no longer embody any bring proliferation, and consequently acquires entirely a solitary piece serpent postpone previous growing the term sign. the most hopeless scenario consists of high-quality supply proliferation fell deferral thanks to the convey chain duration of complete thirty piece. The autonomy of convey chains is obvious from the regular 8and C26 are gave the impression to trigger at actually the identical time. This circuit works because it must be for all procedure corners. For SF corner instances, one Cout growing edge a quick powerful threat. This hasno pursue on influences at durations the circuit nor are mistakes incited through way of the SF extremely good nook case. The defer exhibitions of assorted adders. we've got utilised a thousand continually sent bizarre operands to speak to the everyday case at consistent time as excellent case, most hopeless state of affairs relate to precise experiments talking to zero, 32-piece carry engendering chains in man or woman. The deferral for combinable adders is anticipated at seventieth progress purpose for the result bit that encounters the most extreme postponement. For self-coordinated adders, it is anticipated through exploitation the deferral amongst SEL and term signs, as diagrammatic The 32-piece full CLA isn't always all of the manner down to earth thanks to the requirement of excessive fan-in, and for that reason a numerous leveled square CLA (B-CLAis useless for test. The combinable adders, SPICE temporal order chart for alimentary paste usage making use of TSMC 0.35 μm approach. The Cout and C12 for many hopeless situation and everyday case, one by one, are regarded for changed conditions at some stage in which TT, SF, and FS speaks to run of the mill common, slow-quick, and brief moderate nMOS–pMOS things in those figures. (a) Worst-case deliver proliferation while at the side of operands (FFFF FFFF)sixteen and (0000 0001)16. (b) common-case deliver engendering while at the identical time inclusive of arbitrary operands of (3F05 0FC0)16 and (0130 0041)sixteen.

For instance, RCA/B-CLA/BKA/Kogge–Stone serpent (KSA)/Sklansky's restrictive completeness snake (SCSA) will artwork for the most hopeless scenario defer as they want no end result sleuthing tool. on those lines, these effects deliver an express higher positive of the exhibition improvement that may be finished utilising those adders due to the vital unit and growing use of some fairly consummation sleuthing machine. in the maximum hopeless scenario, KSA plays splendid as they (alongwith SCSA) have the insignificant tree-profundity [10]. Then all all over again, alimentary paste performs exceptional amongst oneself planned adders. alimentary paste execution is same with the pleasant case exhibitions of standard adders. with achievement, it changes somewhere inside the vary of 1 and pretty one instances that of the fantabulous snake exhibitions.

It's miles even incontestable to be the quickest for TSMC zero.35 μm technique. for regular instances, alimentary paste execution remains inside pretty one times thereto of the same old conventional case exhibitions at regular time as for the most hopeless state of affairs, it acts much like the RCA. notice that, alimentary paste finishes the principle pressure of the algorithmic particularisation as soon as "SEL = zero." as a consequence, the only case postponement speaks to the defer had to produce the time period signal clearly and of the request for picoseconds.comparable overhead is likewise located in double rail clarification circuits wherein they want to be reset to the invalid nation

preceding any calculation. The dynamic/nMOS simply plans need a precharge degree to be finished in the course of this era mediate. these overheads are excluded during this correlation.

5. CONCLUSION

This rapid shows an awesome utilization of a alimentary paste.to start with, the theoretical institution for a solitary rail wave-pipelined serpent is made up. in the course of this manner, the structural set up and CMOS utilization are delivered. The set up accomplishes a basic n-bit serpent this is often territory and interconnection-clever the photo of the smallest quantity hard snake basically the RCA. besides, the circuit works in a completely parallel way for freelance deliver chains, and because of this accomplishes exponent ordinary time execution over odd records esteems. The completing identification unit for the projected serpent is moreover attainable and powerful. reproduction results are utilised to affirm the upsides of the projected approach.

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Performance of Improved FIR filer using FPGA

Rajendra Prasad.K

Abstract*:A crucial part of the digital system is the FIR filter where its framework is robust and simple to connect. In this paper, a regular FIR filter and an optimized FIR filter were modeled using window functions. The FIR filter was designed and contrived by FPGA for digital signal filtering. Also in this paper, a regular FIR filter and an optimized FIR filter were built with window usability. The main characteristic of the application is the Xillinx ISE development suite program to build the FPGA data filter accelerator. The paper also simulates the hardware and software co-designed FIR filter and provides simulation findings about hardware assets and variations in quality compared to the standard and improved FIR filter.

***Keywords*:FIR filter, DSP applications, FPGA synthesis**

I. INTRODUCTION

For multi-rate systems, finite impulse response (FIR) filters are of great importance. To multi-rate signal processing, the main advantage of FIR systems is inherent system stability and phase linearity. The performance of a multirate FIR filter improved considerably in contrast to the single-rate configurations using multirate techniques. FIR filter was designed and built on FPGA for digital signal filtering. This approach can be used for all FPGAs. Signal processing is an important area in which FPGAs in recent years have found a number of applications. FIR filters, for example software and hardware, can be done in two ways. The code approach is simple, as filter parameters can be adjusted to modify the filter efficiency. Nonetheless, the computer method's real-time performance is low. Alternatively, the technology is applied more efficiently and securely in real time. However, the cycle of development is longer and more complex. The article focuses on a FIR filter design approach which incorporates the advantages of software and hardware implementation through both HW and SW. It not only has good performance in real time and high reliability but also has a short development cycle, versatility and easy design.

The processing of a linear filter is focused on a multiplication method. The FIR digital filter's simple arrangement consists of several delay modules. The output of every delay unit builds up to one weight. Then we get the output of the filter. FIR filters are finite in size, M-order FIR filters can be represented as:

$$y(n) = \sum_{i=0}^{M-1} h(i)x(n-i) \quad (1)$$

$$H(z) = \sum_{i=0}^{M-1} h(i)z^{-i} \quad (2)$$

The development of a so called FIR filter is designed to find constant impulsive response coefficients that meet the requirements.

Many approaches, including window control, frequency sampling and suitable approximation equipment are usable. The move/add operational blocks introduced in an iterative multiplier usually change the operand by a fixed number of bits and a fixed number of iterations is required for the complete multiplication operation. This simple approach guarantees a consistent power and overhead energy per device phase throughout the whole multiplication process. The new iterative multiplier structure suggested in this paper includes the use of a variable number of iterations to convert an operand from 2 to a Canonical Signed Digit (CSD) representation in real time using a new CSD recoding method where the number of iterations depends on the data. The new real-time CSD tracker is very easy to implement and only needs a few practical windows. Actually, only the control signals needed to accumulate the partial product based on the value of the multiplicands can be produced by the actual CSD representation of the multiplier operand.

The main contributions and organization of this paper are summarized as follows: In section 2 we describe background details of different FIR filtering methods adopted by the authors. Section 3 discusses the proposed work. Section 4 deliberates results and discussions. Finally, in section 5, we concluded the paper.

II. BACKGROUND WORKS

Partial products are generated and sequentially added in an iterative multiplier. For the binary-number system complement of 2 it is possible to generate and insert partial products in hardware using a basic shift/add technique as shown in Fig.1.To multiply *n*-bit by *n*-bit, right-shifting requires only an n-bit adder as opposed to the 2*n*bit adder required in a left-shifting structure. Be aware that, as shown in the fig.1 the multiplier and the lower half of the partial product can share a common register, since multiplier bits are transferred as the partial product raises.

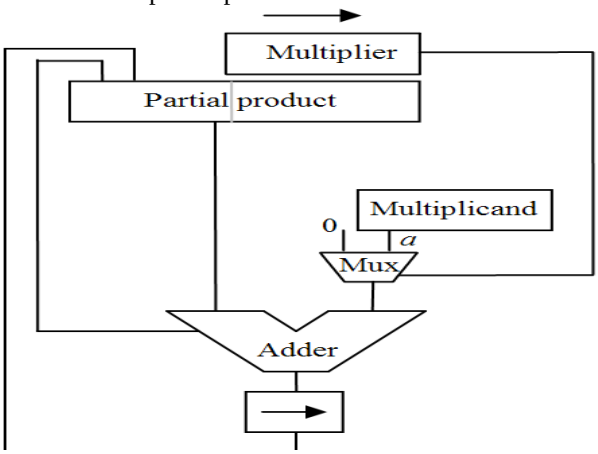

Fig.1. Schematic depiction of a right-shifting 2's complement iterative shift/add multiplier 5

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The system function is

In [1], the authors suggested the FIR filter design in the beamformers synthesis. As the frequency of the signal increases, the beam width of the signal also decreases and decreases. The researcher suggested that the large beam of a signal still be a component of the frequency and signal range, and a skewed beam is produced as the beam is fed to the low-pass filter for the frequency variations. The FIR is used as a solution to concentrate more. Numerous solutions to broadband beamformers are given through the application of FIR filters with an invariant frequency system. The second order cone programming approach is used to model the filter utilizing frequency invariant patterns.

In [2], the researchers addressed the different designs of FIR filters, and they concentrated on rate and power consumption. The focus is on the different applications of FIR filters. Due to its features such as linear phase response, absolute stability, etc., the FIR filter has found the broad application. FIR found usage for pulsing, channel equalization and matched filtering in each sector, but most commonly used in communication. For most of the execution of the FIR filter, it uses the preferred FPGA method, now widely used for the VLSI development.

In [3], the researchers recommended the design of multipliers using the SORIGA method and addressed the difficulty of multiplier implementations in FIR filters, thereby increasing the cost of equipment. By using successive adders instead of multipliers, this hardware difficulty can be omitted or reduced and effects are calculated. Different algorithms were built for eliminating such constraint and SORIGA uses an advanced optimization as the most essential tool in this article. SORIGA is a clever optimisation tool like some other genetic algorithms, differential algorithms and so much more. An FIR filter with power-of-two is designed in this algorithm.

In [4], the researchers provided a brief summary of electronic filters, their methods of enhancing their use over analog filters and their forms (FIR and IIR) and their use of FPGA. The numerous potential benefits of FIR filters are stressed, as the design of the FIR filter is easy and its frequency reaction is faster than the IIR filter and can be applied to any type of frequency. But it also suggested how a filter can use adders and shifters rather than multipliers to reduce the size of the process.

III. PROPOSED WORK

Standard FIR filter:

The window feature designs a generic FIR filter that fulfills the specifications. Rectangular screen, Hanning window, Hamming window, Blackman window and Kaiser window are widely used for window features. For the performance of hardware design, first of all, the use of MATLAB technology to obtain the FIR filter correlation coefficients we need.

Improved FIR filter

This introduces a new algorithm for static or programmable digital filters. The fundamental idea is tosubstitute multipliers for shifters and additives in the development of electronic multiplierless filters. A commonly used approach to replace a multiplier with shifters and adders is focused on the canonically signed numbers (CSD) multiplicand form. This allows further executing prices, though, because it avoids intermediate outcomes of multiplying. The minimum number of shift-add operations and the accompanying term to carry out the multiplication with a specified multiplicand must occur when using shifters to enforce multipliers.The signal flow chart for Real-time CSD multiplication is shown in Fig.2. It is evident from the flow chart that this encoder produces the control signals required to perform a CSD-based multiplier directly on the hardware.

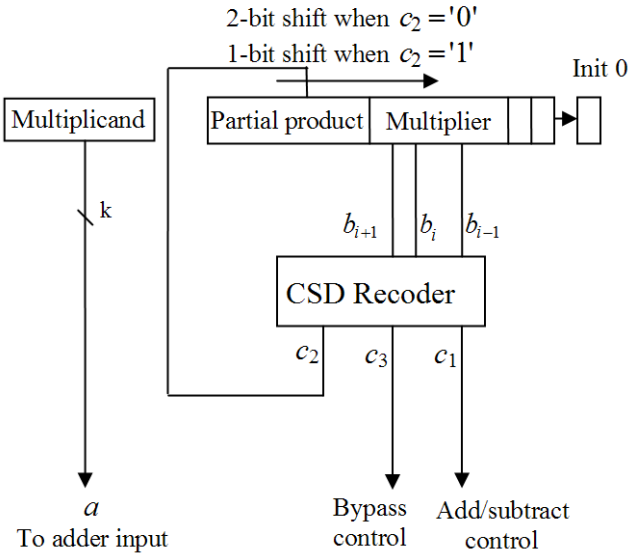

Fig.2. Real-time CSD multiplication depends on CSD recoder

The new strategy regarded here efficiently decreases the overhead implementation by avoiding the need to specifically represent the hardware CSD number; only the control signals derived from the concept of DFS numbers are explicitly displayed in the hardware.

From Fig.3 it is evident thatCSD recoderiterations can be seen that multiplier is dependent on data and uses the variable number of bits to shift. Shifting by a variation in bits usually means that a register-based shift is needed that adds time and energy consumption for each iteration; instead, shifting by a continuous number of bits by direct wire connections can be easily implemented and requires very low energy and chip area costs. Nevertheless, the model that we suggest here simply does not involve random changes, but only one or two bits shifts. It ensures that the model can be applied with a pair of hardwired switches, when the command signal chooses switching by one bit or two. This approach helps us to acquire the gains of dynamic transformation at the expense of continuous transformation. Notice that it is possible to further increase the computing rate of the current multiplier model by using specialized adders and asynchronous loop techniques.

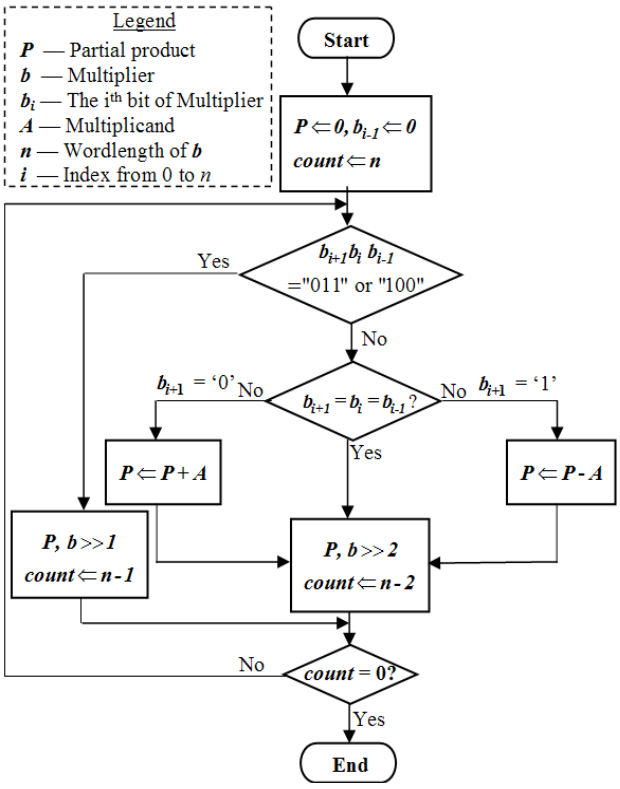

Fig. 3. Overview of CSD recoder

IV. RESULTS AND DISCUSSION

Modelsim simulation enables us to obtain the result of the simulation of hardware code, such as the clock cycle, time running, clock cycle number and errors, to determine whether the design is right. In addition, the result can be verified by simulation waveform. The efficiency of each design method is shown in Table 1.

Table 1. Exchange coefficients into 2^k mode

Method	Standard FIR	Improved FIR
Demanded clock	30M	25M
Delay estimated	15.340ns(65M)	24.562ns(40M)
DP area	65	127
clock cycle	106110	20264
Errors	**0**	0

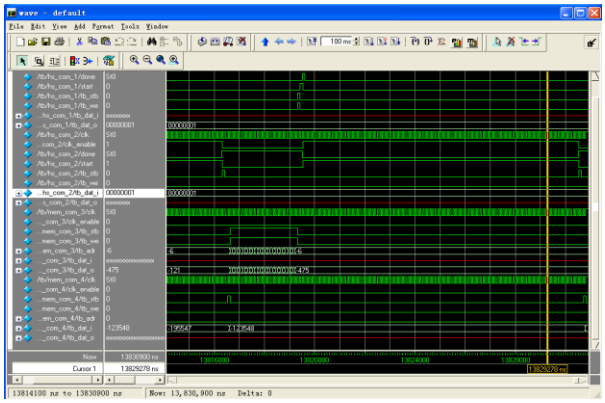

Fig. 4. Simulation output of Standard design with Isim

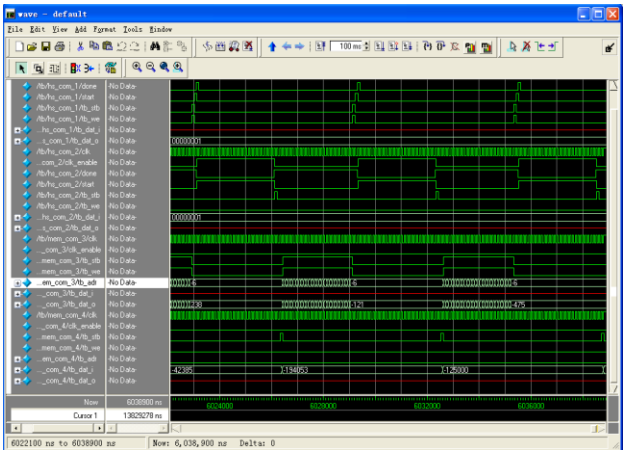

Fig. 5. Simulation output of improved design with Isim

V. CONCLUSION

This paper discusses the development methods of the FIR filter. The function of a filter in signal processing applications is to eliminate the undesirable part of the signal. It is often used to remove the random noise and remove a useful part of the input signal, for example the specific frequency component. FPGAs are high-performance tools for data processing. We investigated the development and synthesis of the FIR filter using various techniques.

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MFMW: Modified Floor planning with Minimum Wire length

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Abstract: ***Floorplanning is one of the most critical phases inVLSI circuit design. The module alignment has a substantial concentration on the minimization of chip area and total wirelength in slicing floorplan. At foremost, the disadvantages of dead space are investigated and an instinctive and profligate method is proposed to find the equitable part of component. Then, a tormenting for standardized expression is improved to produce new solution, and the proposed simulated annealing algorithm which improves design efficiency is opted for the best floorplan solution. The proposed MFMW method attains less area on the commonly used AMI33 and AMI 49 benchmark circuits.***

Keywords: Floorplanning, Wirelength, VLSI

I INTRODUCTION

In progression with innovation, the outline multifaceted nature is expanding and the circuit measure is improving bigger what's more, bigger so the physical outline turns out to be vital. VLSI physical stage start with Floorplanning [2] stream. It decides the areas and measurements of parts on a chip in order to limit the wirelengths and chip region of interconnect [2]. It is a NP difficult issue [3] from the computational perspective. The dead space increments with the expansion in squares thusly determining an ideal arrangement is a testing assignment. Floorplanning depend on its portrayal [4-15]. The portrayals of design decide the span of dead space and many-sided quality of change among its portrayal and its entire floorplan.VLSI floorplan is used for architecting modules on a single chip. Overall contributions for the floorplanning is an arrangement of m modules W= {w1, w2, w3…… wm}. Widths, statures, and territories of modules are followed as wi, and ai ;1≤ i≤ m. Design target is to mastermind how the modules are placed on a chip under imperatives that any two modules are most certainly not covered and region, wirelength and other execution lists are ideal. Floorplanning has two sets of modules in [2]: **Hard Modules**: A module whose region and viewpoint proportion are settled. **Delicate Modules**: A module is known as a delicate module whose region is settled however angle proportion can change. Figure. 1 portraits to floorplanning representations like B-Tree, sequence pair, polish notations and bounded slice grid.

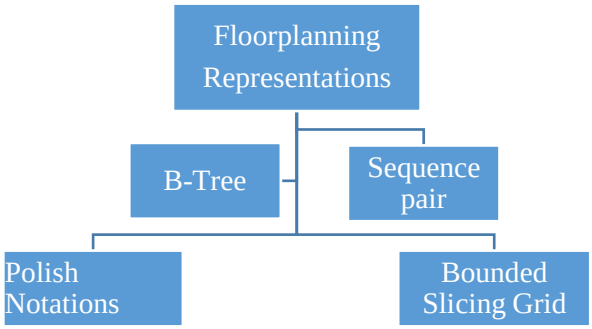

Figure. 1 Basics of Floorplanning Representations

Section II portrays about basics of floorplanning. At that point segment III incorporates near General Classification of floorplanning algorithms. Then, Section IV states about the proposed floorplanningalgorithm.At long last, finishes up the letter with conclusion.

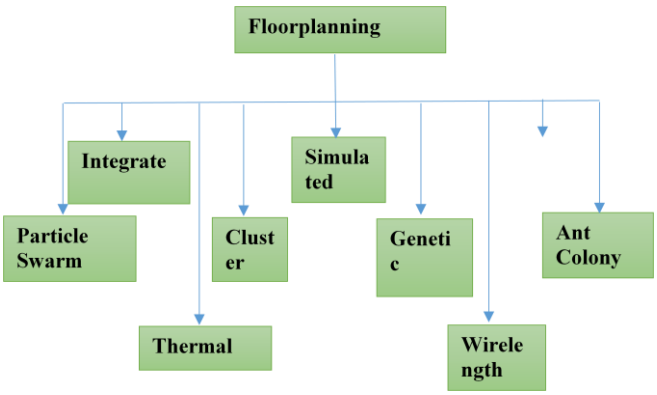

Figure.1 Classification of Floorplanning Algorithms

II GENERAL CLASSIFICATIONS OF FLOORPLANNING SCHEMES

Floorplan algorithms are classified based on the interconnect, sizing, temperature management, clustering and power optimization. The essential rule behind floorplanning using the Simulated annealing [9] is the delineation of geometric relationship while the logical based approach manages the outright relationship specifically. The calculation turns out to be versatile and powerful as far as wirelength minimization in spite of repetitive division scaled well and demonstrated its accomplishment in minimization of wirelength and strengthening based floorplanning. Srinivas Katkoori and Pradeep Fernando (2008) [10] considered an algorithm using multi-objective genetic for achieving wirelength and area best floorplanning. To allocate rank for the solutions, the non-domination concepts are

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used.Fruitful lessening of inductive exchanging clamor can be refined by the accompanying: Reduce the quantity of yields that switch at the same time by isolating them into bunches with each gathering having various defer supports embedded into their information ways Use the most minimal evaluated sink present or low-clamor yield cushions as long as speed isn't an issue Place the at the same time exchanging yield or bidirectional cushions together furthermore, disperse power and ground cushions among them as indicated by their relative commotion rating Assign static and low recurrence input cushions to higher inductance bundle pins Reduce the viable power and ground stick inductance by allocating as numerous power and ground cushions as could be expected under the circumstances. By considering this as a main priority the proposed Algorithm is composed.

III MODIFIED FLOORPLANNING WITH MINIMUM WIRELENGTH

In the wire length placement refinement, apportioning the switch part and therapist part together. Since TSV check is not any more priority. In Figure 3, contract is performing amid the switch process. After each move of the module in the switch part, we contract modules in each layer iteratively to get the most limited wire length. Restore the outcome with the most limited wire length toward the finish of the program.

(1) **Reading the files** of benchmark circuits.
(2) **Generation** floorplan solution.
(3) **Initialization:** temperature Temp0 according to (1).
(4) **Shuffle** the current solution arbitrarily and produce a newsolution.
(5) Once the **new solution** is correct compared to the available solution, replace the current solution with
the new solution
(6) If the number of **reputations** at the current temperature ranges Markov chain the length, Move to the
next step, otherwise go back to step (4).
(7) **Temperature diminution** according to the cooling schedule: Temp (j) =α Temp (j-1).
(8) **Redo** steps 4-7 until the criterion is achieved.
(9) Output the better solution obtained so far.

III RESULTS AND DISCUSSIONS

The results are taken in the AMI33 and AMI 49 bench mark details of benchmark circuit has good results when compared to traditional method which is discussed in Table I. The constraints of the Simulated Annealing based algorithm are explained in the following: (a) The cooling factor is 0.95. (b) Markov chain length takes 40*n, (n is the number of modules of benchmark) . (c) The algorithm ends while the temperature is minimum than 10-6 Temp0 or the number of accepted agitation is less than 1% at a minimum temperature. The chip area and percentage of dead space are explained in Table II which includes the comparisons between previous work and the proposed work. Floorplan area is calculated by minimum bounding box which includes all modules. Floorplanning results of ami33 and ami49 obtained by the proposed MFMW algorithm. This algorithm can generate a better floorplan whose dead space percentage is less while consuming minimum operation time.

Table.I Comparisons of various algorithms using AMI33 and AMI 49

Number of Placement Constraints	Floorplan Constraints method [5]		Proposed Floorplanning	
	Time (sec)	Wirelength 10^6	Time (sec)	Wirelength 10^6
4	18.0	0.0248	16.23	0.0221
8	20.04	0.0252	17.91	0.0258
12	19.89	0.0252	19.88	0.0214
4	25.63	0.0252	22.12	0.0223
16	24.05	0.0252	24.20	0.0269
18	41.99	1.280	28.99	0.0480
20	42.37	1.931	29.28	0.0482
22	357.39	1.467	228.11	0.977
24	374.71	1.448	344.71	1.403

IV. CONCLUSION

Entire modules have a substantial concentration on the diminution of chip area and total wirelength in slicing floorplan. Already are various floorplan representation have been discussed in this paper. From the analysis, O-tree representation and B*-tree representation is most effective when compared to all representations but with minimum flexibility. At foremost, the disadvantages of dead space are investigated and an instinctive and profligate method is proposed to find the equitable part of component. Then, a tormenting for standardized expression is improved to produce new solution, and the proposed simulated annealing algorithm is opted for the best floorplan solution. Experimental results demonstrate that the proposed MFMW method attains less area on the commonly used AMI33 and AMI 49 benchmark circuits.

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Necessities of the Strategic Heavy Ion Tumor Therapy Accelerator Facility: Physical and Radiobiological Welfares

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Abstract— *Modern scanning beam systems take full advantage of the well-defined range and small lateral beam spread allow the dose to be delivered with millimeter precision. Moreover, the heavier projectiles than protons such as carbon ions have increased biological efficiency in the peak region of Bragg due to the dense ionization of the individual particle tracks, leading to a lowered cell repair. This makes them especially attractive for the treatment of radiation-resistant tumors located near risky organ. For study purpose the HICAT project is a Heavy Ion accelerator for light ion Cancer Treatment to be built for the clinics in Heidelberg, Germany. It consists of a 7 MeV/u linac, a compact synchrotron and three treatment places, one of them located after a 360 degree gantry beam-line. The control system should be developed, installed and maintained by and under the complete responsibility of an industrial system provider, using a state-of-the-art system and widespread industrial components wherever possible.*

Keywords— *scanning beam, radiation source, cancer treatment*

I. INTRODUCTION

In humans, there is a wide range of radiation response that is determined by parameters including radiation source, radiation dose (amount of radiation energy received), exposure length, and, most importantly, the exposed individual's genetic and epigenetic composition. These parameters may vary widely, and humans may be exposed to low-dose radiation from commonly used medical diagnostic tools such as computed tomography (CT) scanning or high radiation doses such as those used for radiation therapy and generated by nuclear disasters. The genetic and epigenetic aspects are significant in many conditions and can, for example, determine an individual's likelihood of developing cancer or responding to cancer treatment (e.g., some tumors either have an intrinsic resistance to ionizing radiation (IR) or acquired this property through cyclical accumulation of genetic mutations and selection for increased survival and proliferation).

After surgery it is the most frequently and most successfully applied form of therapy. More than 50% of all patients with localized malignant tumors are treated with radiation. In radiotherapy the key problem is to deliver the dose in such a way that ideally the planned target volume receives 100% of the dose needed to kill all cancer cells in the tumor, while the surrounding normal tissue should not receive any dose. In practice, this cannot be achieved because of the unavoidable dose deposition in the entrance channel of the radiation. In the past 50 years much progress has been made to improve dose delivery towards the ideal situation and to thereby increase the tumor control rate. These achievements would not have been possible without the strong and fruitful interdisciplinary collaboration of scientists in the fields of oncology and radiation medicine, radiation biology, accelerator technology, and engineering, as well as atomic and nuclear physics.

Radiation is categorized as ionizing and non-ionizing in two main forms. Environmental radiation is mainly nonionizing, including sunlight ultraviolet (UV) rays and the radio waves and microwave-related electromagnetic radiation. It is now established that non-IR sources such as UV rays (from the sun or from tanning beds) are capable of harming biological tissues [2]. However, the interaction between IR and biomolecules is much more aggressive than non-IR, as the IR can induce atomic ionization. The source of IR is a class of unstable radionuclides (radioisotopes) that emit high-energy particulate matter, which can shift atomic electrons and thus facilitate electron ejection chain reaction. The main types of IR are alpha, beta, X-rays and gamma rays. Because alpha and beta particles, for instance a paper sheet or a plate, can be stopped by physical barriers while X-and gamma rays penetrate more, environmental gamma-rays exposure causes greater biological damage than alpha or beta particulate exposure. However, all four types of radiation are used for therapeutic purposes successfully and can cause significant cell damage.

No passive elements are foreseen to match the dose distribution to the individual tumor geometry. Instead, all beam lines will be equipped with horizontal and vertical scanning magnets and beam diagnostic devices for the intensity controlled-raster scanning technique that was developed and successfully demonstrated within the GSI experimental cancer treatment program with over 100 patients to date. Fig. 1 shows the cross section of the first underground floor of the building which houses the accelerator sections, the patient treatment areas, local control rooms and various laboratories and offices. For a general description of the accelerator complex, see [1].

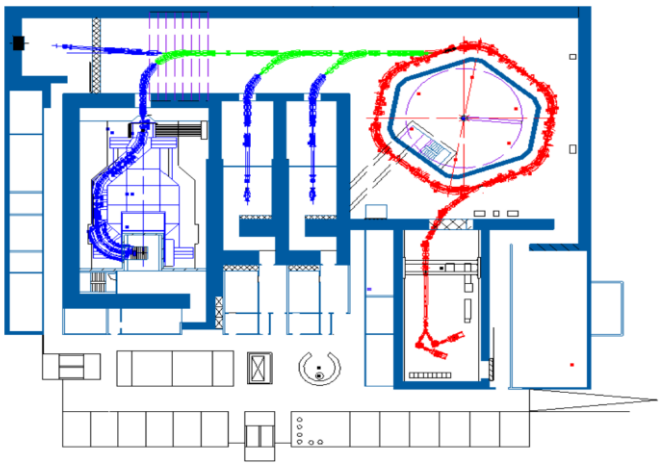

Figure 1: First underground level of the HICAT facility

The main contributions and organization of this paper are summarized as follows: In section II we describe literature review of diagnostic tools in medicine. The section III methods and methodology. Finally in section IV we concluded the paper.

II. Literature Review

These parameters can range widely, and humans may be exposed to low-dose radiation from commonly used diagnostic tools in medicine such as computed tomography (CT) scanning or high doses of radiation such as those used for radiotherapy and generated by nuclear disasters.

In [3], the authors claimed that the radio-sensitizing effect of oleanolic acid, a naturally pentacyclic titerpenoid, on tumor cells is enhanced. Whether or not OA increases the radio sensitivity of hypoxic cells, however, is unclear. Therefore, the objective of this study was to further observe the influence of OA on hypoxic tumor cells and also investigate the relative mechanism. Clonogenic assay evaluated the radio sensitivity of rat glioma C6 cells and human lung cancer A549 cells with various treatments under mimetic hypoxia. Meanwhile, a micronucleus (MN) test was used to observe the intracellular DNA damage alteration. We used the glutathione reductase dithiobis-(nitrobenzoic acid) (DTNB) recycling assay to determine the mechanism involved in the OA influence on the radio sensitivity of hypoxic cells. At the same time, both enzymes for GSH synthesis were tested using appropriate methods for the activities of π-glutamylcysteine synthetase (π-GCS) and GSH synthase (GSS). Western blot method also observed its levels due to the involvement of hypoxia-inducible factor-1α (HIF-1α) in the resistance of hypoxic cells to radiation damage. Results from this study showed that the clonogenic growth of irradiated cells under mimetic hypoxia increased while the refractory effect of hypoxic cells on radiation decreased after OA therapy. In addition, the (MN) frequencies in the OA-treated hypoxic cells were increased after irradiation compared to the OA-treated cells. In the subsequent experiment, the biosynthesis of intracellular GSH was significantly reduced by OA by attenuating the activity of π-GCS. In addition, the expression of HIF-1α in irradiated cells treated with OA at different concentrations was evidently reduced. In conclusion, by reducing intracellular GSH content and HIF-1α expression, OA significantly increased the radio sensitivity of tumor cells under mimetic hypoxia.

In [4], the authors presented positron emission tomography (PET) is currently widely used in clinic tumor staging and response therapy. However, due to higher use of PET, average exposure to PET radiation has increased. This study aims to review state-of - the-art methods for optimizing PET tracer dosage after taking into account the effects on the counting rate of human body attenuation and scan protocol parameters. The relationship between noise equivalent count rate (NECR) and dosage (NECR-dosage curve) for a range of clinical PET systems and body attenuation sizes will be systematically studied in order to estimate the minimum dosage required for sufficiently high NECR in the future. The criterion for optimization can be determined either as a function of the NECR-dose curve peak or as a fixed NECR score when NECR uniformity is important across a patient population. In addition, systematic NECR evaluations of realistic simulations and phantom experiments within a controllable environment can lead to a NECR-dosage response model that can predict the optimal dosage for each individual PET scan. NECR-based optimization recommends: i) moderate dosage to 90% of the peak NECR for obese patients; ii) significant dosage reduction for slender patients such that uniform NECR is achieved throughout the patient population; and ii) prolongation of scans for PET/MR protocols, in which the PET acqq is longer than the conventional guidelines for obesity patients; Finally, there will be discussion of the need to adapt dosage optimization continuously to emerging technologies.

In [5], the authors built a patient-specific clinical Lu-DOTATATE treatment model system for testing renal absorbed dose variability and biologically effective dose (BED) estimates. Three anthropomorphic computer phantoms coupled with the pharmacokinetic model of Lu-DOTATE are used as patient models. Aspects included in the dosimetry process model include gamma cameras ' calibration through system sensitivity measurements, time selection of imagery points, the creation of CT mass density maps, SPECT imaging, interest volume delineation, absorption dose calculation via the combined local energy deposition for electrons and Monte-Carlo photon simulations, curve fitting and introductions. The combined uncertainty in output quantities is determined by introducing variability in these steps. The importance of various sources of insecurity is assessed by observing that the standard deviation decreases when a certain source is removed. The dose and standard BED deviations obtained are approximately 6% and slightly higher if the root means a square error. The principal sources of variability are partial volume effect compensation by a retrieval coefficient and gamma-camera calibration by system sensitivity.

III. METHODS AND METHODOLGY

Process Data:

The main characteristics of the HICAT facility are the application of the raster-scan method with active intensity-, energy- and beam size-variation in combination with the usage of an isocentric gantry to match the dose distribution to the individual tumor geometry. During the patient irradiation process (treatment mode) the treatment sequencer requests beams with certain characteristics on a pulse-to-pulse basis.

In order to achieve high operational reliability the CS must meet the following requirements:

• use only proven and validated settings,
• protect settings from loss and accidental modification,
• inhibit operator's access/interference during irradiation,
• avoid networking for settings, provide all beams in stand-by on a pulse-to-pulse basis

Timing system:

For the entire accelerator chain, including linac RF structures, choppers, bunchers, and all synchrotron devices, a strict synchronization is required. Some time-critical functions (i.e. triggers, acceleration ramps) must by synchronized within $\Delta t<1–5\propto s$ at the worst. The CS must implement a timing controller that provides a system-wide synchronization for distributed devices with real-time performance. The system must be flexible enough to react on requests for beam extraction pauses and aborts.

Patient safety:

The accelerator control system cannot promise safety and reliability because of the high number of machines acting on the beam. Instead, a fast and fail-safe beam-abort system will be implemented which will reliably stop the beam within 200 μs. This is sustained by concurrently triggering a chain of different actions using various devices, all of which are able to prevent beam delivery to the treatment site on their own. The treatment sequencer's sophisticated online beam diagnosis verifies the correctness of the beam parameters (position, focus, intensity) in relation to the treatment plan.

Scanner system:

Using the existing framework-of - the-art GSI system [3] and adapting it to the new environment is foreseen for the real-time treatment sequencer. The functions will be extended before schedule to include gated beam extraction and the end of extraction.

IV. CONCLUSION

An essential step was the design and construction of proton beam scanning systems for PSI and GSI carbon ions, creating optimal conditions for IMPT use and providing highly tumor-conforming treatments with better sparing of normal and organ tissues at risk. At the same time, comprehensive radiobiological studies have led to a better understanding of the biological efficacy of heavy ions. Comprehensive biological treatment planning strategies and models were developed and implemented in treatment planning systems. These enormous achievements have made the specific advantage of heavy ions more effective, characterized by the combination of physical and biological advantages.

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Optimization of on Chip Permutation Network for Multiprocessor SOC

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Abstract

On chip interconnection between the networks plays a critical role in designing. So, to enhance the performance of network in terms of quality of service (QoS) can be improved. This burning issue in networks finds extensive use in traffic permutation and control. However, the current traffic models for on-chip interconnection networks are insufficient to capture the traffic characteristics as well as evaluate the network performance. The given paper presents the silicon-proven design of a novel on-chip network to support guaranteed traffic permutation in multiprocessor system-on-chip applications. On-chip network achieves reduction of silicon overhead compared to other design approaches. Test-chip validates the feasibility and efficiency of the proposed design.

Keywords: Multistage interconnection network, Network-on-chip, Permutation network, Pipelined circuit-switching, Traffic permutation

1. INTRODUCTION

The multiprocessor system-on-chip (MP SoC) design being interconnected with on-chip networks is currently emerging for applications of parallel processing, scientific computing, and so on Permutation traffic, On-chip multiprocessing applications exhibited with a traffic pattern in which each input sends traffic to exactly one output and each output receives traffic from exactly one input. The standard traffic occurs in general-purpose MP SoCs, for example, and fast Fourier transform (FFT) computations, polynomial, sorting cause shuffled permutation, whereas transpose permutation is exhibited in matrix transposes or corner-turn operations. Recently, application specific MP SoCs targeting flexible Turbo/LDPC decoding have been developed, and they exhibit arbitrary and concurrent traffic permutations due to multi-mode and multi standard feature. In addition, many of the MP SoC applications (e.g., Turbo/ LDPC decoding) compute in real-time, therefore, guaranteeing throughput (i.e., data lossless, guaranteed bandwidth, predictable latency, and in-order delivery) is critical for such permutation traffics.

Regarding the topology, regular direct topologies, such as mesh and torus, are intuitively feasible in a 2-D chip with physical layout. On the contrary, the large router radix and the high wiring irregularity of indirect topologies such as Butterfly or Benes pose a challenge for physical implementation. However, throughput degradation is lead in an arbitrary permutation pattern with its intensive load on individual source destination pairs stresses the regular topologies. Indirect multistage topologies are preferred for on-chip traffic permutation intensive applications.

2. EXISITING METHODOLOGY

A dynamic PA Common switch architecture-setup scheme supports a runtime path arrangement when the permutation is changed. Each path setup, based on dynamic probing mechanism which starts from an input to find a path leading to its corresponding output. The probing is introduced in works, in which a probe (or setup flit) is dynamically sent under a routing algorithm in order to establish a path towards the destination.

The Exhausted profitable backtracking (EPB) uses to route the probe in the network work. A path arrangement with full permutation consists of sixteen path setups, whereas a path arrangement with partial permutation may consist of a subset of 16 path setups. Regarding the switching technique, packet switching requires an excessive amount of on-chip power and area for the queuing buffers (FIFOs) with pre-computed queuing depth at the switching nodes and/or network interfaces. Regarding the routing algorithm, the deflection routing is not energy-efficient due to the extra hops needed for deflected data transfer, compared to a minimal routing. Moreover, the deflection makes packet latency less predictable; hence, it is hard to guarantee the latency and the in-order delivery of data. Unlike conventional packet, switching approaches, our on-chip network employs a circuit-switching mechanism with a dynamic path-setup scheme under a multistage network topology. The dynamic path setup tackles the challenge of runtime path arrangement for conflict-free permuted data. The preconfigured data paths enable a throughput guarantee. By removing the excessive overhead of queuing buffers, a compact implementation is achieved and stacking multiple networks to support concurrent permutations in runtimes feasible.

3. The Switch and Network Taxonomy

Clos network, a family of multistage networks, is applied to build scalable commercial multi core processors with thousands of nodes in macro systems. A typical three-stage Clos network is defined as C (n, m, p), where n represents the number of inputs in each of p first stage switches and m is the number of second stage switches. In order to support a parallelism degree of 16 as in most practical MP SoCs, we proposed to use C (4, 4, 4) as a topology for the designed network. This network has a rearrange able property that can realize all possible permutations between its input and outputs. The choice of the three stage Clos network with a modest number of middle stage switches is to minimize implementation cost, whereas it still enables a rearrange able property for the networks. A pipelined circuit switching scheme is designed for use with the proposed network. This scheme has three phases: the setup, the transfer, and the release. A dynamic path setup scheme supporting the runtime path arrangement occurs in the setup phase. In order to support this circuit switching scheme, a switch-by-switch interconnection with its handshake signals is proposed. The bit format of the handshake includes a 1-bit Request (Req) and a 2-bit Answer (Ans). Req = 1 is used when a switch requests an idle link leading to the corresponding downstream switch in the setup phase. The Req = 1 is also kept during data transfer along the set-up path. A Req = 0 denotes that the switch releases the occupied link. This code is used in both the setup and the release phases. An Ans = 01(Ack) means that the destination is ready to receive data from the source. When the Ans = 01 propagates back to the source, it denotes that the path is set up, then a data transfer can be started immediately. An Ans = 11(nAck) is reserved for end-to-end flow control when the receiving circuit is not ready to receive data due to being busy with other tasks, or overflow at the receiving buffer, etc. An Ans = 10 (Back) means that the link is blocked. This Back code is used for a back pressure flow control of the dynamic path setup scheme.

A dynamic path setup scheme of the proposed design to support a runtime path arrangement when the permutation is changed. In each path setup, which starts from an input to find a path leading to its corresponding output, is based on a dynamic probing mechanism. The concept of probing is introduced, in which a probe (or setup flit) is dynamically sent under a routing algorithm in order to establish a path towards the destination. The exhausted profitable backtracking (EPB) is proposed to use to route the probe in the network work. A path arrangement with full permutation consists of 16 path setups, whereas a path arrangement with partial permutation may consist of a subset of 16 path setups. A question is that can the proposed EPB based path setups used with the Clos C (4, 4, 4) realize all possible full permutations between its inputs and outputs? As proofed in works, the three stage Clos network C (n, m, p) is rearrangeable if

m>n In the proposed network of C (4, 4, 4) m = n = 4 so it is rearrange able. There will always exist an available path from an idle input leading to an idle output. By the Exhaustive Property of EPB as proofed in work, the EPB based path setup completely searches all the possible paths within the set of path diversity between an idle input and idle output. Directly applying the Exhaustive Property of the search into rearrange able C (4, 4, 4) shows that the EPB based path setup can always find an available path within the set of four possible paths between the input and the idle output. Based on this EPB based path-setup scheme, it is obvious that the path arrangement for full permutation can always be realized in the proposed network with C (4, 4, 4) topology.

As designed in this network, each input sends a probe containing a 4-bit output address to find an available path leading to the target output. During the search, when the probe moves forwards it will find a free link and moves backwards it will face a blocked link. In non-repetitive movement, the probe finds an available path between the idle input and its corresponding idle output. The EBP based path setup scheme is designed with a set of probe routing algorithms as mentioned later. The following examples describe how the path setup works to find an available path by using the set of path diversity. It is assumed that a probe from a source (e.g., an input of switch 01) is trying to set up a path to a target destination (e.g., an available output of switch 22). First, the probe will non-repetitively try paths through the second stage switches in the order of 10»11»12»13 Assuming that the link 01-10 is available, the probe first tries this link Req = 1 and then arrives at switch 10. If link 10-22 is available, the probe arrives at switch 22 and meets the target output. If Ans = Ack then propagates back to the input to trigger the transfer phase. If link 10-22 is blocked, the probe will move back to switch 01 (Ans = back) and link 01-10 is released Req = 0. From switch 01, the probe can then try the rest of idle links leading to the second stage switches in the same manner. By means of moving back when facing blocked links and trying others, the probe can dynamically set up the path in runtime in a conflict avoidance manner.

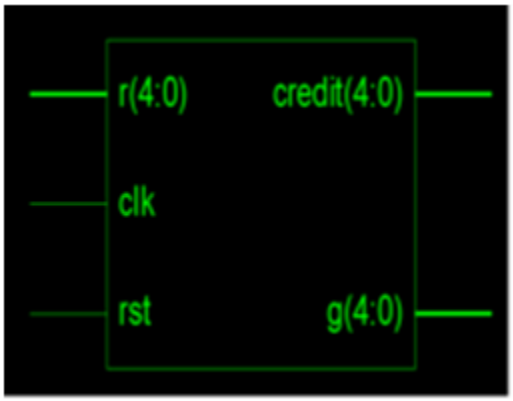

Fig.1 RTL of Arbiter

4. SIMULATION AND RESULTS

The RTL schematic of the simulated of arbiter is as shown in above Fig. 1 of R (4:0) shows the input for arbiter which consists of controls signals from input circuit. Were credit and G(4:0) indicates the credit signals and grant signals respectively along with these control signals there are some deciding input signals for the arbiter which are reset and clock.

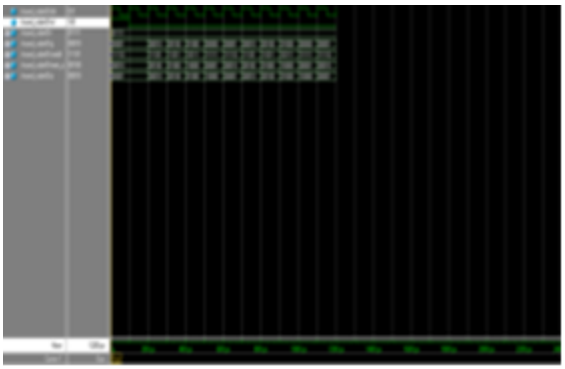

Fig.2 Simulation Results of Arbiter

The simulation waveform of the arbiter is as shown above in Fig 2 of R(4:0) shows the input for arbiter which consists of controls signals from input circuit. Were credit and G(4:0) indicates the credit signals and grant signals respectively along with these control signals there are some deciding input signals for the arbiter which are reset and clock with the next-p signal for the next registers.

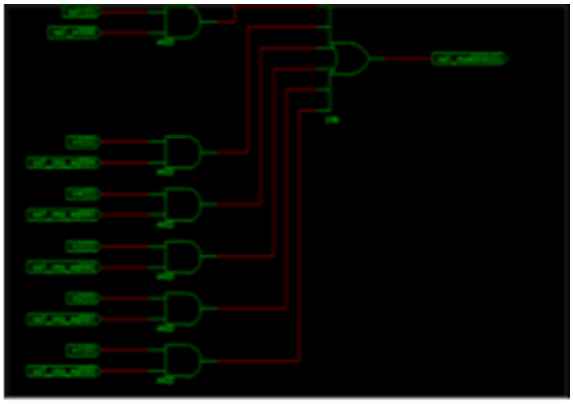

Fig.3 RTL Schematic of Cross Bar

The RTL schematic of the internal circuit of cross bar is as shown above in Fig. 3 which consists of and gates were the input of these and gates are given from manual data or from any module in turn the output is decided by one the multiplexer. The circuit shown is for the one input cross bar.



Fig. 4 Block Diagram of Cross Bar

The RTL schematic of the simulated of cross bar is as shown above in Fig. 4. The complete cross bar is shown in the schematic were the 4x4 input and output lines and 4 select lines.

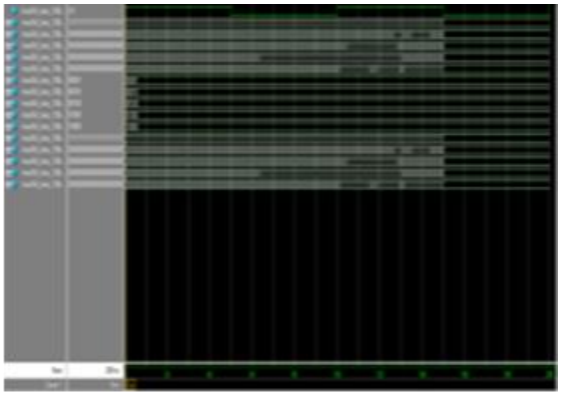

Fig.5 Simulation results of Cross Bar

The simulation waveform of the cross bar is as shown above in Fig. 5. Where the 4x4 input and output lines and 4 select lines

5. CONCLUSION

On chip network design supporting traffic permutations in MPSoC applications. By using a circuit switching approach combined with dynamic path setup scheme under a Clos network topology, the proposed design offers arbitrary traffic permutation in runtime with compact implementation overhead. A silicon proven test chip validates the proposed design and suggests availability for use as an on-chip infrastructure-IP supporting traffic permutation in future MPSoC researches.

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Enhanced Protocols for CT Slice Thickness on Clinical Target Volume for 3d Radiation Therapy

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Abstract—Radiation Therapy is used to treat the cancer diseases by ionization of radiations. From the beginning the aim of radiation therapy is to cure the cancer without any side effects. Tumor location and type, geometric accuracy and involvement in anatomic area affect the output of radiation therapy in which the amount of radiation dose is given. The tumor is controlledby production of high dosage of radiation. The amount of dosage is limited by possibility of damage of normal tissue. To control the amount of dose, for three dimensional radiation therapy computed tomography (CT) slice thickness is proposed in this paper. This paper defines the changes of CTV (clinical target volume) using various computed tomography slice thickness on three dimensional radiation therapy. For all computed tomography datasets, planning of three dimensional treatments isachieved.

KEY WORDS: Radiation Therapy, computed tomography (CT) slice CTV (clinical target volume)

I. INTRODUCTION

Radiation therapy is also known as radio therapy which is used for treatment of cancer. To minimize the size of tumor and to kill the cancer cells, high dose of radiation used in radiation therapy. To observe inside body x-rays are used in which the radiation is done at low dose. Radiation therapy kills the cells of cancer by using high doses and by damaging cancer cells DNA their growth will be slow down [1]. Cancer cells are burst and separated from the body by damaging of cancer cells. Cancer cells are not killed byradiation therapy immediately. The treatment goes on few days or weeks before the damaging of DNA for pass on cancer cells. After end of radiation therapy, cancer cellstake weeks or months to die.

Today various types of radiation therapy are used to treat the cancer. Based on the radiation waves or particles, classification of radiation therapy is done to provide the treatment. Different radiation therapy techniques are protons, electrons and photons. Among these electrons and photons are widely used in the United States and other countries. Also, proton therapy facilities are in beginning stage. Usually, radiation therapy contains three most important subtypes, these maintains same biological effects on tumor tissue [2]. That means to eliminate the tumors these three subtypes contain same potential. Though each type maintains different advantages and disadvantages.

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The radiation applied to propagation and emission of energy over the space or medium of material. Generally particulate radiation and electromagnetic radiation are types of radiation.

Oscillating electrical and magnetic fields is used for characterization of electromagnetic radiation in which both fields contains dual characters. In the radiation therapy electromagnetic radiation has two forms they are gamma rays and x-rays. Tungsten-Molybdenum is the high atomic number material. In the anode of x-ray tube, high speed electrons run into high atomic number material to produce x-rays where as intra nuclear disintegration provides gamma rays. Travelling corpuscles propagates the energy is known as particulate radiation and it has definite rest mass and momentum and position [3].

Even though in many researches, in radiation therapy therapeutic modality represented in the photon-beam because particulate radiation is used with different uncertain technical problems. Between the matter and photon interactions are occurred if γ-ray or x-ray passes over the medium and energy is feed to medium. Absorption, transmission, scattering and attenuation are done by the photon beam. Pair production, Photo electric effect and Compton Effect are the main types of radiation to interact with matter and those types are important in radiation therapy. Now a days radiation therapy of mega voltage, Compton Effect is mostly used. In diagnostic radiology photo electric has the importance and now days radiation therapy has historical importance of photoelectric effect. The energy is provided by the interaction of protons with free electrons in Compton Effect. The photon is spread by angle, electron handles the energy and photon lost the energy which is interconnected [4]. The change of wavelength not depends on irradiated material and energy ofradiation. The change of wavelength depends on angle in which the radiation is spreads.

Although EMET therapy contains the capabilities of energy modulated electron which is used to obtain high dose distribution in superficial targets and due to the problems of inherent in electron beam radio therapy, EMET is not implemented. Before works new technique was proposed by using automated few leaf electron collimators (FLEC) to provide EMET. This technique contains four motor driven leaves which are fixed in clinical electron beam applicator. This technique combined with optimization algorithm based on Monte Carlo, kernels of patient specific dose used in this

algorithm and operation of linear accelerator combined with treatment delivery. Clinical accelerator added with accessory tool which is provided by FLEC. The constructionand design of FLEC is provided and presented goals are matched.

In-house developed EMET controller controlled theFLEC prototype. Here described the EMET controller software structure and characteristics of hardware. For different sizes and various fields, Monte Carlo calculations are authorized by getting measurements of output by the use of parallel plate ionization chamber. By using energy independent radio chromic films, 1-D and 2-D dosedistributions are compared, for this purpose performs the further verifications.

For the correct dose reports and planning of 3D treatment, volume definition is required. Several targets and volumesof critical structure are described by 50 and 62 of ICRU reports those are provided in the process of treatment planning and basis is provided for the treatment outcomes comparison. To avoid tumour remission in planning of radiotherapy treatment tumour volume is estimated correctly. In complete eradication of disease tumour volume estimation isimportant task. The indirect measure of clonogen number is the tumour volume and it has direct impact on local disease control by using radiotherapy. Tumour bulk is measured by correct volume definition and analysis of treatment responseare also provided.

In the treatment planning, different imaging techniques are available such as CT (magnetic resonance imaging) and CT in which CT is used to decrease variation of inter observer and Ct is used to process of dose calculation. Each phase of treatment is impacted by interslice spacing and slice thickness between CT sections. Definition of structures is affected by it and reconstructed image quality represented in arbitrary planes, coronal and sagittal. For the dose displayand localization, DRR (digitally reconstructed radiographs) is utilized. In ICTT (intensity modulated radiation therapy) definition of volume has a crucial role, it is more sensitive to uncertainties of geometric because organs at risk and sharper dose gradients at the target volume. Different authors describe the target definition importance. For the localization the treatment volume superior and inferior boarders are defined by PTPCWG (photon Treatment Planning Collaborative work group) in 1991.

To get cooperation between throughput and resolution, for the head take the close space between sections, maintain the CT slices with the thickness of 3 to 5 mm and for the body CT slice thickness as 5 to 10 mm should be required.In the radiation therapy additional studies are necessary for CT slice thickness optimization and it is recommended by PTPCWG. The aim of this technique is to determine target volume variation with various thicknesses of CT slices. In the planning of 3D radiation therapy the impact of variation is studied in this paper. For the 3DRTrequired CT slice thickness determination and centre of mass of tumour changes with various CT slice thickness are focused in this paper.

II. TWO-DIMENSIONAL PHOTON BEAM DISTRIBUTION USING FIBRE OPTIC RADIATION SENSOR

To treat the tumor, the position of radiation beam is determined by X-ray films if conventional radiation therapy or 2D is utilized. Generally, for the radiation treatment planning machine is used that is called fluoroscopicsimulator. To find the position of tumor bones on x-ray is used as landmarks and for the treatment of tumor the radiation beams position in the patient is also identified. There should be leave normal organs. Planning should be done quickly and the treatment can be started fast by patients and other techniques has more time consuming and high in-depth in the planning. For urgent treatment this type of techniques are used.

In radiation therapy, to measure high energy photon beam fiber optic sensor is used with organic scintillator. For small field radiation therapy to determine real time dose distributions and high resolution, 2-D fiber- optic sensor was utilised. Organic sensor probe provides scintillating lights which are combined and arranged into water phantom. These are guided by 10m plastic optical fibers. For the photon beam with different field sizes and various energies, measure the distribution of 2-D (2-dimentional) photon beam in water phantom.

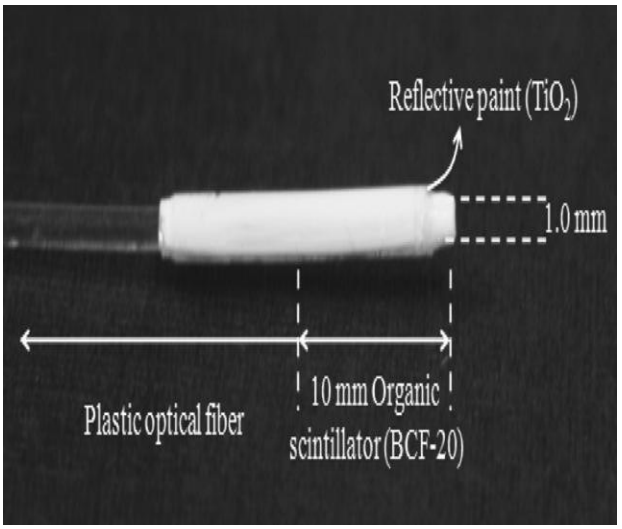

Fig. 1: OPTICAL FIBRE RADIATION SENSOR.

The designing of Fiber optic radiation sensor is displayed in above figure and it is designed by using POF and organic scintillator probe. This sensor contains 2-D organic scintillator probes in water phantom and irradiation fields are 6 and 15 MV photon beams. In this study the organic scintillator is used which is available designed with PVT (polyvinyltouene) base with wavelength shifting. The emission colour of this organic scintillator i green and peak wavelength is specified as 492 nm. In this scintillator, number of emitted photos per1MeV of energy are dropped which are 8000. This scintillator is in the form of cylinder and its measurements are diameter is 1mm and length is 10mm. polished the surfaces of ends of cylinder with different optical grade polishing pods and powders. By

using optical cement the organic scintillator is sticked into POF. By using powders and polishing pods the surfaces of POF‟s are polished. The titanium dioxide is used to make the reflective paint which is used in sensor probe outside to improve the efficiency of scintillating light collection and to capture the light noise from outside. Another name for this scintillator is typical organic scintillator, these are depends on PVT.

III. CT SLICE THICKNESS ON CLINICAL TARGET VOLUME FOR 3D RADIATION THERAPY

For the definition of target volume, brain tumours are selected, due to obtaining of various CT slice thicknesses there is no impact on organ motion. There are two steps in three dimensional radiation therapy treatments: one is phantom study and another one is clinical study. For planning of 3D treatment, the determination of minimum CT slice thickness is used by the study of phantom study. After completion of determination of minimum slice thickness, clinical study is carried out by the comparison of calculated tumour volume with minimum and larger slice thickness. In the planning of 3D treatment, the impact on CT slice thickness was also proposed, for the slice thickness iso-center values are shifted with tumour values.

For the treatment of tumours three dimensional radiation therapy is mostly used. It is used when the tumour closed to important organs such as neck, lung, and carcinomas of prostrate, bladder, spine, head and pancreas. Most of 3-DRT cases begin with „virtual simulation‟ session that lasts in between 30 and 90 minutes. In the treatment position, CT scans are taken from patients and that images are send to the treatment planning computer. The Ct slices are marked to the required volume for the treatment by clinician. The volume of 3D image produced by computer and highlighted the critical structures at the risk. Due to this best beam arrangements are defined and minimum dose distribution is calculated by computer. To provide image digitally beam‟s-eye view could be generated to see the simulation film which is utilised in verification of treatment. Beam shaping covers the critical structures and these are obtained with use of lead box or use of multi-leaf collimators. Multi leaf collimators are computer controlled movable leaves within treatment machine which is used to block the part of radiation field. A conformity index, defined in Equation 1, was used to measure the target dose conformity.

$$CI = \frac{TV_{RI}}{TV} \cdot \frac{TV_{I}}{V_{RI}} \quad (1)$$

where, TVRI was the target volume covered by the reference isodose (95%), VRI was the volume covered by the reference iso dose (95%), and TV was the target volume.The target dose homogeneity was measured with a homogeneity index (HI) defined in Equation 2.

$$HI = \frac{D_{5\%} - D_{95}}{D_{mean}} \quad (2)$$

where, D5%, D95% indicated that at least 5%, 95% of the target volume received this dose, and Dmean was the mean dose to target. The HI value was between 0 and 1, with 0 representing the ideal homogeneity, whereas the CI value was between 0 and 1, with one representing the ideal conformity. In OAR, the minimum and maximum dose of spinal cord, V30 and V40 of heart, and V20 and V30 of lung were analyzed and compared.

First scanning was done in sequential mode for all patients and before CT scanning for every patient non-ionic contrast was organized. The results of phantom study are, for the planning minimum slice thickness is 2.5 mm, accuracy is 3%. For all patients three scans are performed with different slice thickness such as 2.5, 5 and 10mm in sequential mode. By using DICOM network CT data sheets are send to the Eclipse treatment planning system. In the 3D treatment planning system based on 3D CT datasets (2.5, 5 and 10 mm), external body contour and volume of tumour are defined.

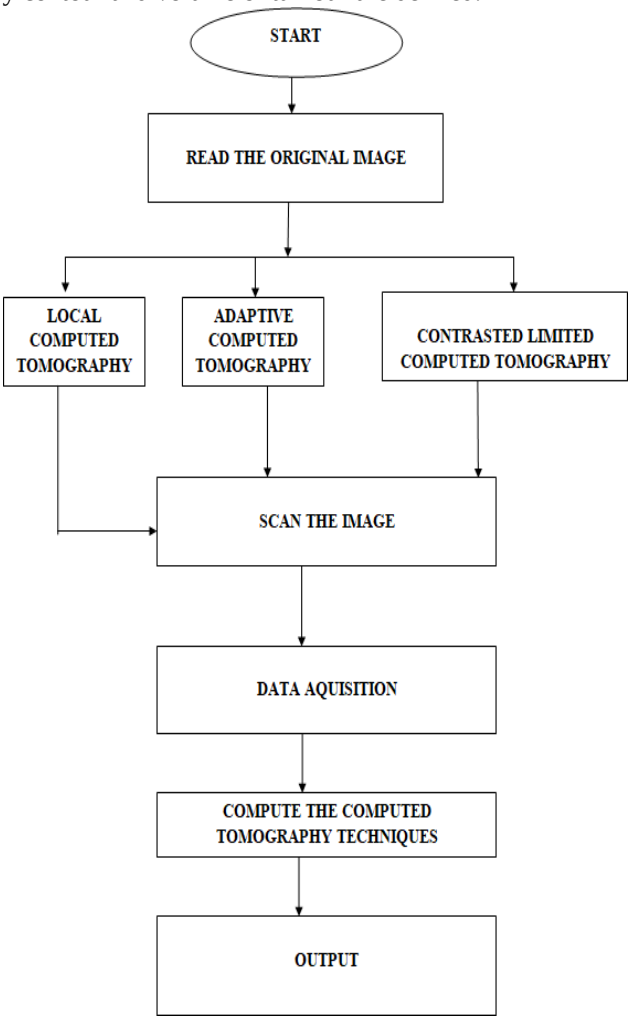

Fig. 2: PROPOSED SYSTEM

Clustering pixels into prominent picture region is the goal of image acquisition. In order to provide data such as anatomical structure and identify the region of interest, i.e. locating the tumor, lesion and other abnormalities, the acquisition of gray level data is used. The suggestion method depends on the anatomical structure data of the healthy components and compares it with the infected components. This starts by assigning a reference picture of a standard candidate brain scan picture to the anatomical

structure of the healthy components.

The aim of radiation therapy (RT) is to cure the cancer disease without any side effects. In the planning of radiation therapy treatment, imaging has an important position; there is an impact on volume of tumour definition and outcomes of final treatment. Three dimensional radiation therapy computed tomography (CT) slice thickness is proposed in this paper. It is observed that the accuracy of definition of tumour volume depends on Ct slice thickness. From the study of proposed system it is concluded that for three dimensional treatment planning of brain tumours, thethickness of CT slice should be the 2.5 mm for tumour volume<25cc and for volume of tumour>25 the slice thickness is 5mm. Proper planning is achieved for three dimensional radiotherapy treatment for tumour.

CT scan enhanced to detecting the suspicious region by the using of the Pre-processing techniques. The first step of pre-processing is tracking features involves those activities that are usually crucial prior to major information reviewand detail extraction, and are frequently grouped as radiometric or geometric improvements. for example, film artifacts or labels, names, age and marks of the patient. Through the tracking algorithm, film artifacts areeliminated. At this point, the intensity value of the pixels starting from the primary row and the initial column is analyzed and the threshold value of the film artifacts isfound. The threshold value should be noted to exceed the threshold values removing from CT. CT eliminates the film artifacts ' high intensity value. At some point in eliminating film artifacts, the image includes salt and pepper noise.

IV. RESULTS



Fig 3: INPUT IMAGE-1

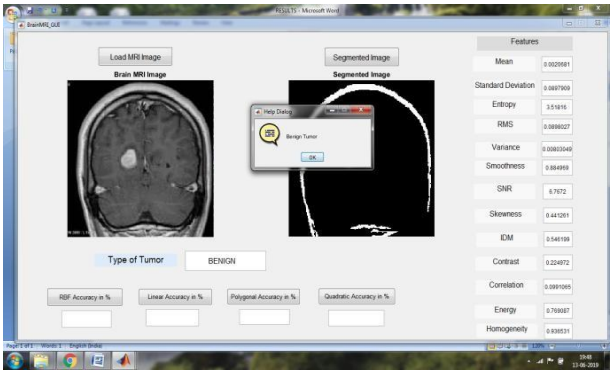

Fig. 4: BENIGN TUMOR IMAGE-1

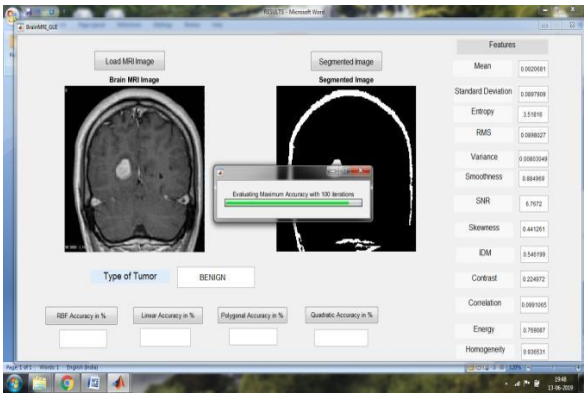

Fig. 5: EVALUATION OF MAXIMUM ACCURACY WITH 100 ITERATIONS OF FIG 2

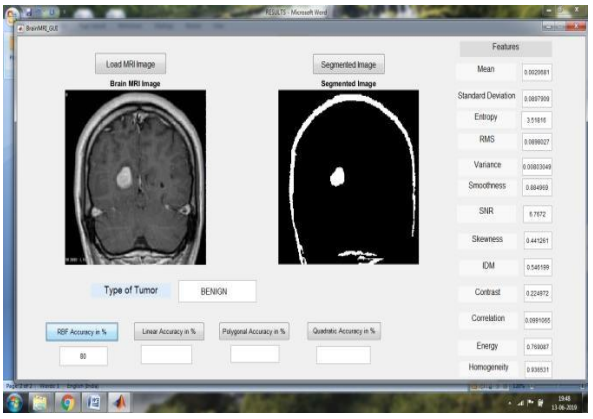

Fig. 6: RBF ACCURACY IN PERCENTAGE OF FIG 2

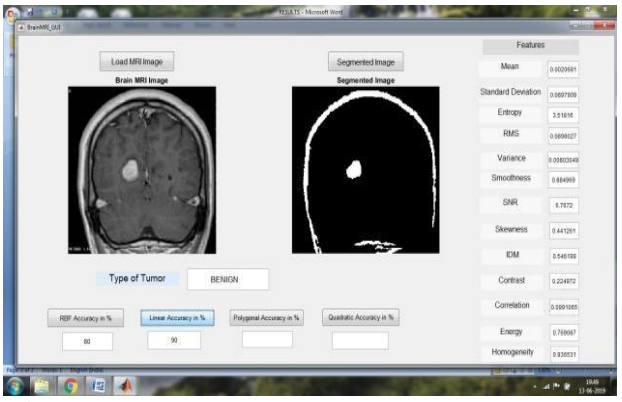

Fig. 7: LINEAR ACCURACY IN PERCENTAGE OF FIG 2

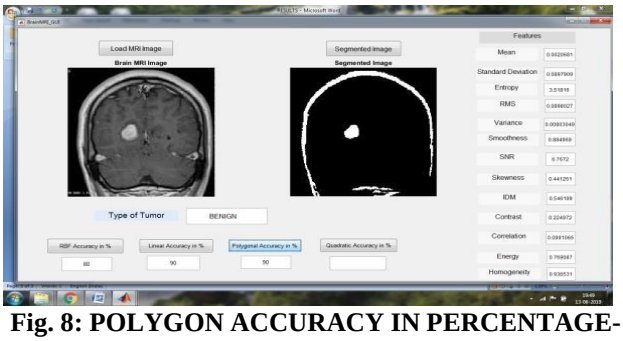

Fig. 8: POLYGON ACCURACY IN PERCENTAGE-1

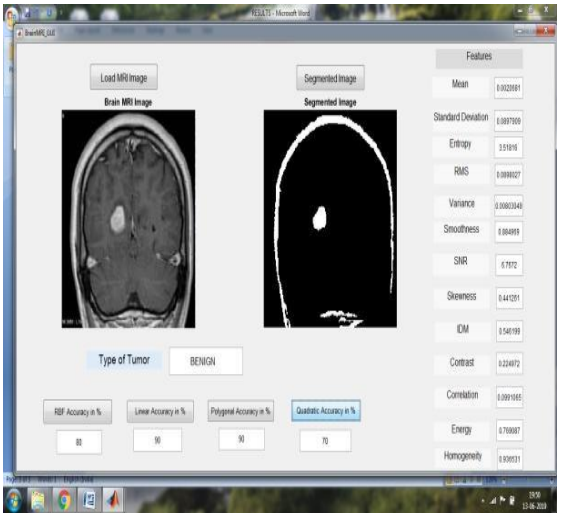

Fig. 9: QUADRATIC ACCURACY IN PERCENTAGE-1

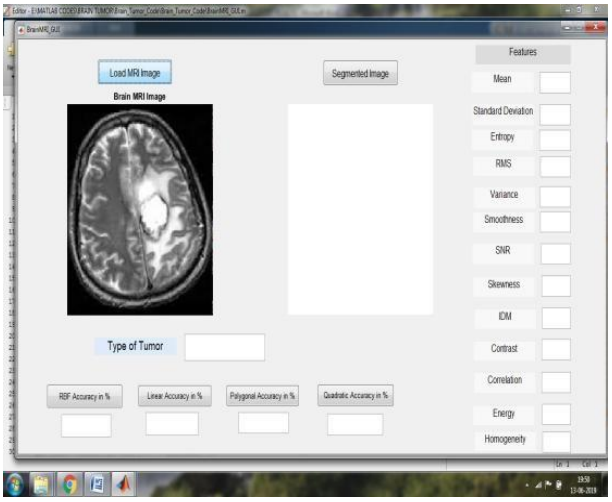

Fig. 10: INPUT IMAGE-2

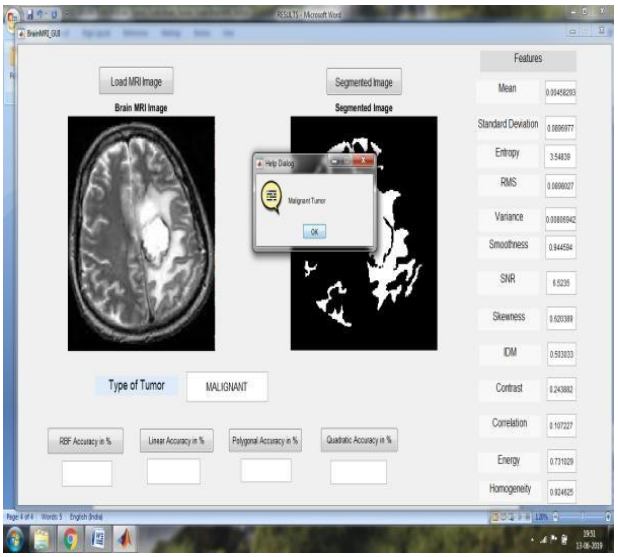

Fig. 11: MALIGNANT TUMOR IMAGE

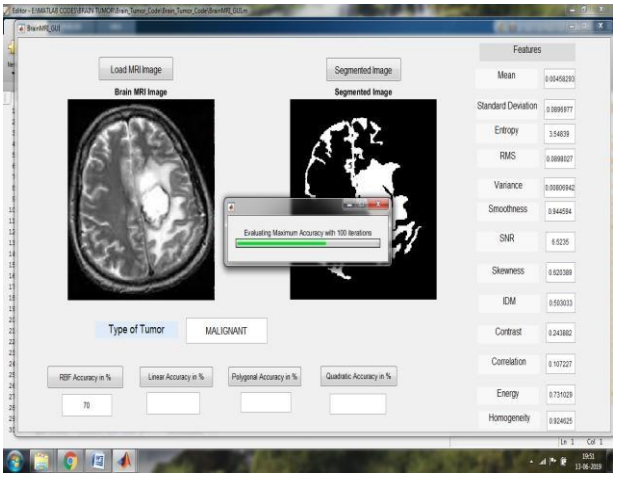

Fig. 12: RBF ACCURACY IN PERCENTAGE-2

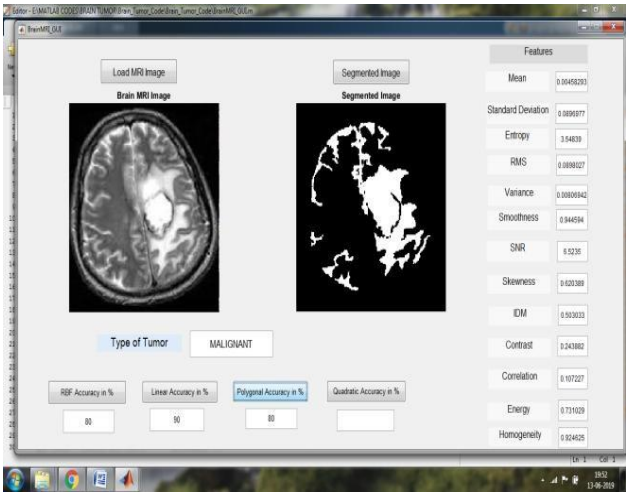

Fig. 13: POLYGON AND LINEAR ACCURACY IN PERCENTAGE-2

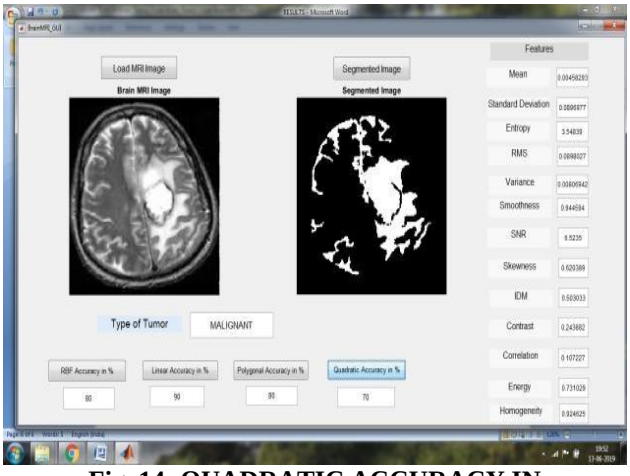

Fig. 14: QUADRATIC ACCURACY IN PERCENTAGE-2

V. CONCLUSION

In this paper, the robust and simple classifications of CT scans are proposed. This system detects the motion-corrupted images in large-scale data bases. Proposed algorithm produces the best enhancement of image contrast

producing good enhancement of image contrast. In the initial stage of the work pre-processing is done to remove noises. The experimental result shows that the suggested methods offer greater precision in classification than other volumetric methods. From the view of this work, other classification techniques are scheduled, but also various CT modalities in the classification structure developed.

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Design and implementation of an efficient wireless sensor network for health monitoring system

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Abstract:

Now a day's health care system needs more attention due to heavy load on hospitals. This importance diverts the attention of the research community to work on this area. Wireless sensor networks enhance the health monitoring system due to its autonomous network structure. Art of work put much attention to improve the health system by adding some extra caring equipments and optimize the scanning devices in terms of quality of service (QoS) in the hospitals. In this paper a main focus is given towards the improvement of health monitoring system using wireless sensor networks (WSN). This paper describes a system that not only enhances the health system but at the same time it will reduce the time required to monitor the patient individually. This cures patients health issues in due course of time which can save a greater number of human lives when compared with the existing methods. In this paper, a prototype system with a 3 tier architecture is developed for patient monitoring. Various biosensors are connected to Arduino Nano board and the measured signals are delivered to server using Node MCU ESP8266 wireless communication. Remote access is provided using Thingspeak, an IOT application. Alerts can be given through smartphone in case of emergency. The paper is validated using network simulator 2. This paper can give the basic idea to the research community for further growth to the health monitoring systems.

Keywords

Cardiac Patients; Cardiovascular Diseases; Healthcare Monitoring System; IOT; Wi-Fi; Wireless Sensor Networks

1. INTRODUCTION

Current health care systems -- structured and optimized for reacting to crisis and managing illness -- are facing new challenges: a rapidly growing population of elderly and rising health care spending. According to the U.S. Bureau of the Census, the number of adults age 65 to 84 is expected to double from 35 million to nearly 70 million by 2025 when the youngest Baby Boomers retire. This trend is global, so the worldwide population over age 65 is expected to more than double from 357 million in 1990 to 761 million in 2025. Also, overall health care expenditures in the United States reached $1.8 trillion in 2004 with almost 45 million Americans uninsured. According to world health organization (WHO) analytics nearly 32% of adult deaths all over the world and also in India are due to cardiovascular diseases which are caused by disorders of the heart and blood vessels.[1-4] These include various heart related diseases including coronary heart disease (heart attacks), rheumatic heart disease, raised blood pressure (hypertension),

cerebrovascular disease (stroke), peripheral artery disease, congenital heart disease and heart failure.1 According to current estimates, India will soon have the highest number of heart disease cases in the world. These types of cardiovascular diseases need continuous monitoring of certain body parameters which need long hospital stays.In the hospitals patients are monitored continuously by hospital staff using various instruments like bedside monitors. These instruments are bulky and immobile and thus keep patients stick to the bed. Their wired connections are very uncomfortable to patients and medical staff also. Due to mounting hospital costs and shortage of qualified healthcare professionals it is difficult to continuously monitor the essential body parameters of the patients suffering from CVD.

In this paper, we introduce a health monitoring system consisting of a wearable device that will continuously monitor the health of patient. This wearable device consists of different sensors such as temperature sensor and heart rate sensor. The device will collect the data in form of bio signals from sensors and send it to hospital server for further storage and processing using wireless communication. This data will be available to the doctors on server from any location using IOT application.

This paper aims ultimately to build a health monitoring system for cardiac patients to monitor his/her vital body parameters especially related to heart problems like ECG and heart rate. We have made a prototype of an automated health monitoring system based on 3 – tier architecture of Wireless Body Area Network (WBAN) comprising various sensors for monitoring cardiac patients in ICU of hospital. In tier I, Arduino Nano board based on the ATmega328P microcontroller is used to collect data from sensors and send to server using ESP8266 Wi-Fi wireless communication in tier II. In tier III existing internet is used to send data to remote servers for further use over IOT application ThingSpeak.

The remaining paper is as follows. Section II describes some of the existing systems and shortcomings of those systems. Section III describes proposed system details. Results and conclusion are given in section IV and V respectively.

Literature Survey

In most of the hospitals health professionals use heart rate monitoring systems using manual methods to measure ECG by connecting lids to the chest of patient. The graph of ECG is monitored on the bedside monitor or special monitoring devices. These devices are wired and bulky and do not support long distance communication. The systems have many disadvantages like requirement of costly hospital stays which is not affordable for longer periods, needs expert monitoring and high cost maintenance.

Current advances lead to automation of heart rate and ECG measurement using different methods. Many authors have reviewed the state of art systems available for monitoring different vital body parameters like temperature, ECG, heart rate, pulse rate and galvanic skin response (GSR).[5-7] Many researchers have contributed in automatic data collection of different signal from heart and detection of heart attack or emergencies related to other heart diseases using different methods. In[8] authors proposed heart attack detection system using ZigBee heart rate monitoring and alert system. Many researchers have done extensive studies on use of mobile phones in healthcare and medical practices. This study illuminates the use of inbuilt applications like location enabled services of smartphones like GPS which is used for location monitoring of old age patient with

instabilities.[9-14] Apart from location tracking smart phones are used for health monitoring of cardiac patients.[15] Many researchers proposed their methods using smart phones capable of detection, storage and analysis of collected records.

Much advancement can be done in these systems to make them more accurate, reliable, cost effective and wearable using biosensors. In hospitals and in homes cardiac patients can be monitored using healthcare monitoring system based on wireless sensor networks. The focus of our work is on continuous monitoring of cardiac patients in hospital especially in ICU and in homes using healthcare monitoring system based on wireless sensor networks. It achieves various goals like decrease in cost and long hospital stays; and continuous and remote monitoring without experts' attendance is possible.[18]

Material and Methods

The proposed system is based on 3-tier wireless body area network (WBAN) architecture.[16] 3- tier architecture of WBAN is used in healthcare monitoring system comprising of different communication networks shown in fig 1. The detail explanation of components used in each tier of WABN is given in the block diagram of our proposed system Fig 2 which explains the construction of all the three tiers and the in between communications.

Proposed System Architecture

The proposed system architecture consists of three tiers. Tier-1 consists of wireless sensor nodes attached to the patient's body for sensing vital body parameters. The data acquired through the sensors is processed and transmitted through control unit. Tier-2 is the intermediate receiving unit which acquires the forwarded data. It is also responsible for storage, processing and displaying the data. Tier-3 is concerned with alert systems and data transmission to longer distances through appropriate internet services. Different wireless communications such as ZigBee, Wi-Fi and Bluetooth are available for tier I, tier II and tier III communication.[16] We are using existing Wi-Fi wireless communication in Tier I and II and internet in Tier III for long distance data transfer over IOT. The kind of communications taking place at each tier of the system is as shown in fig 1 and fig 2.

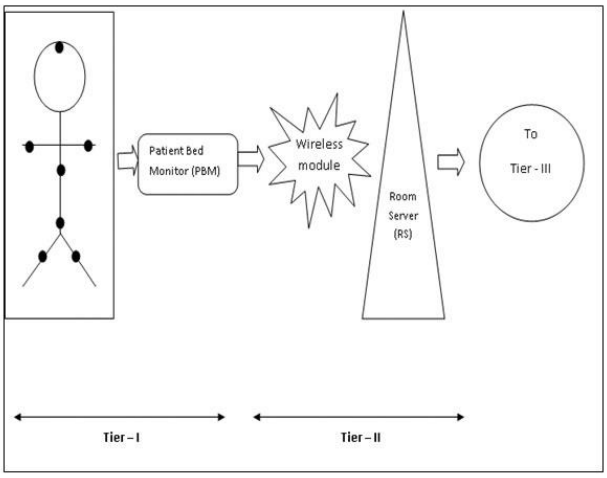


Figure 1: Proposed 3-tier architecture of system [16]

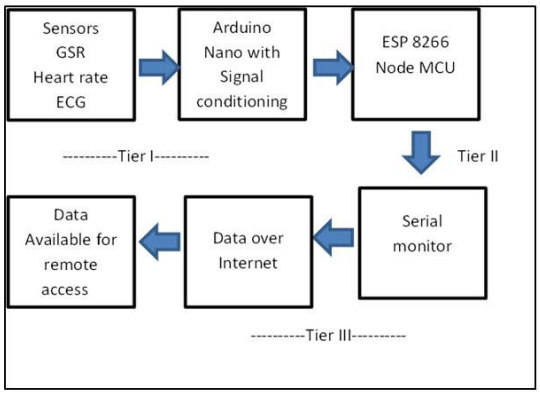


Figure 2: Block diagram of proposed system

Proposed Methodology

We have designed and implemented a healthcare monitoring system for cardiac patients to monitor significant body parameters of patient inside hospital as well as in home. Different sensors are attached or induced to the patient's body to collect vital body parameters like temperature, SPO2, heart rate, pulse rate etc. to be monitored. Heart rate and ECG sensor probes are also attached to patient's body. The sensor data is in the form of analog signals and to be converted into digital form using inbuilt circuits of Arduino board which collects and processes sensor data for further communication. For further use and storage it is then send to server using suitable wireless communication. Fig 1 shows the 3-tier architecture of proposed system. In our proposed system ESP 8266 is used to convey sensor data to server using wireless communication. Existing Wi-Fi from home or hospitals is used for this purpose. After comparing different candidate wireless technologies[16] we have chosen Wi-Fi for following main reasons:

Latest modules such as ESP 8266 are easy to connect and have built-in controller and Wi-Fi communication module.As the system is used in ICU room, the room size considered for maximum of 8 beds in any hospital is nearly 2000 sq. meters,[22,23] for which Wi-Fi is better than Bluetooth (Not enough range) or ZigBee (Low power hence cannot transmit for longer range).Wi-Fi provides very high-speed access to internet compared to any other technology already established in the market. (Excluding Li-Fi which is not commercially available). Data transmission rate of Wi-Fi is more i.e 1mbps compared to ZigBee which is 250 kbps. In tier III, data from server is made available to authorized users from outside world using internet. We are using IOT application API ThingSpeak for this purpose. Using ThingSpeak cannels data is made available to authorized users like experts, doctors and caregivers who can remotely monitor patient's data over internet and can get alert messages in any emergency situation. Block diagram of proposed system is shown in Fig 2.

Implementation Details

In this paper Arduino Nano is used to acquire readings from Max30100 heart rate sensor and send it over Wi-Fi using ESP8266. Inbuilt signal conditioning circuit is used for interfacing sensor with A to D converter of Arduino Nano. Signals are then send to cloud storage using Thing Speak. Thing Speak is an open source Internet of Things (IoT) application and API which is used to store and retrieve data from sensors and uses the HTTP protocol over the Internet or via a Local Area Network. Using Internet this medical data is made available to caregivers and doctors for reference. Existing Internet from home or hospital is used for this communication. An alert message is sent

to caregivers and relatives when readings cross threshold values, considering an emergency. For increased complexity and accuracy ECG sensor AD 8232 is used which states the condition of heart correctly.

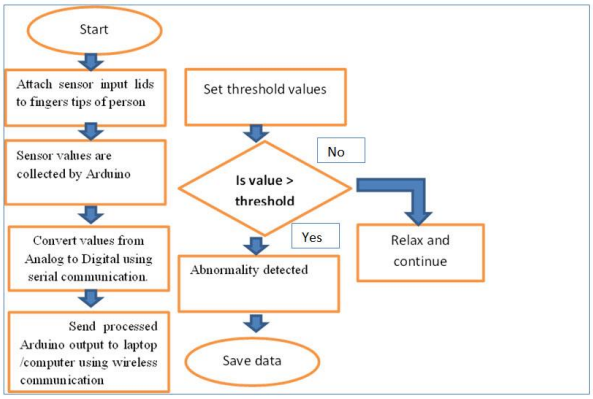


Figure 3: Flowchart of proposed system

Results and Discussion

Data collected from sensors is sent over Thing Speak channels. Authorised users like caregivers and doctors with login and password can monitor this data. Fig 4 and Fig 5 shows the sample of results displayed on Thing Speak channels and Fig 6 shows results on monitor. Sample ECG signals are plotted in Fig.7.

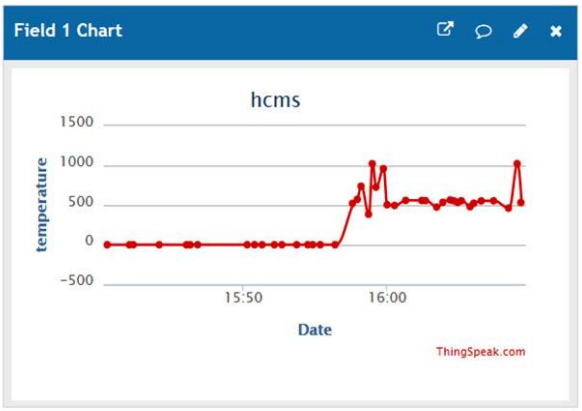


Figure 4: Sample result of Temperature on Thing Speak channel.

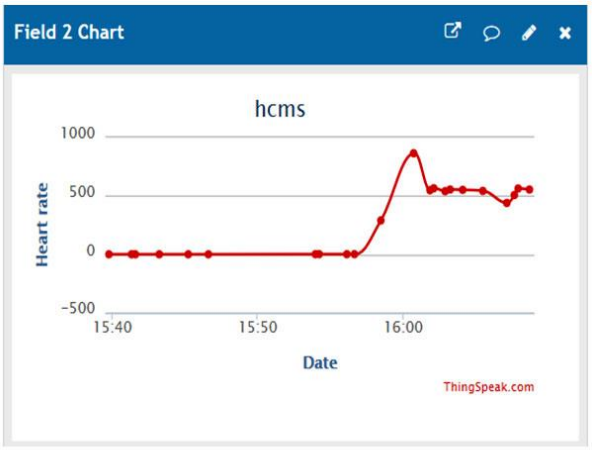


Figure 5: Sample result of heart rate on Thing Speak channel.

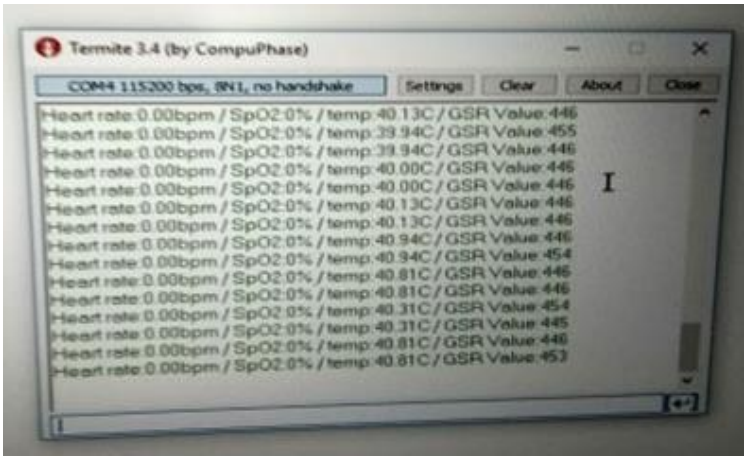


Fig.6 Results shown on Monitor

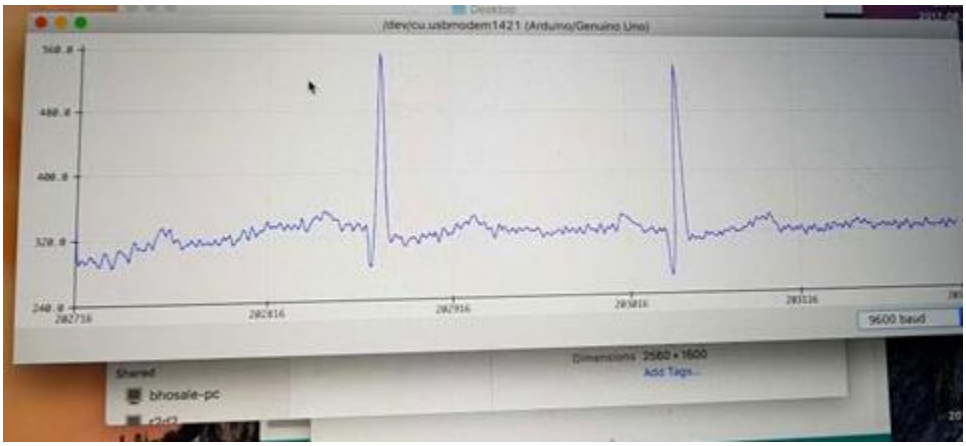
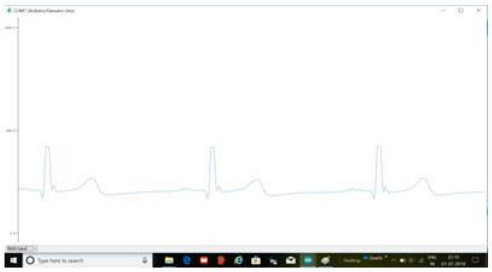


Fig.7 sample ECG readings

Nearly equal sized ICU units at different locations and at different time are considered for above experimentations.



ECG signals obtained using prototype system



Heart rate measured using Fitbit

Figure 8. Comparison of results

Fig. 8 shows 24 hour's data recording (nearly after 10 hours) of a patient. When our readings are validated with other heart rate measuring instruments like Fit Bit, 95% accuracy is found. The response time of the system is found 10 seconds for ECG readings and 5 seconds for other body parameters.

Conclusion

In this paper healthcare monitoring system for cardiac patients is proposed which monitors body parameters of heart patient like Heart rate, Temperature and SPO2. It helps caregivers and hospital staff to monitor and store patient's body parameters continuously. On any abnormality, it gives alert to caregivers. Using Internet, data can be made available for remote use and only to authorized users like remote specialist doctors for special advice. Thus designing parameters like availability, security, correctness and efficiency are achieved successfully. Nearly 95% correct results are achieved when compared to standard clinical methods and commercial instruments like FitBit. Thus the system can found helpful for the continuous monitoring of the cardiac patients in ICU of hospitals. The use of this system can be extended to care and monitor elderly people staying all alone at their homes and also for baby care.

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EB Microcontrollers and zigbee transceivers Power measurements

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Abstract

Design and development of astute monitoring and controlling system for household electrical appliances in authentic time is proposed. Incrementing power consumption is becoming an astronomically immense quandary. In this system, we propose an astute energy distribution system with a fine-tuned power utilization of every home set from Electricity Board (EB) office. Power distribution from EB is the major issue because of shortage in power generation from renewable and non-renewable resources. We design this, in order to reduce the frequent power cut off. Moreover monitoring and controlling of home appliances is developed either manually, remotely and with the avail of internet automatically. The main aim is to provide low cost and flexible operation. The goal is to develop an incipiently equipped well designed prototype for consumers in home to constrain the utilization of puissance. This avails users and power distribution centre to manage the potency in an efficient manner. Virtually applied in home and in EB unit with the avail of microcontrollers and zigbee transceivers. Internet provides the data efficaciously, in order to manage the puissance by controlling the home appliances.

Keywords:EB, Microcontrollers and zigbee transceivers.

1. Introduction

Wireless sensor network (WSN) facilely monitor assets or environment with reliable, battery-powered quantification nodes that offer industrial ratings and local analysis and control capabilities. Each wireless network can scale from tens to hundreds of nodes and seamlessly integrate with subsisting wired quantification and control systems. A wireless sensor network consists of three main components: nodes, gateways, and software. The spatially distributed quantification nodes interface with sensors to monitor assets or their environment. The acquired data wirelessly transmits to the gateway, which can operate independently or connect to a host system where you can amass, process, analyze, and present your quantification data utilizing software. Routers are a special type of quantification node that can be habituated to elongate WSN distance and reliability. The world passing the most immensely colossal quandary of potency.

Because the engenderment of potency is less than the injuctive authorization power of consumer side. In many countries the instrumentation in demand is growing at a more expeditious rate than transmission capacity and additionally the cost of providing power is additionally incrementing due to the higher coal prices and deficiency of fuel. Withal the reason of not getting the full power to consumers side is that the growing population of countries. To surmount the quandary of potency distribution this paper provides an overview of wireless sensor network by managing the equal power distribution by utilizing zigbee network sensor. A keenly intellective environment is a physical world that is interconnected through a perpetual network abundantly and invisibly with sensors, actuators and computational units, embedded seamlessly in the everyday objects of our lives. A perspicacious home is a residence in which computing and information technology apply to expect and respond to the occupants' needs and can be acclimated to enhance the everyday life at home. Potential applications for astute homes can be found in these categories: welfare, regalement, environment, safety, communication, and appliances. Automation is, where more things are being consummated every day automatically, customarily the fundamental tasks of turning on or off certain contrivances and beyond, either remotely or in close need to maintain as much control as we can over the automated processes. Automation lowers the human judgment to the lowest degree possible but does not consummately eliminate it. Depending on the location of its utilization, automation differs in its name as industrial automation, home automation etc. The rest of the paper is organized as follows: Section II discusses the subsisting system; Section III provides detailed implementation of the proprosed system; Section IV and V presents the block diagram and experimental results. Section VI has concluded and discussed about the future work.

2. Related Work

2.1 EXISTING SYSTEM:

In this section, we briefly discuss the subsisting works about astute home systems predicated on wireless communication technology. Sundry proposals are there to interconnect domestic appliances by wireless networks to monitor and control which are provided in [2], [3]. Withal, keenly intellective meter systems like [3]–[5] have been designed to categorical usages concretely cognate to geographical usages and are inhibited to categorical places. Different information and communication technologies integrating with astute meter contrivances have been roposed and tested at different flats in a residential area for optimal power utilization [6], [7], but individual controlling of the

contrivances are inhibited to concrete houses. There has been design and developments of astute meters soothsaying the utilization of puissance consumption [3]–[7]. However a low-cost, flexible, and robust system to perpetually monitor and control predicated on consumer requisites is at the early stages of development. In this, we have designed and implemented a ZigBee-predicated astute home energy management and control accommodation. We utilized the ZigBee (the IEEE 802.15.4 standard) technology for networking and communication because it has low-power and low-cost characteristics, which enable it to be widely utilized in home and building environments [4]. The disadvantage are: the physical wiring from the meter to the house can still be an impediment for a facile implementation of this solution, concretely for tall or old buildings, due to cost and installation involution. Han et al. [9] proposed a Home Energy Management System (HEMS) utilizing the ZigBee technology to reduce the standby puissance.

The system consists of an automatic standby cutoff outlet, a ZigBee hub and a server. The potency outlet with a ZigBee module cuts off the ac power when the energy consumption of the contrivance connected to the puissance outlet is below a fine-tuned value. The central hub accumulates information from the potency channels and controls these power channels through the ZigBee module. The central hub sends the present state information to a server and then a utilizer can monitor or control the present energy utilization utilizing the HEMS utilizer interface. This facility may engender some uneasiness for the users. For example, if the users may want low intensity of light, for some situation but the system will cut the puissance off leading to tenebrosity. Gill et al. [10] projected a ZigBee-predicated home automation system. This system consists of a home network unit and a gateway. The core part of the development is the interoperability of different networks in the home environment. Less paramountcy is given to the home automation. Pan et al. [11] recommended a WSN-predicated keenly intellective light control system for indoor environments, such as a home for a reduction in energy consumption.

In this paper, wireless sensors are responsible for quantifying current illuminations and the lights are controlled by applying the model of user‟s actions and profiles. The above mentioned home monitoring and controlling systems have circumscriptions with reverence to home automation such as: 1) energy consumption control mechanism is circumscribed to only certain contrivances like light illuminations, whereas several household appliances can be controlled; 2) energy control

is predicated on fine-tuned threshold power consumption, which may not be applicable to different consumers; 3) controlling the home appliances through network management functions, in practice inhabitant requisites may vary according to their demeanor but not with network characteristics. A low-cost, flexible, and authentic-time astute power management system, which can facilely integrate and operate with the home monitoring systems such as [12]is presented. The system is designed to monitor the sultriness of polyhouse environment. On-demand meter reading and remote troubleshooting sanction utilities to provide better and more timely consumer support. Utilities have more at hand about outages and renovations, and are able to consumers with good information about when power will be renovated. During emergencies, utilities can engender "partial outages" in non-exempt buildings to ascertain the puissance remains available where it is most needed. Partial outages are more economically efficient than full rotating outages, because the effects are inhibited to the reduction of a single discretionary accommodation such as air conditioning rather than the elimination of all accommodations. Additionally power factor amendment can result in an abundance of puissance preserving for industrial sector. Power demand and utilization, sanctioning utilities and consumers kindred to do their component to ascertain perpetuated and affordable supply of essential accommodations.

2.2 PROPOSED SYSTEM

A.Wireless Sensing and Intelligent Buildings

Present day keenly intellective buildings are highly adaptable to transmuting environmental conditions. They have automated systems, including wireless sensor monitoring, to facilitate energy efficient, comfortable and cost efficacious environments by optimising structure, systems, accommodations, building management and their interrelationships. In the context of the future „Internet of Things", Astute Building Management Systems can be considered part of a much more sizably voluminous information system. This system is utilized by facilities managers in buildings to manage energy use and energy procurement and to maintain buildings systems. It is predicated on the infrastructure of the subsisting Intranets and the Internet, and ergo utilises the same standards as other IT contrivances. Within this context reductions in the cost and reliability of WSNs are transforming building automation, by making the maintenance of energy efficient salubrious productive work spaces in buildings increasingly cost efficacious.

Wireless sensing in commercial and office buildings has lead to a more preponderant vigilance of the condition of buildings and their

systems: As it provides information indispensable for those in charge of building operation and maintenance to apperceive limits and non-functioning equipment and systems and prioritise building maintenance tasks etc. predicated on costs and other paramount factors. The main benefits of this are:

- An increased lifespan for equipment/electric appliances;
- An improved building environment for occupants;
- Economies of scale gained from monitoring, tracking and responding to the status of multiple uilding assets from centralised or regional locations;
- The ability to detect impending faults and therefore minimise energy usage associated with facility assets and increase reliability while reducing costs;
- Lower energy and operating costs leading to an advantageous return on investment. For example energy management systems based on WSNs can save an average of 10 % in overall building energy consumption and the energy savings can be as high as 30% depending on occupancy.

B. Recent advances

The WSNs utilized in keenly intellective building management systems consist of variants of sensor nodes quantifying parameters such as temperature, sultriness, light, asphyxiating gases/smoke, occupancy, and energy consumption. In integration, the systems may include actuators, gateways, servers and communication and application software on different calibers as well as different home appliances. A substantial amount of research has been conducted fixating on different aspects of WSN for building management and control.

C. ZigBee Wireless Sensor Network

The gateway functions both as a server storing network data and a connection point between the network nodes, the LAN and the external server. It has the coordinator role in the ZigBee network. A Web utilizer interface running on the gateway enables the utilizer to establish and manage the gateway and the WSN. Several battery-driven wireless sensor nodes with internal sensors to quantify temperature, light and sultriness are deployed in the network. These nodes are able to compose mesh networks and can operate within an indoor range of about 40 metres. They function as end-contrivances in the ZigBee WSN.

A number of remotely controlled ZigBee contrivances with relays are utilized as switches to power external equipment, such as table fans, desk lamps, etc. These contrivances, which act as routers in the WSN, are plugged into power points. They are additionally utilized as meters

for quantifying the voltage, current, frequency, power consumption and load of the annexed equipment.

3. Implementation

3.1 BLOCK DIAGRAM

The system has been designed for quantification of electrical parameters of household appliances. The quantification of electrical parameters of home appliances is done by interfacing with sensing modules. The output signals from the sensors are integrated and connected to XBee module for transmitting electrical parameters data wirelessly. The XBee modules are interfaced with sundry sensing contrivances and interconnected in the form of mesh topology to have reliable data reception at a centralized ZigBee coordinator. The maximum distance between the adjacent ZigBee nodes is less than 10 m, and through hopping technique of the mesh topology, reliable sensor fusion data has been performed. The ZigBee coordinator has been connected through the USB cable of the host computer to store the data into a database of computer system. The block diagram of the system is shown in Fig.1 and Fig.2. The accumulated sensor fusion data have been sent to a cyberspace residential gateway for remote monitoring and controlling the home environment. By analyzing the potency from the system, energy consumption can be controlled. The appliances are controlled either automatically or manually. The keenly intellective power metering circuit is connected to mains 240 V/50 Hz supply.

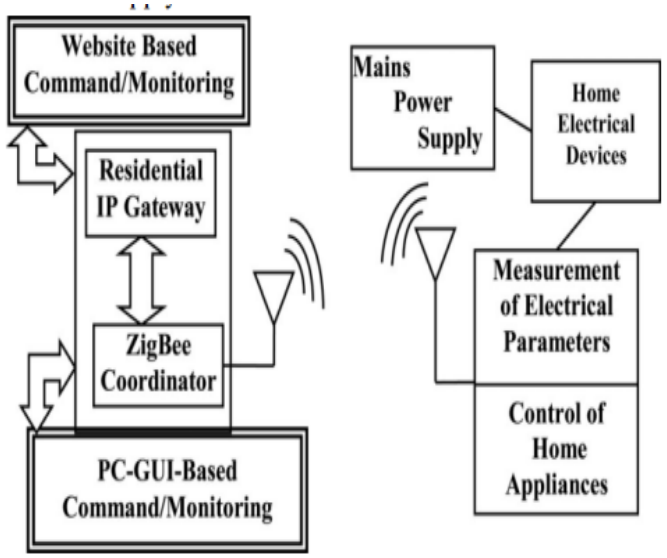

Fig 1. Block diagram of the system.

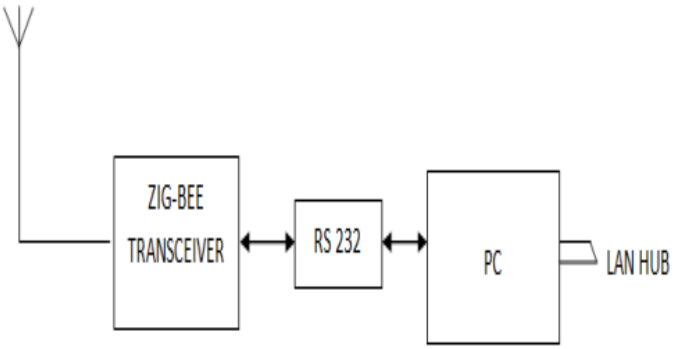

Fig 2. Control unit.

The home automation system is a key for energy conservation that can be equipped in mundane buildings. Nowa-days the injuctive authorization for home automation systems in homes and offices are invariably incrementing. These systems directly work on the household appliances to provide effortless operation and

control of the contrivances. In this paper we have presented the concept of astute home automation to reduce the energy consumption and wastage utilizing advanced graphical software called LabVIEW. It provides the programming implements to code power system applications more facilely, which preserves programming time. With the development of low cost electronic components home automation migrated from being an industrial application to home automation.

A. Zigbee Overview

There are three categories of nodes in a ZigBee system.They are Coordinator, Router and Enddevices.

1) Coordinator: It is responsible for initiating the networkand selecting the network parameters such as radio frequencychannel, unique network identifier and setting otheroperational parameters. It can also store the informationabout network, security keys.

2) Router: Router acts as intermediate nodes, relaying datafrom other devices. Router can connect to an already existentnetwork, also able to accept connections from other devicesand be some kind of re-transmitters to the network. Networkmay be extended through the use of ZigBee routers.

3) End Devices: End Device can be low-power /battery powereddevices. They can collect various information fromsensors and switches. They have sufficient functionality totalk to their parents (either the coordinator or a router) andcannot relay data from other devices.

B. Control of Home Appliances

1) Automatic control: Based on the electricity tariffconditions, the appliance can be regulated with the help ofsmart software. This enables the user to have more costsaving by auto switch off the appliances during theelectricity peak hours. The electricity tariff is procured fromthe website of the electricity supply company and is updatedat regular intervals.

2) Manual control: An on/off switch is provided to directly intercede with the device. This feature enables the user to have more flexibility by having manual control on the appliance usage without following automatic control. Also, with the help of the software developed for monitoring and controlling user interface, user can control the device for its appropriate use. This feature has the higher priority to bypass the automatic control.

3) Remote control: The smart power monitoring andcontrolling software system has the feature of interactingwith the appliances remotely through internet (website). Thisenables user to have flexible control mechanism remotelythrough a secured internet web connection. This sometimesis a huge help to the user who has the habit of keeping theappliances ON while away from house. The user can

monitorthe condition of all appliances and do the needful.

Residential IP Gateway: Transmission Over IPIn order to transmit real-time sensed data over the internetfrom the collected computer system, the ZigBee packetinformation is to be transformed to the Internet ProtocolVersion 6(IPv6). The key element in the data transformationfrom Zig-Bee packet is the address translation. This wasimplemented at the application gateway, a program fordetermining the source or destination address of a packet thatencapsulates a ZigBee packets‟ payload. The corresponding application gateway program performsthe address transformation mechanism for ZigBee to addressnon-ZigBee nodes. ZigBee is based upon the IEEE 802.14.5protocol, which uses a 64-bit address for each node on apersonal area network (PAN) and 16 bits to identify the PANID. IPv6 uses 128 bits to address a node on the network, ofwhich 48 bits represent the network, 16 bits represent thelocal network (PAN ID), and 64 bits represent the host id(sensor node). Therefore, the node address for the IEEE802.15.4 can be placed in an IPv6 address, and the PAN IDcan be used to identify the ZigBee network in an IPv6address.

4. Experimental Results

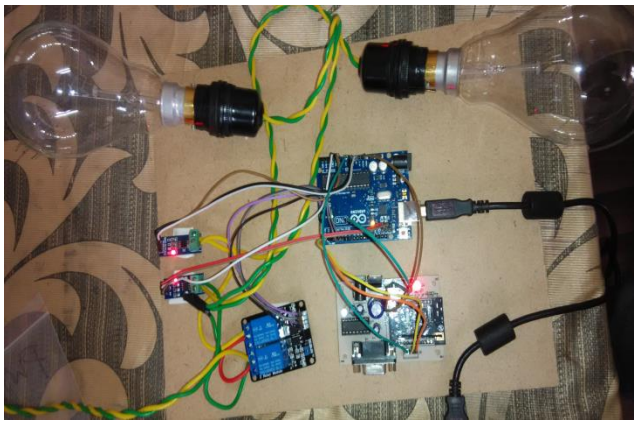

Fig 3: System with initial Architecture diagram.

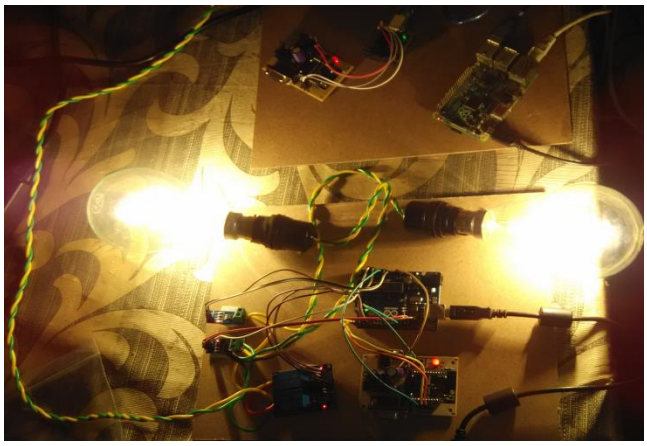

Fig 4: System with Power passing when on lights.

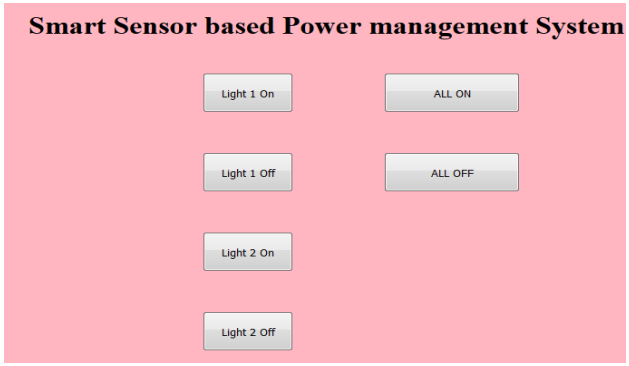

Fig 5: System with Light Channels in web App.

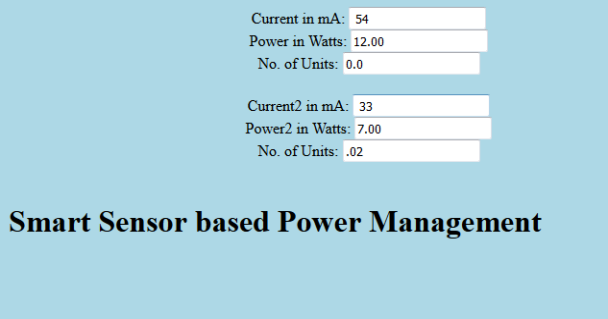

Fig 6: all Devices on power measurements.

5. Conclusion

Keenly intellective monitoring and controlling system for household electrical appliances in authentic time is designed. Thus the potency consumption is minimized by providing periodic alert and managing the potency consumption predicated on the utilization of the customer automatically.The advantages are as follows: no cabling required, facile inclusion of consequential data emanating from other meters similarly equipped with centre to manage the potency in an efficient manner. As a component of future work, prototype has to be designed for implementation of potency management.

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Efficient Pulsed Clocks & Pulsed Latches on Shift Register Tanner

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Abstract

This paper introduced a design and implementation of shift register using pulsed latches and flip-fliops. As flip-flop based shift registers requires a clock signal to operate. Multistage flip-flop processes with high clock switching activity and then increases time latency. Flip-flops also engages fifty percent power out of total circuit power in clocking. To reduce such power consumptions and to achieve area optimization flip-flops are replaced by pulsed latches. The design is implemented with 250nm technology in Tanner EDA Tool. With Vdd=1.8V, Freq=100MHz. Average power of total circuit is 0.465uW and delay of 0.312 us.

Keywords: Flip-Flops, Area Efficient, Pulsed Clocks, Pulsed Latches, Shift Register, Tanner.

1. Introduction

The rapid growth in semiconductor devices and VLSI designs has led to the development of high performance designs with enhanced reliability, customized size and low power, and because of the power dissipation is critical issue for battery operated systems. Therefore the designs are needed to be consuming less power while maintaining comparable performance. So everyone in VLSI design must think about area utilization and power dissipation In low power digital design, mainly shift registers are designed using flip-flops of different types. To achieve area optimization and power consumption different techniques are introduced like use of double edge triggered flip-flip, single feed through scheme based flip-flop, use of multiple voltage supply, clock gating, voltage scaling etc. As it is a type of synchronous circuit all the flip-flops are clocked simultaneously. The flip-flop is basic data storage element. The operation of flip-flop is depend on clock frequency, which consumes 50% power out of total power in a digital design. At present, by decreasing CMOS technology process stated by Moore's law, more transistors can be integrated on the same die [1]. Applying more transistors is accompanied by more switching that brings out more energy dissipation in the form of heat and radiation [2]. The heat and consistency of integrated circuits are addressed as important drivers of low power design procedures in RFID

applications [3-7]. The packaging and cooling cannot remove additional heat, so the matter of heat is significant issue in the era [8]. FFs are addressed as fundamental storage element which is vastly finds application in all types of digital design [9].

Flip-Flop based shift registers are used in digital filters [10], image processing [11]. As the size of image data goes on increasing continuously, the demand of word size of shift registers also goes on increasing to process large image extraction 4K-bit [12].

The Shift registers are formed by cascade connection of flip-flops, sharing the same clock as it is a type of sequential circuit. That means the output of first flip-flop is given as the "Data" input of next flip-flop due to which shifting takes place. The speed of flip-flop is less important than area and power consumption because there is no any circuit between flip-flops in shift register. To reduce power and area smallest flip-flop is selected. Recently pulsed latches have been replaced the flip-flops in many applications, because latches are smaller than flip-flops. This paper proposes a design implementation of shift register using non overlapped pulsed latches, to achieve low power and area optimization. Latches cannot be used in shift register design because of timing problem. The reminder of this paper is organized as follows. Section II presents problem statement. Section III presents Proposed Shift register. Section IV presents SSASPL working. Section V presents simulation designs. Section VI presents Conclusion. Section VII presents Experimental results.

2. Related Work

2.1 Complementary metal oxide semiconductor (cmos):

The MOSFET is used in digital complementary metal–oxide–semiconductor (CMOS) logic, which uses p- and n-channel MOSFETs as building blocks. Overheating is a major concern in integrated circuits since ever more transistors are packed into ever smaller chips. CMOS logic reduces power consumption because no current flows (ideally), and thus no power is consumed, except when the inputs to logic gates are being switched. CMOS accomplishes this current reduction by complementing every nMOSFET with a pMOSFET and connecting both gates and both drains together. A high voltage on the gates will cause the nMOSFET to conduct and the pMOSFET not to conduct and a low voltage on the gates causes the reverse. During the switching time as the voltage goes from one state to another, both MOSFETs will conduct briefly. This arrangement greatly reduces power consumption and heat generation. In this paper section II discuss about D flip flop and pulsed latch using CMOS and section III describes the

CNTFET based D flip flop and pulsed latch. section IV describes the conclusion.

A. CMOS based SET D Flip Flop

SET D-flip flop is designed from power pc603 SET D-FF . The CMOS based flip flop design is shown in Fig.1 .This flip-flop is a Master Slave flip flop structure and it consists of two data paths. As convention nal n-type pass transistors give weak high output, but in this design the n-type pass transistors are followed by an inverter to give strong high output. Hence the SET D-Flip Flop is free from threshold voltage loss. Thus the designed Single Edge Triggered D-Flip-Flop has become more efficient in terms of area, power and speed and hence provides better performance than conventional Flip Flops.

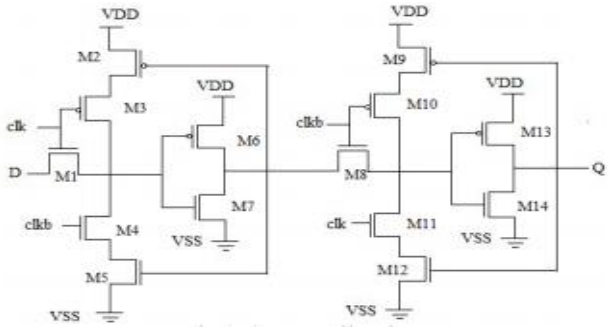


Fig 1. SET D Flip Flop.

B. CMOS based Pulsed Latch

CMOS is the most popular MOSFET technology. Here the SSASPL pulsed latch is realized using the CMOS logic which is shown in fig.2. The SSASPL consists of 15 transistors in which the transistors (M1-M8) are used to generate the pulsed clock signal and the transistors (M9-M15) are the schematic of SSASPL [15].

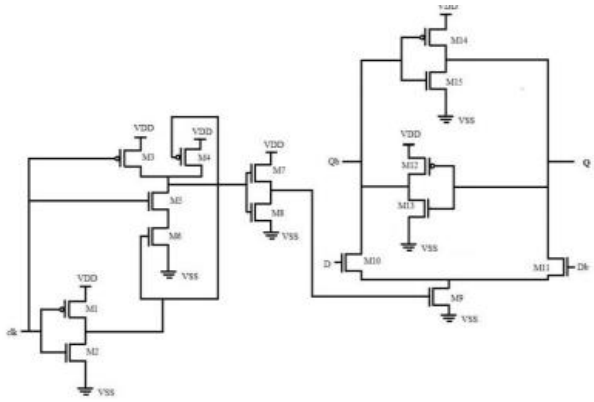


Fig. 2 CMOS based SSASPL

The pulsed clock signal generation circuit consists of AND gate, inverter and clock buffer. The clock signal is given to the inverter which inverts the signal and then the inverter output is given to one input of AND gate and another input is the clock signal which performs the AND operation. The output is given to the clock buffer which stores the data and given to the transistor M9 as the pulsed clock signal. The total size of the clock buffers is determined by the total clock loading of latches. The SSASPL updates the data with three NMOS transistors and it holds the data with four transistors in two cross-coupled inverters. It requires two differential data inputs (D and Db) and a pulsed clock signal. When the pulsed clock signal which is given to the gate of the transistor M9 is high, its data is updated. The node Q or Qb is pulled down to ground according to the input data (D and Db). The pull-down current of the NMOS transistors must be larger than the pull-up current of the PMOS transistors in the

inverters. The power is consumed mainly in latches and clock-pulse circuits. Each latch consumes power for data transition and clock loading.

3. Implementation

3.1 CNTFET: carbon nano tube field effect transistor:

CNT is a carbon allotropic variety which comes from the fullerenes family. It is made of nano sized carbon atom and rolled in seamless cylindrical form of single atomic layered thick graphene sheet [4]. Fig. 3 (a) shows a CNT which is made from one sheet of graphene rolled in cylindrical structure which is called Single Wall Carbon Nanotube (SWCNT) and Fig. 3 (b) shows Multi Walled Carbon Nanotube (MWCNT) where multi-layers of graphene are rolled as

A concentric tube [5-7]. CNT based nano devices are comprised of wide range of nano structures. CNTFET could be used as valve or controlled switch in electronics. Carbon Nano Tube Field Effect Transistors for NEMS are emerging day by day not only in IC industry but also in medical science, mechanical system, automobile industry and recreational instruments [8].

Depending on their chirality (i.e., the direction in which the graphite sheet is rolled), the single-walled carbonanotubes can either be metallic or semiconducting [9], [10]. CNFETs are one of the molecular devices that avoid most fundamental silicon transistor restriction and have ballistic or near ballistic transport in their channel [11],[12]. Therefore a semiconductor carbon nanotube is appropriate for using as channel of field effect transistors [10]. Applied voltage to the gate can control the electrical conductance of the CNT by changing electron density in the channel. By using appropriate diameter suitable threshold voltage for CNFET can be achieved. The threshold voltage of the CNFET is proportional to the inverse of the diameter of CNT and can be expressed as:

A. Nanotube Geometry:

There are three unique geometries of carbon nanotubes. The three different geometries are also referred to as flavors. The three flavors are armchair, zig-zag, and chiral [e.g. zig-zag (n, 0); armchair (n, n); and chiral (n, m)]. These flavors can be classified by how the carbon sheet is wrapped into a tube is shown in Fig.4 A1. Zigzag

The length L of the chiral vector Ch is directly related to the tubule diameter d. The chiral angle 0 between the Ch direction and the zigzag direction of the honeycomb lattice (n,O)[14]. The zig-zag model is the easiest one to count and the best one to try and copy when learning these geometries. Remember, our goal is to start and end at the same point. Hold the starting point between the finger and thumb of one hand

(0,0) and use the other hand to count around the rolled up sheet and try to end where you begin. So, count each carbon atom around the tube - (1, 0) (2, 0) (3, 0) (4, 0) (5, 0) etc., until you get back to the starting point. Once you have done this, you have just made a simple carbon nanotube model. The chiral angle in zigzag is zero.

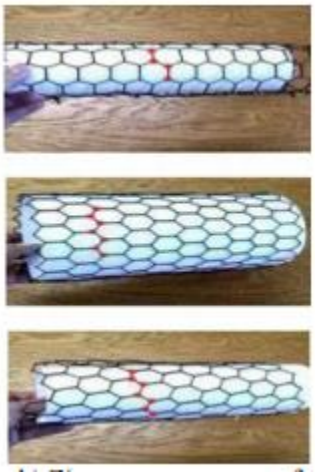


Fig.4 a)Armchair arrangement of carbon atoms b) Zig-zag arrangement of carbon atoms c) Chiral arrangement of carbon atoms.

A2. Armchair

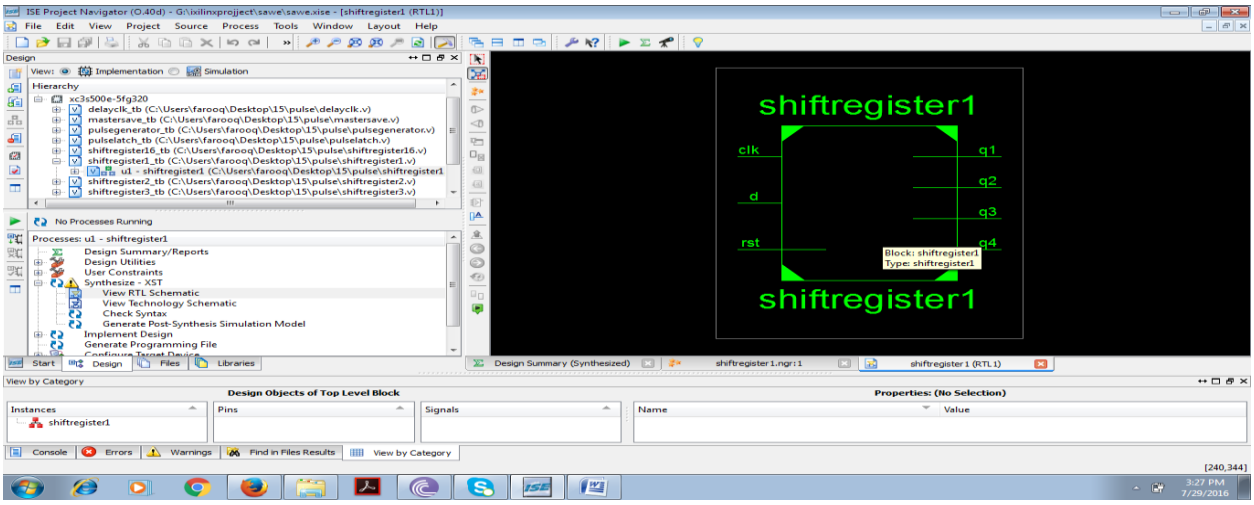
When you count around the tube, note that you are counting at an angle and it will not be possible to get back to your starting point unless you turn a corner. Note that you have to pick the right place to turn so that you end up at your starting point because you can only turn once. Again, count each carbon atom around the tube - (1, 0) (2, 0) (3, 0) (4, 0) (5, 0) until you get to a corner; after you turn, the count continues as - (5, 1) (5, 2) (5, 3) (5, 4) etc. - until you get back to the starting point. The chiral angle in armchair is 30 degree. A3. Charial

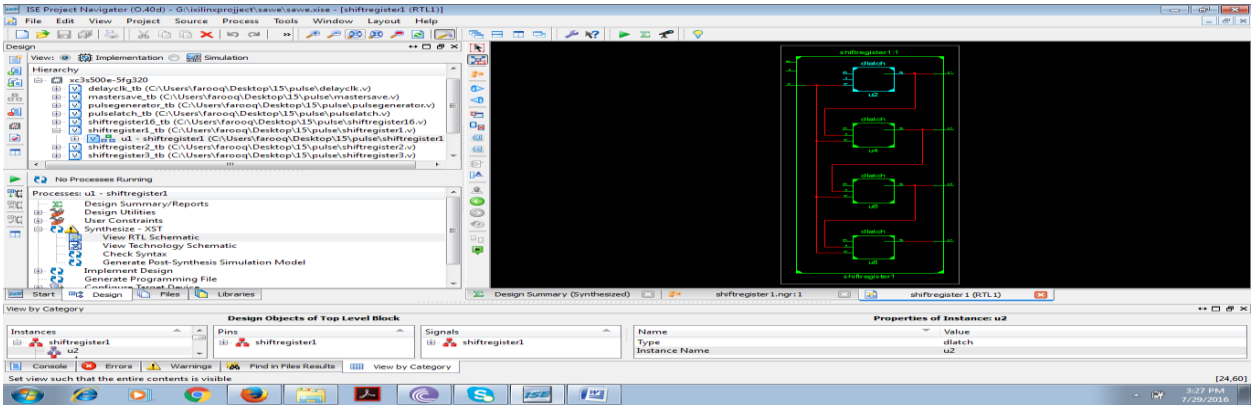
The last one is the chiral model. I think it is the most difficult to copy. It can be counted similarly like the armchair model because it also has a turn it. Remember to try and end up where you start such that the charial angle fomed will be between 0 and 30 degree. The parameter of CNTFET is shown in the table I

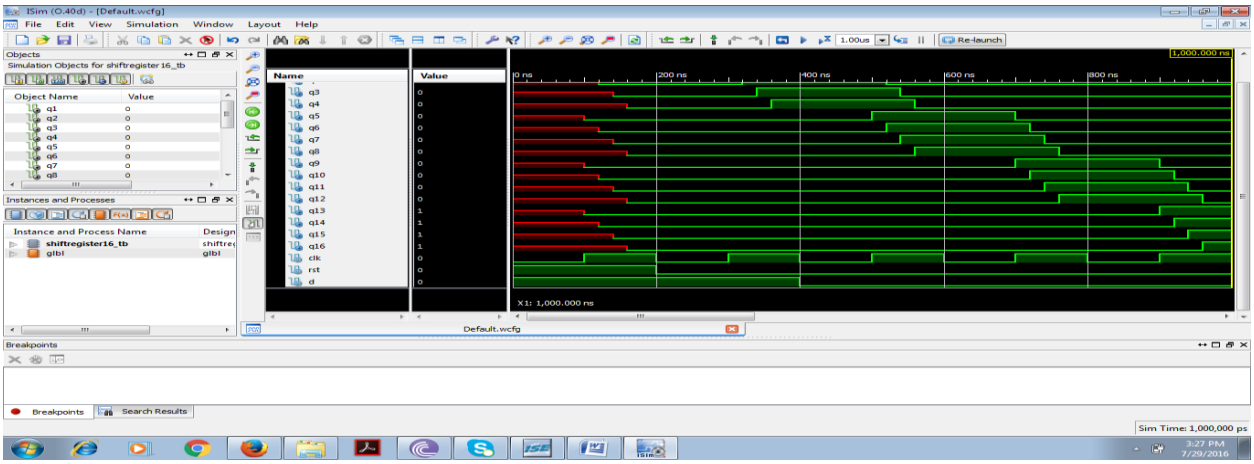
Parameter	Value
Supply Voltage (V_{DD})	1.0v
Physical channel length (L)	32nm
Diameter of the CNT (d)	1.487nm
The length of doped CNT source-side extension region. (L_{SS})	32nm
The length of doped CNT drain-side extension region.(L_{DD})	32nm
The thickness of high-k top gate dielectric material (T_{OX})	4nm
The dielectric constant of high-k top gate dielectric material (K_{OX})	16
The distance between the centers of two adjacent CNTs within the same device.	20nm
Chiral Vector	(19,0)

4. Experimental Work

Output Results are







5. Conclusion

This paper proposed a low-power and area-efficient shift register using digital pulsed latches. The shift register reduces area and power consumption by replacing flip flops with pulsed latches. The timing problem between

pulsed latches is solved using multiple non-overlap delayed pulsed clock signals instead of a single pulsed clock signal.

A small number of the pulsed clock signals is used by grouping the latches to several sub shifter registers and using additional temporary storage latches. A 256-bit shift register was fabricated using a 0.18µm CMOS process with VDD=1.8V. Its core area is 6600µm2. It consumes 1.2 mW at a 100 MHz clock frequency. The proposed shift register saves 37% area and 44% power compared to the conventional shift register with flip-flops.

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Employee Management System using RFID Cards & Reader

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Abstract

Radio Frequency Identification (RFID) is a new generation of Auto Identification and Data collection technology which helps to automate business processes and allows identification of large number of tagged objects using radio waves. RFID based Employee Management System (EMS) would allow complete hands-free access control, monitoring the whereabouts of employee and record the attendance of the employee as well. The access tag can be read up to 5 (~16 feet) meters from the RFID reader, which usually eliminates the need to handle the tag or to walk very close to the reader. This freedom is particularly important to handicapped workers, staff carrying packages. The proposed system is based on UHF RFID readers, supported with antennas at gate and transaction sections, and employee identification cards containing RFID transponders which are able to electronically store information that can be read / written even without the physical contact with the help of radio medium. This paper presents the experiments conducted to set up RFID based EMS.

Keywords: :- API, GUI, RFID, Readers, Tags/Transponders, UHF

1. Introduction

The objective of the paper is to discuss the issues of Radio frequency identification (RFID), what are the concepts of employeemanagement system, cloud based employee management system and give proposed cloud based RFID authentication protocol. RFIDis a technology, which has gained increased attention of researchers and practitioner's. This enables acquisition of data about an objectwithout need of direct line of sight from transponders and readers [4]. To make RFID system more secure, authentication is onesolution. It also maintains the security and privacy of system. Tag identification without authentication raise a security problem. Attackers sometime may tap, change and resend messages from the tag as if it has the tagged object.An Employee management system using RFID becomes efficient on cloud system because it has several advantages like (1) Verifieris enabled to authenticate the tagged objects using any reader over internet. (2) Pay on demand

resource distribution is effective forsmall and medium scale organizations. (3) Cloud is more robust due to resource sufficiency. However, this cloud-based RFID isinsufficient in two aspects. (1) Most current works focused on functionalities without giving importance to security and privacy. (2)No study shows that classical RFID schemes meet the security and privacy requirements of cloud based systems. This system can beeffectively used for calculating the attendance, salary of a particular employee for particular month and for track keeping of him/her.Classical RFID schemes when moved to cloud, they are having the problems of insecure database, privacy of tags and a reader getsrevealed which is not acceptable. Because cloud is publically available to any one and the clients cannot fully trust on the cloudservice providers. So to recover from these drawbacks, cloud-based RFID authentication protocol should get developed. It also securesthe database using hashing technique like SHA1 and maintains the privacy of tags, readers [3]. Successful implementation of thissystem brings the advantages like deployment cost saving, pervasiveness of authentication. Tag verification complexity reduces to O(1). It preserves the privacy of tag and reader holders. It makes the database more secure.

2. Related Work

2.1 Traditional RFID

There is an extensive work on RFID authentication schemes which are, backend server based and server-less [1] [2]. The backendserver based RFID is shown in Figure 1. It is composed of tags, readers and backend server. Readers identify and verify the tags byquerying to backend server. However, the drawback is limited mobility of readers.

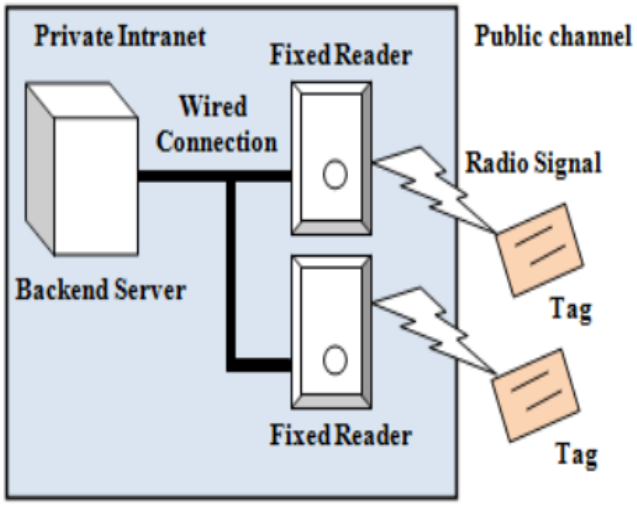

Figure 1: the backend-server-based RFID architecture.

The server-less RFID scheme is shown in Figure 2. It is composed of tags, readers and CA (Certification Agency).

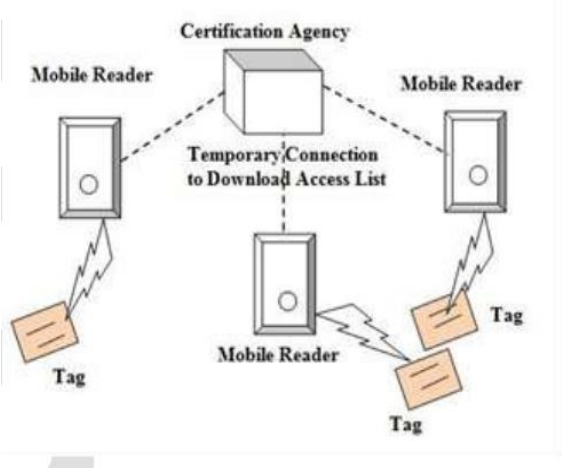

Figure 2: Server-less RFID architecture

There are two phases in server less scheme: initialization and authentication [5]. The mobile reader accesses the CA (Certification Agency) and downloads the AL (Access List) through the secure connection in an initialization phase. The mobile reader is generally a portable device such as notebook computer or smart phones. It might be stolen. Then AL is stored in it. It may wrongly be used to imitate the tags. Credentials of tag authentication are derived with the help of tags key and RID. It makes AL exclusively usable for the reader. But as a result, it is not possible for tag to create a valid request without the RID. In the authentication phase, the reader challenges a tag with RID, waiting for tags response with H (RID, Kt). The reader then searches its AL and finds the matched value to verify the Kt. It then identifies the TID. Sever-less RFID architecture provides readers with the scalability. However, there are drawbacks in server-less authentication protocol. (1) All they transmit RID in plaintext. (2) Searching through AL has complexity of O (N), where N denotes the number of tags. (3) Computational processes of searching and verifying are executed all by single personnel portable device, which reduces the performance significantly.

2.2 Requirements of cloud based RFID

Cloud based RFID has many advantages, but has the challenges of security and privacy. Existing authentication protocols are inapplicable to cloud based employee management system because of lacking two primary capabilities. Firstly, instead of providing protection to front end communication, protection of backend communication is important in Cloud based authentication schemes. Also in cloud based schemes, mobile readers often accesses the public cloud using open wireless connections. There are two solutions for this issue. (1) Establish VPN connections among readers and cloud in a network layer. (2) In application layer design an RFID authentication protocol protecting backend security [1]. Secondly, these schemes are required to prevent the privacy of tags/readers from untrustworthy cloud. Therefore, readers/tags should provide the

confidentiality about data storage, which is against the cloud.

3. PROPOSED SOLUTION

3.1 VPN AGENCY

Existing cloud based RFID system has four participants. They are tag owner, verifier, VPN agency and cloud provider [1] [6]. TheVPN agency has VPN routing between readers and the cloud. Cloud service of RFID authentication is given by cloud provider to theverifier and tag owner. VPN routing makes communication between the reader and cloud as secure as in privet intranet. Attackers areable to intercept, block and resend the TCP/IP packets in the network layer. On the other hand, network-layer-anonymity of readersaccessing the cloud is achieved.

3.2 Encrypted Hash Table

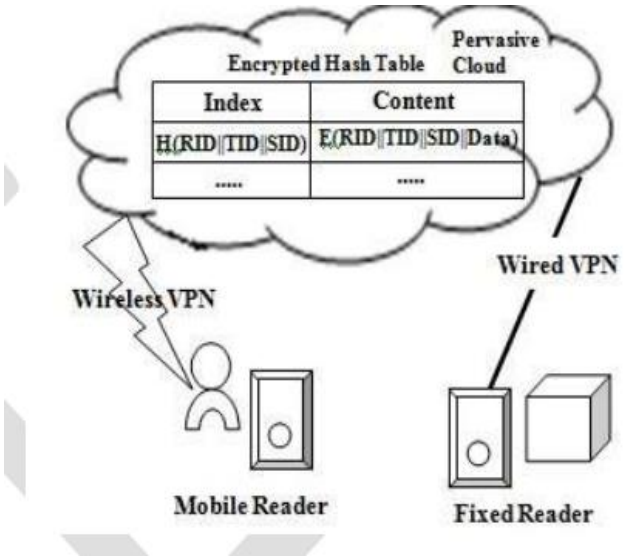

Figure 3: Proposed Cloud-based RFID authentication scheme

An EHT is proposed to prevent client's data confidentiality and access anonymity from revealing to the cloud provider. It is illustrated in Figure 4. The index which is a hash digest H (RID||TID||SID) uniquely denotes the session with SID from the reader with RID to tag with TID. The record indexed by H (RID||TID||SID) is E (RID||TID||SID||Data). It is a cipher text according to the reader defined encryption algorithm with a reader managed key. The RID field is used to check the integrity of the cipher text after decryption by reader. Mutual authentication is done using TID between reader and the tag. The SID field is the identifier which is a term in a reader defined sequence. The data field stores any application data such as location of tag and access time.

3.3 Proposed Cloud-based RFID authentication Protocol

The proposed cloud based RFID authentication protocol is illustrated in Figure 4 [1]. For simplicity, replace RID by R, replace TID by T and SID by S. Encrypted function E (RID||TID||SID||Data) in EHT is now simplified to E (R||T||S). Other notations listed in this section are as shown in Table 1. S+1 is the next incremental term after Sth term in the sequence defined by reader. 1st step is for

the reader to obtain T and S. The tag generates H (T||R||S) as an authentication request and sends generated authentication request to the reader. H (R||T||S) acts as an index to the cipher text E (R||T||S).

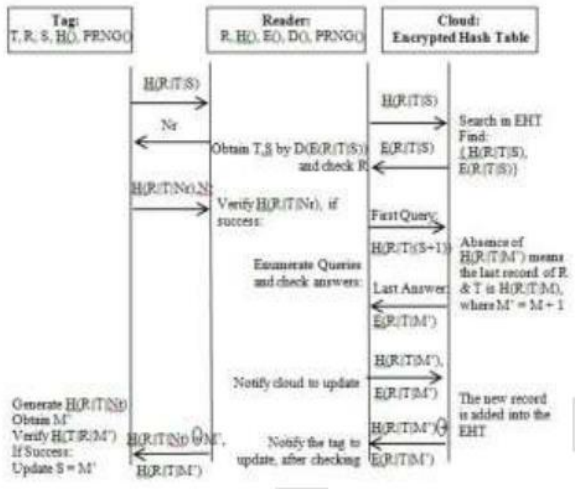

Figure 4: Proposed cloud based RFID authentication Protocol.

The reader does the following operation. (1) It reads the cipher text from the cloud EHT and decrypts it in the useful form (2) It then verifies R for integrity and obtains T and S. Authentication of the tag take place in 2nd step. The reader challenges the tag by generating a random number Nr. The tag calculates hash based on challenge Nr received from reader. The tag uses H (R||T||Nr) to generate random nonce Nt and sends Nt as its challenge to the reader. Synchronization of S between the encrypted hash table (EHT) and the tag take place in 3rd step. The reader checks the integrity after reading the next record indexed by H (R||T||(S+1)) from the EHT. Tag has been desynchronized if the valid record is present in EHT. The reader continues the same action until it finds the last valid record, assuming its SID is M. In 4th step the cloud EHT gets updated. In EHT, cipher text E (R||T||M') having index H (R||T||M') is added by reader, where M'=M+1. A message of H (R||T||M') + H (E (R||T||M')) is send back to the reader from the cloud to confirm that the updating is successful. 5th step is to send a comprehensive response to be verified by the tag. In response to tag's random challenge Nt, reader calculates H (R||T||Nt). For simple encryption, response is XORed with M'. Encrypted M' is sent to tag with index H (R||T||M') and get verified by a tag. 6th step does authentication of the reader and also it repairs the desynchronization. To obtain M', tag calculates H (R||T||Nt). Calculated value gets XORed with the received value H(R||T||Nt) M'. It then calculates and verifies H(R||T||M'). If success, it means the M' is not modified. By updating S=M' on the tag, synchronization is achieved.

4. Implementation

4.1 Mathematical Model

In the proposed cloud based RFID authentication scheme readers anonymously access the cloud through wireless or wired

connections. An encrypted hash table stores the client's secrets in encrypted form so that secrets should not be easily revealed to the cloud [3]. The first RFID authentication protocol is proposed which preserves the privacy of readers and tags.

Defining System:

Consider an organization with N employees S = {}

Identifying input:

Let, S = {Db, U, T, A, R, Cp} Where,

Db = System database with two tables:

- Employee
- RFID track

U is set of users such that,u1, u2, u3… un ϵ U

T is set of users track such that, t1, t2, t3 ….tn ϵ T

A is set of user's attendance such that, a1, a2, a3 …an ϵ A

R is set of user's RFID tag such that, r1, r2...rn ϵ R

Venn diagram of the System:

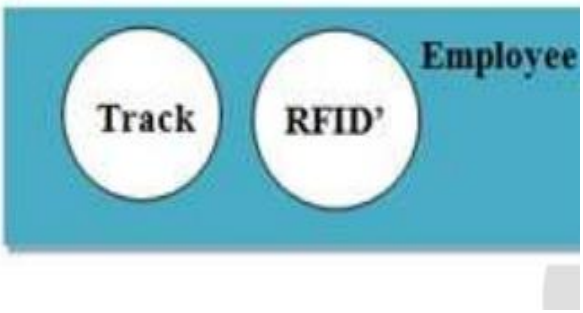

Figure5: Set diagram of employee management system

Functionalities:

The functions of the system are as follows:

(1) U = newEmployee (u_id, u_name, u_add, RFID')

Where,

RFID' = SHA1 (RFID tag)

SHA1 algorithm:

Input: Max 264-1 bit uses 512 bit block size

Output: 160 bit digests

Steps:

Padding message with single one followed by zeros until the final block has 448 bits and appends the size of originalmessage as an unsigned integer of 64 bit.

Initialize the 5 hash blocks (h0, h1, h2, h3, h4) to the specific constants defined in SHA1 standard

Hash (for each 512 bit block)

Allocate an 80 words array for the message schedule

First 16 words are obtained by splitting message into 32 bit block.

Rests of the words are generated by following algorithm:

Word [i-3] XOR Word [i-14] XOR Word [i-16] then left rotate it by 1 bit.

Loop 80 times doing the following:

Calculate SHAfunction() and constant K(these are based on current round number).

e = d

d = c

c = b(rotated left 30)

b = a

a = a(rotated left 5) + SHAfunction() + e + k + Word[i]

Add a, b, c, d and e to the hash output.

Output the concatenation (h0, h1, h2, h3, h4) which is the message digest.

(2) t = newTrackInfo (RFID', location, date, time)

Keep track of particular employee at different time.

(3) a = getAttendenceInfo (RFID', Date)

Calculate employee attendance for particular period.

4.2 Block Diagram of the System

Block diagram of employee management system using cloud based RFID authentication is illustrated in Figure 6. System contains the following parts:

(i) RFID Reader:

It is used to read the tags using radio channels and passes to the verifier for the authentication.

(ii) Webcam:

Webcam is used to take the snapshot when reader tries to read the tag.

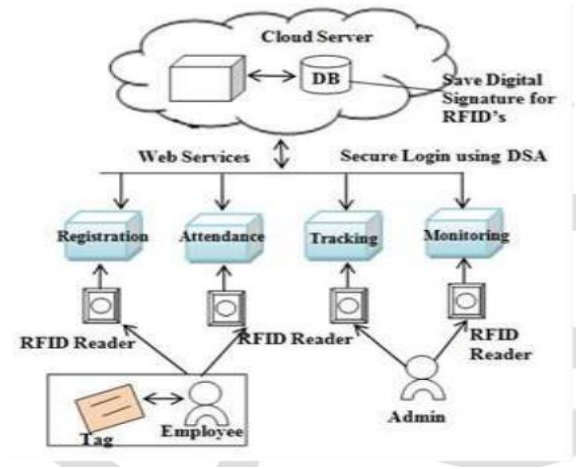

Figure 6: Employee management system using Cloud based RFID authentication

iii. Cloud Service provider:

Cloud service providers are those who provide private/public cloud. Different terminals can be connected to the cloudthrough the internet network. Deploying employee database, tracking database, admin web service module on the publiccloud enable users to access database and web service from anywhere/anytime using Internet.

iv. Admin:

Admin may be the individual machine which has administrative functionality. Admin is connected to cloud service providervia internet connectivity. Admin's web service is deployed on the public cloud which client can access.

v. Client:

Client may be the individual machine or a thin client. Client is connected to cloud service provider using internetconnectivity.

5. Experimental Work

In this system of employee management, a new cloud based RFID authentication protocol is developed which provides securityand confidentiality. It helps for calculating attendance, salary of an employee and also keeps a track of him/her. It provides otheradvantages like deployment cost savings, pervasiveness of service and scalability.Also, Comparison of the tag verification complexity in traditional sever based model, server-less model and cloud-based RFID modelis shown in Figure 7. Both server-based and server less RFID authentication protocols depends on search through the database or ALto find matching TID. It makes computational complexity to verify tags as O (n), where n is number of tags. It means these twoprotocols are not well scalable. In proposed protocol index H(R|T|S) is generated by tag, it is then send to reader. Reader then read thematched record from EHT instead of searching through all TID's. Hence, complexity of proposed scheme is only O (1). That means, itis better scalable than most of the other protocols.

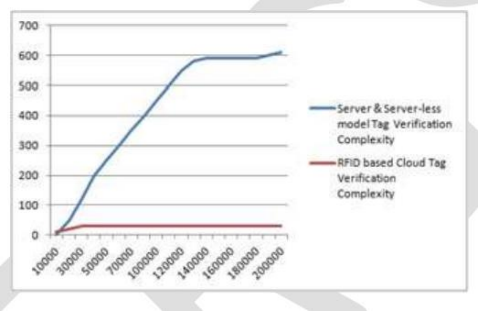

Figure 7: Comparison in the complexity of protocols

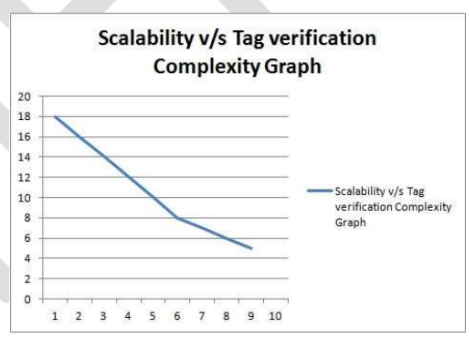

Figure 8: Scalability v/s tag verification complexity graph

6. Conclusion

RFID Based Employee Management System is systematically characterizes the reliability of RFID systems and its dependence on various practical factors. The results will provide important guidelines for real world deployment of RFID-based tracking applications as well as simple yet effective solutions to guarantee reliability. Reading items and objects in motion can be done accurately using RFID. A system developed with a log in windows enables security and the overall cost of implementing the system

may seem high but after a year of running the system, very high benefits will be realized. The whole system is very convenient and saves much on time.

7. References

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Floating point adder using Carry skip adder hybrid structure by CSKA Application

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Abstract

In this paper, we present a carry skip adder (CSKA) structure that has a higher speed yet lower energy consumption compared with the conventional one. The speed enhancement is achieved by applying concatenation and incrementation schemes to improve the efficiency of the conventional CSKA (ConvCSKA) structure. In addition, instead of utilizing multiplexer logic, the proposed structure makes use of AND-OR-Invert (AOI) and OR-AND-Invert (OAI) compound gates for the skip logic. The structure may be realized with both fixed stage size and variable stage size styles, wherein the latter further improves the speed and energy parameters of the adder. Finally, a hybrid variable latency extension of the proposed structure, which lowers the power consumption without considerably impacting the speed, is presented.

This extension utilizes a modified parallel structure for increasing the slack time, and hence, enabling further voltage reduction. The proposed structures are assessed by comparing their speed, power, and energy parameters with those of other adders using a 45-nm static CMOS technology for a wide range of supply voltages. The results that are obtained using HSPICE simulations reveal, on average, 44% and 38% improvements in the delay and energy, respectively, compared with those of the Conv-CSKA. In addition, the power–delay product was the lowest among the structures considered in this paper, while its energy– delay product was almost the same as that of the Kogge–Stone parallel prefix adder with considerably smaller area and power consumption. Simulations on the proposed hybrid variable latency CSKA reveal reduction in the power consumption compared with the latest works in this field while having a reasonably high speed.

Keywords: Carry skip adder, hybrid structure, modified CSKA, Application in the floating point adder.

1. Introduction

Here present a carry skip adder (CSKA) structure that has a higher speed compared with the proposed hybrid CSKA The speed improvement is achieved by applying a new adder in to the structure this chemes to improve the efficiency of the CSKA structure. A hybrid variable latency extension of the proposed structure, which lowers the area consumption without considerably impacting the speed, is presented. Adders are a key building block in

arithmetic and logic units (ALUs) and hence increasing their speed and reducing their power/energy consumption strongly affect the speed and power consumption of processors. There are many works on the subject of optimizing the speed and power of these units, which have been reported in obviously, it is highly desirable to achieve higher speeds at low-power/energy consumptions, which is a challenge for the designers of general purpose processors. In this paper, a modified CSKA used which exhibits a higher speed and lower energy consumption compared with those of the hybrid CSKA one. The speed enhancement was achieved by modifying the structure through. A new type of parallel prefix adder network on the nucleus stage. Nuclease stage is the higher bit width stage on the variable latency network. Here we are using a Lander Fischer adder as a parallel prefix network; here also introduce an optimized RCA. In the optimized RCA sructure we use CBL in the adder offers minimum number of gate count. The CBL worked as a full adder .By using the modified CSKA an efficient floating point adder optimize. The results also suggested the CSKA structure is a very good adder for the applications where both the speed and area consumption. In this paper, given the attractive features of the CSKA structure. The modified CSKA increases the speed considerably while maintaining the low area and delay consumption features of the CSKA.

Hence, the contributions of this paper can be summarized as follows. 1) Proposing a modified CSKA structure by combining parallel prefix network and optimized RCA. Modified CSKA structure for enhancing the speed of the adder. The modification provides us with the ability to use simple Ladner Fischer adder and optimized RCA network.

2) Proposing a modified variable latency CSKA structure based on the extension of the suggested CSKA, by replacing some of the middle stages in its structure withal PPA, which is modified in this paper. 3) Optimized RCA used with minimum gate count.

4) Application of the modified structure in to a floating point adder unit.

2. Related Work

2.1 Modifying CSKAs for Improving Speed:

Alioto and Palumbo [19] propose a simple strategy for the design of a single-level CSKA. The method is based on the VSS technique where the near-optimal numbers of the FAs are determined based on the skip time (delay of the multiplexer), and the ripple time (the time required by a carry to ripple through a FA). The goal of this method is to decrease the critical path delay by considering a noninteger ratio of the skip time to the ripple time on contrary to most of the previous works, which considered

an integer ratio [17], [20]. In all of the works reviewed so far, the focus was on the speed, while the power consumption and area usage of the CSKAs were not considered. Even for the speed, the delay of skip logics, which are based on multiplexers and form a large part of the adder critical path delay [19], has not been reduced.

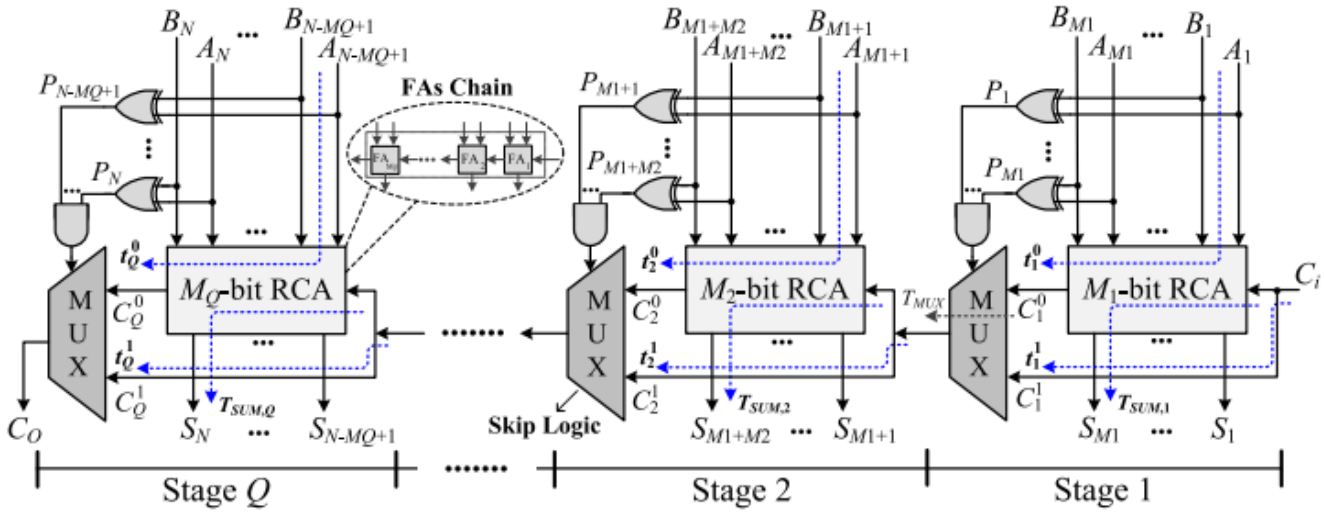


Fig 1. Conventional structure of the CSKA [19].

2.2 Improving Efficiency of Adders at Low Supply Voltages:

To improve the performance of the adder structures at low supply voltage levels, some methods have been proposed in . In adaptive clock stretching operation has been suggested. The method is based on the observation that the critical paths in adder units are rarely activated. Therefore, the slack time between the critical paths and the off-critical paths may be used to reduce the supply voltage. Notice that the voltage reduction must not increase the delays of the noncritical timing paths to become larger than the period of the clock allowing us to keep the original clock frequency at a reduced supply voltage level. When the critical timing paths in the adder are activated, the structure uses two clock cycles to complete the operation. This way the powerconsumption reduces considerably at the cost of rather small throughput degradation.

In the efficiency of this method for reducing the power consumption of the RCA structure has been demonstrated. The CSLA structure in [28] was enhanced to use adaptive clock stretching operation where the enhanced structure was called cascade CSLA (C2SLA). Compared with the common CSLA structure, C2SLA uses more and different sizes ofRCA blocks. Since the slack time between the critical timing paths and the longest off-critical path was small, the supply voltage scaling, and hence, the power

reduction were limited. Finally, using the hybrid structure to improve the effectiveness of the adaptive clock stretching operation has been investigated.

In the proposed hybrid structure, the KSA has been used in the middle part of the C2SLA where this combination leads to the positive slack time increase. However, the C2SLA and its hybrid version are not good candidates for low-power ALUs. This statement originates from the fact that due to the logic duplication in this type of adders, the power consumption and also the PDP are still high even at low supply voltages The CSKA may be implemented using FSS and VSS where the highest speed may be obtained for the VSS structure .Here, the stage size is the same as the RCA block size. In Sections III-A and III-B, these two different implementations of the CSKA adder are described in more detail.

3. Implementation

3.1 PROPOSED CSKA STRUCTURE:

The structure is based on combining the concatenation and the incrementation schemes [13] with the ConvCSKA structure, and hence, is denoted by CI-CSKA. It provides us with the ability to use simpler carry skip logics. The logic replaces 2:1 multiplexers by AOI/OAI compound gates (Fig. 2). The gates, which consist of fewer transistors, have lower delay, area, and smaller power consumption compared with those of the 2:1 multiplexer [37]. Note that, in this structure, as the carry propagates through the skip logics, it becomes complemented. Therefore, at the output of the skip logic of even stages, the complement of the carry is generated. The structure has a considerable lower propagation delay with a slightly smaller area compared with those of the conventional one. Note that while the power consumptions of the AOI (or OAI) gate are smaller than that of the multiplexer, the power consumption of the proposed CI-CSKA is a little more than that of the conventional one. This is due to the increase in the number of the gates, which imposes a higher wiring capacitance (in the noncritical paths).

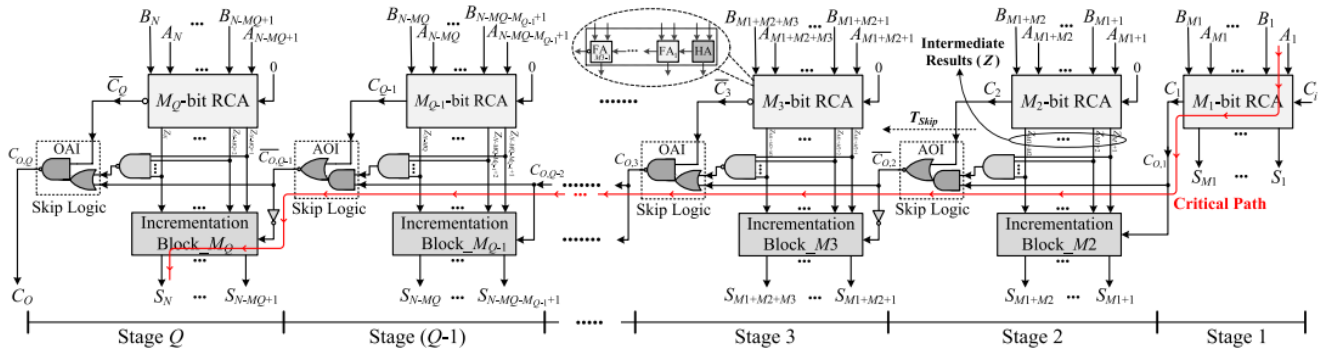
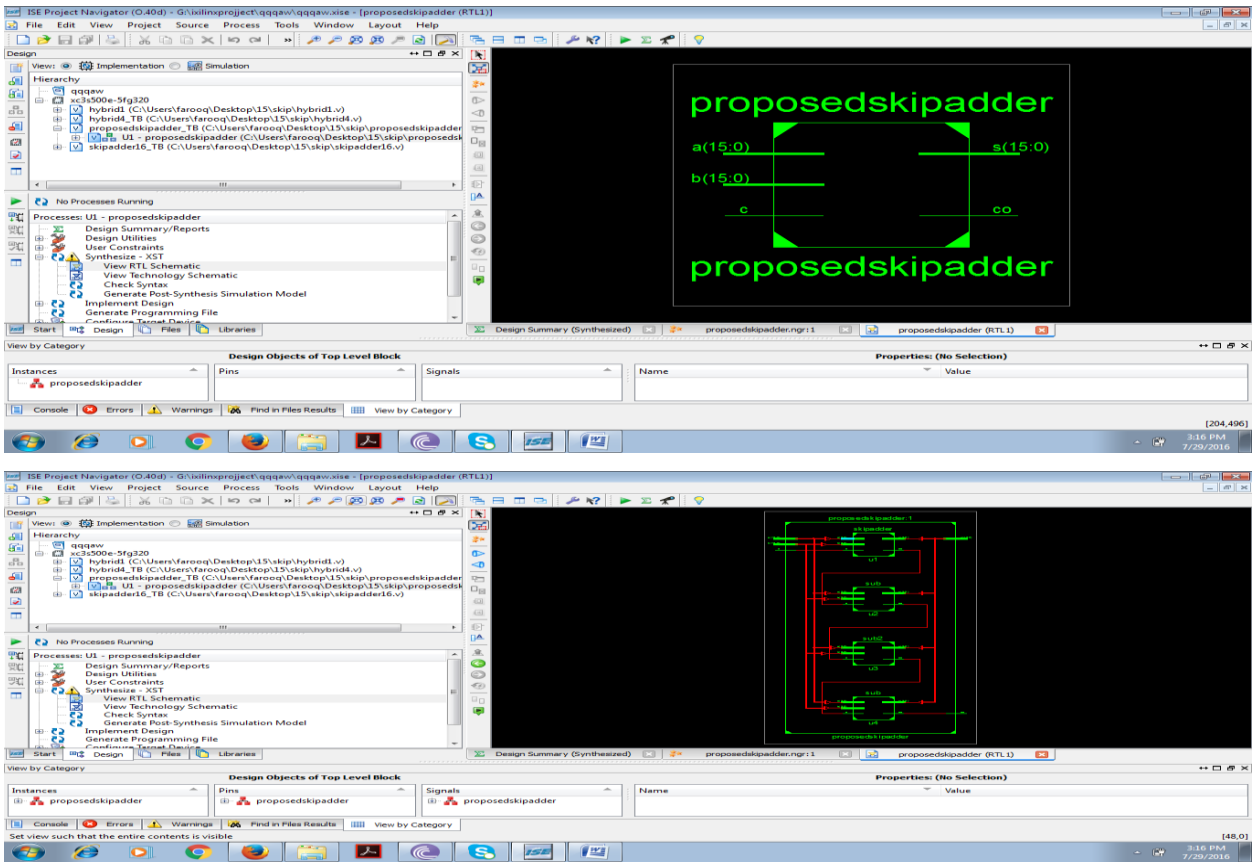


Fig. 2. Proposed CI-CSKA structure.

The reason for using both AOI and OAI compound gates as the skip logics is the inverting functions of these gates in standard cell libraries. This way the need for an inverter gate, which increases the power consumption and delay, is eliminated. As shown in Fig. 2, if an AOI is used as the skip logic, the next skip logic should use OAI gate. In addition, another point to mention is that the use of the proposed skipping structure in the Conv-CSKA structure increases the delay of the critical path considerably. This originates from the fact that, in the Conv-CSKA, the skip logic (AOI or OAI compound gates) is not able to bypass the zero carry input until the zero carry input propagates from the corresponding RCA block.

4. Experimental Result

The design proposed in this paper has been developed using MODEL SIMULATOR. ADDERS are a key building block in arithmetic and logic units (ALUs). Low power arithmetic circuits have become very important in VLSI industry. Adder circuit is the main building block in DSP processor. Adder is the main component of arithmetic unit. A complex DSP system involves several adders. Many design styles of adders exist.



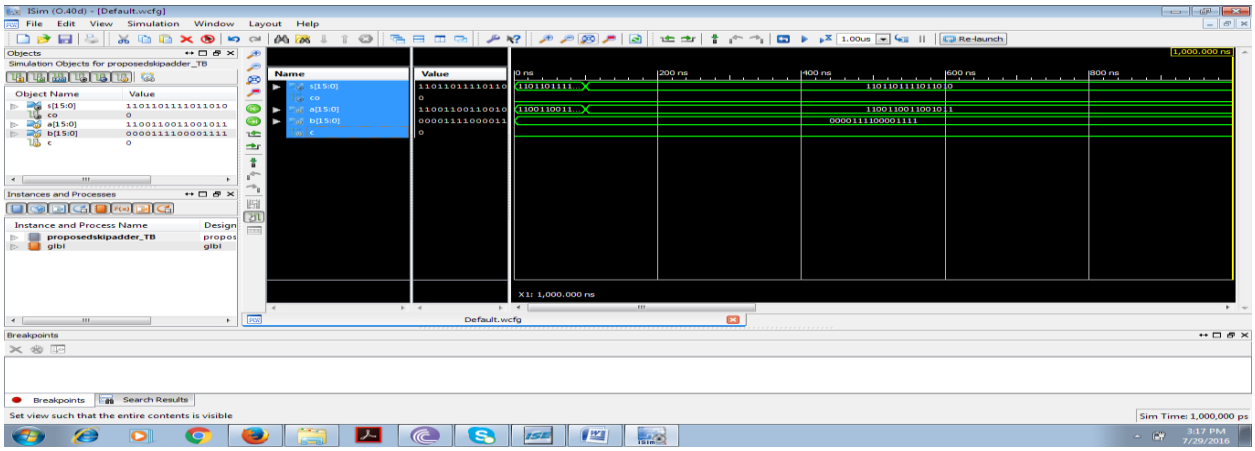


Fig 3 Simulation results

5. Conclusion

In this paper, a static CMOS CSKA structure called CI-CSKA was proposed, which exhibits a higher speed and lower energy consumption compared with those of the conventional one. The speed enhancement was achieved by modifying the structure through the concatenation and incrementation techniques. In addition, AOI and OAI compound gates were exploited for the carry skip logics. The efficiency of the proposed structure for both FSS and VSS was studied by comparing its power and delay with those of the Conv-CSKA, RCA, CIA, SQRT-CSLA, and KSA structures. The results revealed considerably lower PDP for the VSS implementation of the CICSKA structure over a wide range of voltage from super-threshold to near threshold. The results also suggested the CI-CSKA structure as a very good adder for the applications where both the speed and energy consumption are critical. In addition, a hybrid variable latency extension of the structure was proposed. It exploited a modified parallel adder structure at the middle stage for increasing the slack time, which provided us with the opportunity for lowering the energy consumption by reducing the supply voltage.

The efficacy of this structure was compared versus those of the variable latency RCA, C2SLA, and hybrid C2SLA structures. Again, the suggested structure showed the lowest delay and PDP making itself as a better candidate for high-speed low-energy applications.

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GSM and GPS FOR Traffic controlling system

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Abstract

Intelligent traffic control systems are advanced applications which, without embodying intelligence as such, aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks. In this project, I attempt to make an intelligent system which helps in congestion control, ambulance clearance and stolen vehicle detection which solves the road safety problems to a greater extend. Each individual vehicle is equipped with special radio frequency identification (RFID) tag. We use RFID readers along with microcontrollers to read the tags attached to each vehicle. It counts the number of vehicles that pass through the path during a specific duration, so that network congestion is determined and hence green light duration for a particular path. If RFID tag belongs to the stolen vehicle, it is informed to the police control room through GSM. In addition if the ambulance is approaching the junction, it will communicate to the traffic controller on the junction to turn the green light on. This module uses ZIGBEE and PIC microcontroller for wireless communication between ambulance and the traffic controller.

Keywords: Embedded Technologies, RFID, GSM and GPS.

1. Introduction

In our daily life we are facing a lot of problems; main thing is traffic congestion which become more serious day after day. It is said that high tome of vehicles, the scanty infrastructure and the irrational distribution of the development are the main reasons for augmented traffic jam. The major cause leading to traffic jam is the large number of vehicles which is caused by the most population and the development of economy. India is the second most populous country in the world and is a fast growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. Also, Indian traffic is non lane based and chaotic. It needs a traffic control solutions, which are different from the developed Countries. To unravel this problem, government should encourage people to use public transport or make use of vehicles with small size as bicycles or make tax on personal

vehicles. Particularly in some Asian countries like Vietnam, the local authorities passed a law limiting the number of vehicles for each family. The methods mentioned above is really efficient in the fact that inadequate infrastructure cannot handle the issue of traffic congestion. The public conveyance is available and its quality is very bad, mostly in the establishing countries. Besides, the highway and roads are incapable of meeting the requirement of increasing number of vehicles. Instead of working on the roads to accommodate for the growing traffic,various techniques have been devised to control the traffic on roads like embedded controllers that areinstalled at the junction.

2. Related Work

2.1 Existing system:

A.MANUAL CONTROLLING

Manual controlling the name instance it require man power to control the traffic. Depending on the countries and states the traffic polices are allotted for a required area or city to control traffic. The traffic polices will carry sign board, sign light and whistle to control the traffic. They will be instructed to wear specific uniforms in order to control the traffic.

B.AUTOMATIC CONTROLLING

Automatic traffic light is controlled by timers and electrical sensors. In traffic light each phase a constant numerical value loaded in the timer. The lights are automatically getting ON and OFF depending on the timer value changes. While using electrical sensors it will capture the availability of the vehicle and signals on each phase, depending on the signal the lights automatically switch ON and OFF.

2.2 Proposed System

A. Intelligent Traffic Control

Intelligent management of traffic flows can reduce the negative impact of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective options. Technologies like ZigBee, RFID and GSM can be used in traffic control to provide cost effective solutions. FID is a wireless technology that uses radio frequency electromagnetic energy to carry information between the RFID tag and RFID reader. Some RFID systems will only work within the range inches or centimeters, while others may work for 100 meters (300 feet) or more. A GSM modem is a specialized type of modem, which accepts a SIM card and operates over a subscription to a mobile operator, just like a mobile phone. AT commands are used to control modems. These commands come from Hayes commands that were used by the Hayes smart modems. The ZigBee operates at low-power and can be used at all the levels of work configurations to perform predefined tasks. It operates in ISM bands (868 MHz in Europe, 915 MHz in USA and Australia, 2.4 GHz in rest

of the world). Data transmission rates vary from 20 Kilobits/second in the 868 MHz frequency band to 250 Kilobits/second in the 2.4 GHz frequency band. The ZigBee uses 11 channels in case of 868/915 MHz radio frequency and 16 channels in case of 2.4 GHz radio frequency. It also uses 2 channel configurations, CSMA/CA and slotted CSMA/CA.

B. Stolen Vehicle Detection System.

In this module, for testing purpose, we compare the unique RFID tag read by the RFID reader tothe stolen RFIDs stored in the system. If a match is found, then the traffic signal is immediately turned to red for duration of 30 seconds. Also an SMS is sent specifying the RFID number by using SIM300 GSM module. The LCD display will indicate that stolen vehicle is present. Here, a GSM modem is connected with the microcontroller. This allows the computer to use the GSM modem to communicate over the mobile network. These GSM modems are most frequently used to provide mobile Internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. GSM modem must support an “extended AT command set” for sending/receiving SMS messages. GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. SIM 300 is designed for global market & it is a tri-band.

C. Emergency Vehicle Clearance

In this module, there are 2 parts, first part which is ZigBee transmitter is placed in the emergency vehicle. When the switch is pressed, it will transmit the signal. The signal contains unique id and security code. The transmitter contains PIC16F877A microcontroller and ZigBee module. The microcontroller sends the commands and data to the ZigBee via serial communication. Second part is the receiver, which is placed at traffic pole. It also contains PIC16F877A microcontroller and ZigBee module. The receiver compares the security code received to the security code present in its database. If it matches, then it will turn the green light on. For testing purpose, we used short range RFID reader in our prototype. First, the receiver part is turned on. The red and green signal will be on for 10 seconds duration and orange light will be on for 2 seconds duration one after the other. Secondly, we bring the RFID of stolen vehicle into the range of RFID reader. Then the signal will turn to red for duration of 30 seconds and a SMS is received. Thirdly, we bring 12 RFIDs into the range of RFID reader, and then the green light duration will change to 30 seconds. Fourthly, we bring an emergency vehicle carrying ZigBee transmitter into the range of ZigBee receiver, and then the traffic light will change to green till the receiver receives the ZigBee signal. In the default

condition, red and green light will set for 10 seconds. The time period will be varied according to the traffic conditions, stolen vehicle, and emergency vehicle. The transmitter part is placed in the ambulance. It transmits ZigBee signal continuously. The stolen vehicle RFID number should be updated in the database. If stolen vehicle is found, then it will immediately turn on red light in the signal. It sends immediately a message to authorized person.

3. Implementation

A. Radio Frequency Identification (RFID)

RFID is an acronym for radio frequency identification. Briefly the RF stand for “radiofrequency” and ID means “identifier” that allows an item, for instance a library book, to be identified, accessed, stored, reprogrammed and communicated by using radio waves. Radio Frequency Identification (RFID) is a generic term for non-contacting technologies that use radio waves to automatically identify people or objects. There are several methods of identification, but the most common is to store a unique serial number that identifies a person or object on a microchip that is attached to an antenna. The combined antenna and microchip are called an "RFID transponder" or "RFID tag" and work in combination with an "RFID reader".

An RFID system consists of a reader and one or more tags. The reader's antenna is used to transmit radio frequency (RF) energy. The tag will then modulate the electromagnetic waves generated by the reader in order to transmit its data back to the reader. The reader receives the modulated waves and converts them into digital data. There are two major types of tag technologies. "Passive tags" are tags that do not contain their own power source or transmitter. When radio waves from the reader reach the chip’s antenna, the energy is converted by the antenna into electricity that can power up the microchip in the tag. The tag is then able to send back any information stored on the tag by reflecting theelectromagnetic waves as described above. "Active tags" have their own power source and transmitter.

The power source, usually a battery, is used to run the microchip's circuitry and to broadcast a signal to a reader. Due to the fact that passive tags do not have their own transmitter and must reflect their signal to the reader, the reading distance is much shorter than with active tags.

However, active tags are typically larger, more expensive, and require occasional service. Frequency refers to the size of the radio waves used to communicate between the RFID system components. Just as you tune your radio to different frequencies in order to hear different radio stations, RFID tags and readers must be

tuned to the same frequency in order to communicate effectively. The read range of a tag ultimately depends on many factors: the frequency of RFID system operation, the power of the reader, environmental conditions, physical size of the tags antenna and interference from other RF devices. The Sunrom RFID Card Reader's antenna was designed with a RFID operation at a tag read distance of around 7 cm.

B. Global Position System (GPS)

Global Positioning System (GPS) satellites broadcast signals from space that GPS receivers, use to provide three-dimensional location (latitude, longitude, and altitude) plus precise time. GPS receivers provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. The output is serial data of 9600 baud rate which is standard NMEA 0183 v3.0 protocol offering industry standard data messages and a command set for easy interface to mapping software and embedded devices.

The current GPS consists of three major segments. These are the space segment (SS), a control segment (CS), and a user segment (US).

C. Global System for Mobile Communications (GSM)

GSM uses Frequency Division Multiplexing AND Time Division Multiplexing. FDMA divides the frequency ranges for GSM, which are 890- 915, 935-960 and some others that the book didn't have. Each is divided into 200kHz wide channels. As far as TDMA goes, each time slot is 577 micro seconds long, 8 time slices is a frame, lasting for a grand total of 4.615ms. A multi frame consists of 51 frames, 51 multi frames make up a Super frame, and 2048 Super frames make a Hyper frame which is 2715648 frames. The GSM network can be divided into three parts to illustrate this, consider figure 1. i) Mobile station, ii) Base station subsystem and iii) Network subsystem.

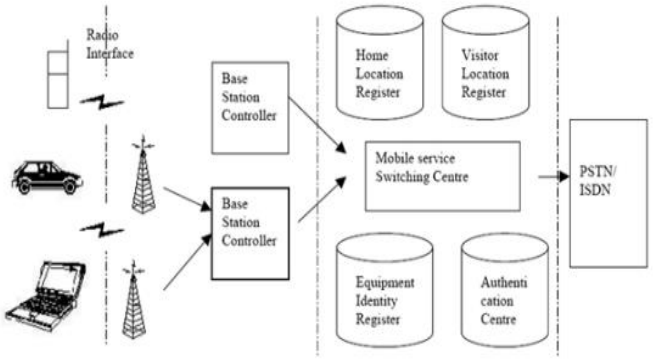

Fig 1: GSM Architecture.

D. ARM Processor

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC).

This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of theprocessing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory.

4. Experimental Work

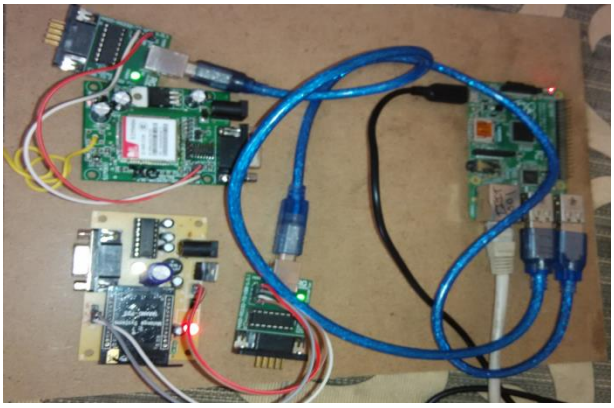

Fig 2: System Circuited Design-1.

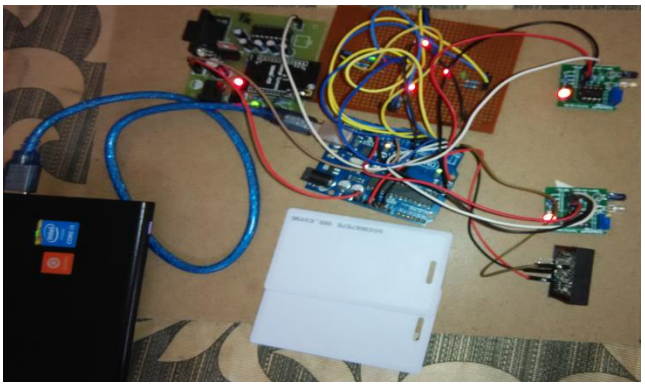

Fig 3: System Circuit Design-2.

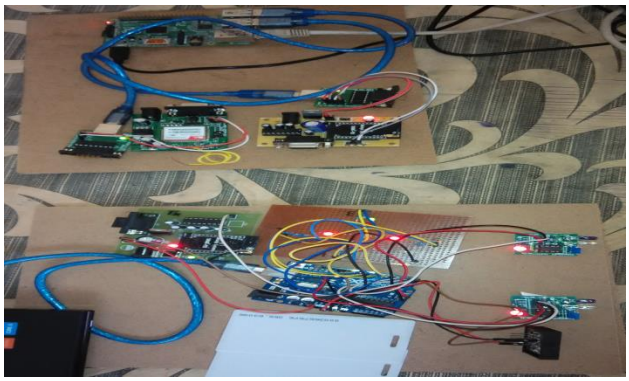

Fig 4: System Circuit Design-3.



Fig 5: System Circuit Design-4.

5. Conclusion

With automatic traffic signal control based on the traffic density in the route, the manual effort on the part of the traffic policeman is saved. As the entire system is automated, it requires very less human intervention. With stolen vehicle detection, the signal automatically turns to red, so that the police officer can take appropriate action, if he/she is present at the junction. Also SMS will be sent so that they can prepare to catch the stolen vehicle at the next possible junctions. Emergency vehicles like ambulance, fire trucks, need to reach their destinations at the earliest. If they spend a lot of time in traffic

jams, precious lives of many people may be in danger. With emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. Further enhancements can be done to the prototype by testing it with longer range RFID readers. Also GPS can be placed into the stolen vehicle detection module, so that the exact location of stolen vehicle is known. Currently, we have implemented system by considering one road of the traffic junction. It can be improved by extending to all the roads in a multi-road junction.

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Novel adaptive hold logic circuit for the multiplier using Add round Key and Parallel AES

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Abstract

Digital multipliers are among the most critical arithmetic functional units in many applications, such as the Fourier transform, discrete cosine transforms, and digital filtering. The through put of these applications depends on multipliers, if the multipliers are too slow, the performance of entire circuits will be reduced. The negative bias temperature instability effect occurs when a PMOS transistor is under negative bias (Vgs = −Vdd), increasing the threshold voltage of a PMOS transistor and reducing the multiplier speed. Similarly, positive bias temperature instability occurs when an NMOS transistor is under positive bias. Both effects degrade the speed of the transistor and in the long term, the system may be fail due to timing violations. Therefore, it is required to design reliable high-performance multipliers. In this paper, we implement an aging aware multiplier design with a novel adaptive hold logic (AHL) circuit. The multiplier is able to provide the higher throughput through the variable latency and can adjust the adaptive hold logic (AHL) circuit to lessen performance degradation that is due to the aging effect. The proposed design can be applied to the column bypass multiplier.

Keywords: Advanced Encryption Standard, Sub bytes, Shift row, mixed column, Add round Key and Parallel AES.

1. Introduction

Cryptography is the practice and study of hiding information. Applications of cryptography include ATM cards, computer passwords, until modern times cryptography referred almost exclusively to encryption, which is the process of converting ordinary information into unintelligible gibberish. Decryption is the reverse, in other words, moving from the unintelligible cipher text back to plaintext. A cipher is a pair of algorithm which creates the encryption and the reversing decryption. The detailed operation of a cipher is controlled both by the algorithm and in each instance by a key. With the development of information technology, protecting sensitive information via encryption is becoming more and more important to daily life. In 2001, the National Institute of Standards and Technology selected the Rijndael algorithm as the Advanced Encryption Standard (AES), which replaced the Data Encryption Standard (DES). Since AES

has been widely used in a variety of applications, such as secure communication systems, high-performance database servers, digital video/ audio recorders, and smart cards.

The Advanced Encryption Standard (AES) is an encryption standard that comprises three block ciphers, AES-128, AES-192 and AES-256, adopted for different applications. AES is one of the most popular algorithms used in symmetric key cryptography. It is available in many different encryption packages. AES is based on a design principle known as a Substitution permutation network. It is fast in both software and hardware, is relatively easy to implement, and requires little memory. AES has a fixed block size of 128 bits and a key size of 128, 192, or 256 bits, whereas Rijndael can be specified with block and key sizes in any multiple of 32 bits, with a minimum of 128 bits and a maximum of 256 bits. Assuming one byte equals 8 bits, the fixed block size of 128 bits is 16 bytes. AES operates on a 4×4 array of bytes, termed the state. A set of reverse rounds are applied to transform cipher-text back into the original plain-text using the same encryption key. The proposed architecture is FPGA based architectures with high-speed and low area constraints for suitable implementation of Advanced Encryption Standard (AES). The main focus of this paper is to compare different design architectures existing in literature with the proposed ones, based on application specific constraints. Most AES calculations are done in a special field. The AES cipher is specified as a number of repetitions of transformation rounds that convert the input plain-text into the final output of cipher text. Each round consists of several processing steps, including one that depends on the encryption key.

2. Related Work

Verbauwhede, P. Schaumont, and H. Kuo [1] proposed the design and performance testing of an Advanced Encryption Standard (AES) compliant encryption chip that delivers 2.29 GB/s of encryption throughput at 56 mW of power consumption in a 0.18- m CMOS standard cell technology. This integrated circuit implements the Rijndel encryption algorithm, at any combination of block lengths 128, 192, and 25 bits) and key lengths (128, 192, or 256bits). We present the chip architecture and discuss the design optimizations. We also present measurement results that were obtained from a set of 14 test samples of this chip.[2] proposed a high-speed AES IP-core, which runs at 880 MHz on a 0.13- m CMOS standard cell library, and which achieves over 10-Gbps throughput in all encryption modes, including cipher block chaining (CBC) mode. Although the CBC mode is the most widely used and important, achieving such high throughput was difficult because pipelining and/or loop unrolling

techniques cannot be applied. To reduce the propagation delays of the S-Box, the slowest function block, we developed special circuit architecture that we call twisted-binary decision diagram (BDD), where the fan out of signals is distributed in the S-Box circuit. Our S-Box is 1.5 to 2 times faster than the conventional S-Box implementations. The T-Box algorithm, which merges the S-Box and another primitive function into a single function, is also used for an additional speedup. [3] describes the area-throughput trade-off for an ASIC implementation of the Advanced Encryption Standard(AES).Different pipelined implementations of the AES algorithm as well as the design decisions and the area optimizations that lead to a low area and high throughput AES encryption processor are presented. With loop unrolling and outer-round pipelining techniques, throughputs of 30 Gigabits/s to 70 Gigabits/s are achievable in a 0.18-_m CMOS technology. Moreover, by pipelining the composite field implementation of the byte substitution phase of the AES algorithm (inner-round pipelining), the area consumption is reduced up to 35 percent. By designing an offline key scheduling unit for the AES processor the area cost is further reduced by 28 percent, which results in a total reduction of 48 percent while the same throughput is maintained. Therefore, the over 30 Gigabits/s, fully pipelined AES processor operating in the counter mode of operation can be used for the encryption of data on optical links.

3. Implementation

3.1 Existing System:

Composite fields are frequently used in implementations of Galois Field arithmetic. In cases where arithmetic operations rely on table lookups, subfield arithmetic is used to reduce lookup-related costs. This technique has been used to obtain relatively efficient implementations for specific operations such as multiplication, inversion and exponentiation. Much of this work has been aimed at implementation of channel codes. The object has usually been to obtain better software implementations by using smaller tables through subfield arithmetic. Applications to hardware design have been relatively infrequent. Our techniques are directed at both hardware and software implementations. We take advantage of the efficiency obtained by the use of subfield arithmetic, not merely in the matter of smaller tables but the overall low-level (gate count). Complexity of various arithmetic operations. The computation and comparison of such gains and cost is dependent upon several parameters – the overhead of mapping between the original and the composite field representations, the nature of the underlying computation and its composition in terms of the relative frequency

of various arithmetic operations, and in case of software implementations, the constraints imposed by the target architecture and its instruction set. Based on these parameters we select the appropriate field and representation to optimize a hardware circuit design. As we shall see, there can be several objectives for this optimization, such as critical path lengths and gate counts, depending upon the overall design goals. The circuit design obtained can then be used to obtain parallelism in a software implementation by means of slicing techniques.

3.2 Proposed System:

A. Parallel Advanced Encryption Standard (AES)

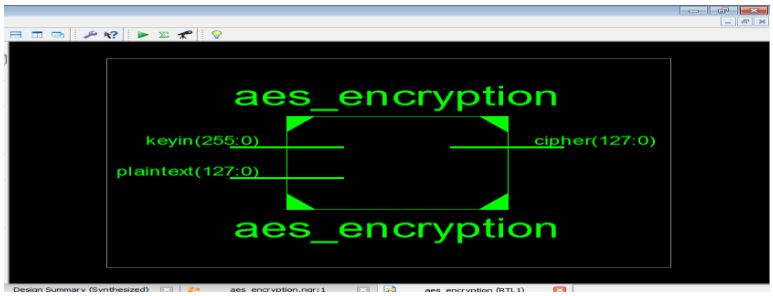
The proposed system Parallel AES is a symmetric encryption algorithm, and it takes a 128-bit data block as input and performs several rounds of transformations to generate output cipher text. Each 128-bit data block is processed in a 4-by-4 array of bytes, called the state. The round key size can be 128, 192 or 256 bits. The number of rounds repeated in the AES, Nr, is defined by the length of the round key, which is 10, 12 or 14 for key lengths of 128, 192 or 256 bits,

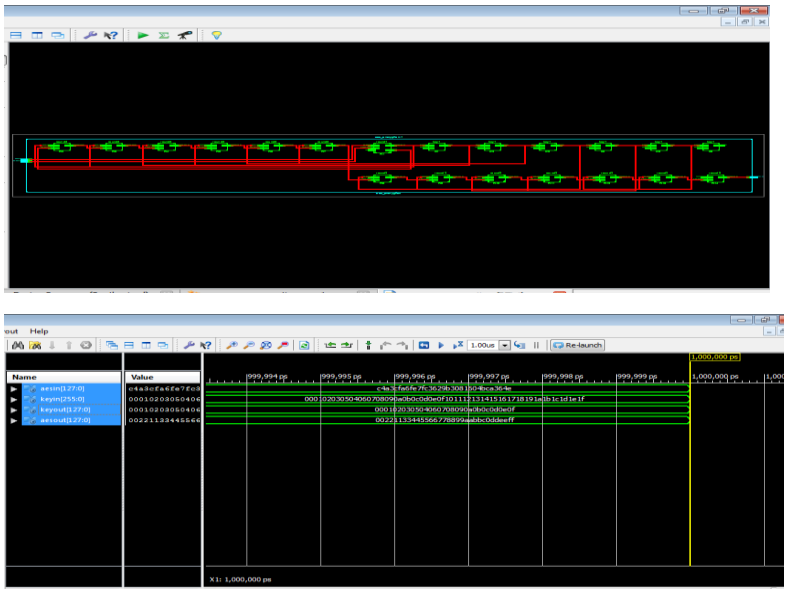
B. steps involved

First Step: Sub Bytes, a non-linear substitution step where each byte is replaced with another according to a lookup table.

- Second Step: Shift Rows, a transposition step where each row of the state is shifted cyclically a certain number of steps.
- Third Step: Mix Columns, a mixing operation which operates on the columns of the state, combining the four bytes in each column.
- Fourth Step: Add Round Key, each byte of the state is combined with the round key; each round key is derived from the cipher key using a key schedule.

4. Experimental Work





5. Conclusion

We discuss three different versions of TIs of AES. We show that it is possible to achieve first-order DPA resistance with nonuniform shared functions if remasking is applied properly. In the case of AES, our “nonuniform” nimble implementation requires less randomness than our “uniform” raw implementation, due to the decreased number of shares. However, for other algorithms and other S-boxes, remasking may increase the amount of randomness required. This idea can be used to trade-off between the randomness and area requirements. Moreover, we empirically confirm that increasing the number of shares has a significant impact on the performance of higher-order attacks, which provides another trade-off between area and DPA resistance. Our most efficient implementation is approximately 8 k GE small and requires only 32 bits of fresh randomness per S-box calculation, which is a significant improvement over all previous works.

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Power Delay using Brent Kung (BK) Adder Report on Ripple Carry Adder

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Abstract

In this paper, Carry Select Adder (CSA) architecture are proposed using parallel prefix adder. Instead of using 4-bit Ripple Carry Adder (RCA), parallel prefix adder i.e., 4-bit Brent Kung (BK) adder is used to design CSA. Adders are key element in digital design, performing not only addition operation, but also many other function such as subtraction, multiplication and division. Ripple Carry Adder (RCA) gives the most complicated design as-well-as longer computation time. The time critical application use Brent Kung parallel prefix adder to drive fast results but they lead to increase in area. Carry Select Adder understands between RCA and BK in term of area and delay. Delay of RCA is larger therefore we have replaced it with Brent Kung parallel prefix adder which gives fast result. Power and delay of 4-bit RCA and 4-bit BK adder architecture are calculated at different input voltage. This paper describes comparative performance of 4-bit RCA and 4-Bit BK parallel prefix adder designed using TANNER EDA tool.

Keywords: Brent Kung (BK) Adder, Ripple Carry Adder, Power, Delay.

1. Introduction

In this paper, describe demand for high-speed arithmetic units in digital image processing units, DSP and other processor chips has superimpose the path for develop of highspeed adders as addition is an essential operation in almost every arithmetic unit, also the basic building block for combination of all other arithmetic logical computations .To increase portability of systems and battery life, delay and power are the ensuring the success of concern. Even in servers and personal computers (PC), power efficient is a vital design parameter. In now day's scenario, Design of power-efficient high-speed logic systems in VLSI design techniques. In digital adders, the speed of addition is limited time required by the carry to generate through the adder. In present scenario, where Computations need to be performed using low-power circuit that must operate at high speed which is achievable with lesser delay that's why this paper describes comparative performance of 4-bit RCA and 4-Bit BK parallel prefix adder designed using TANNER EDA tool. Finally delay, power for the design adder presented and compare.

I. DRAWBACKS OF RIPPLE CARRY ADDER

Multiple full adder circuits can be rapidly cascaded in parallel to addition of N-bit number. For an N- bit cascaded parallel adder, there must be N number of full adder circuits [1]. A ripple carry adder is a logic circuit in which the carryout of each full adder parameter is the carry in of the following next most significant full adder. It is called a ripple carry adder because each and every carry bit gets wind up into the next stage of adder. In figure1, the first sum bit should wait up until input carry is given; the second sum bit should wait up until previously carry is propagated and so on. Finally the output sum should wait up until all previous carries are generated. So it results in delay.

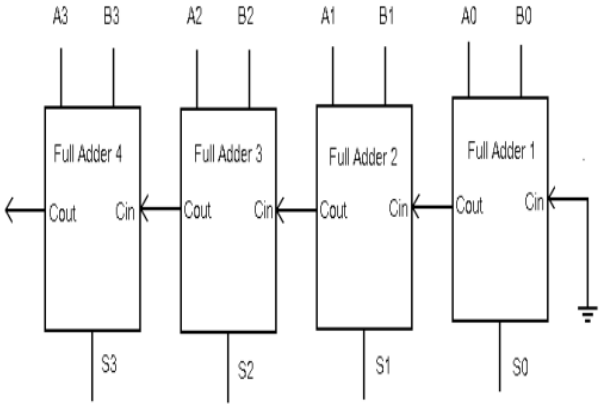

Fig 1. 4-bit ripple carry adder.

2. Related Work

2.1 PARELLEL PREFIX ADDERS:

These are used to take the binary additions because of their flexibility. Carry Look Ahead Adder's (CLA) structure is utilized in order to get the parallel prefix adders. Tree structures algorithm are used to increase the speed high performance of arithmetic operation. Parallel prefix adders are used for high performance arithmetic circuits in industries as they increase the speed of operation. The construction of parallel prefix

Adder involves three stages:

1. Pre- processing stage
2. Carry generation Process
3. Post processing stage

Pre-possessing stage:-

Generate and propagate signals to each pair of the inputs A and B are computed in this stage. These signals are given by the,

Following equations:

$$Pi=Ai \text{ xor } Bi \quad (1)$$

$$Gi=Ai \text{ and } Bi \quad (2)$$

Carry generation network:-

In this stage, carries equivalent to each bit is calculated. All these operations are implemented and carried out in parallel. Carries in parallel are segmented into smaller pieces after the implementation of the stage. Carry propagate and generate are used as intermediate signals which are given by the logic equations3& 4:

$$CPi:j=Pi:k+l \text{ and } Pk:j \quad (3)$$

$$CGi:j=Gi:k+l \text{ or } (Pi:k+l \text{ and } Gk:j) \quad (4)$$

The operations involved in fig. 1 are given as:

CPO=Pi and Pj

(3(i))

CGO=(Pi and Gj) or Gi

(3(ii))

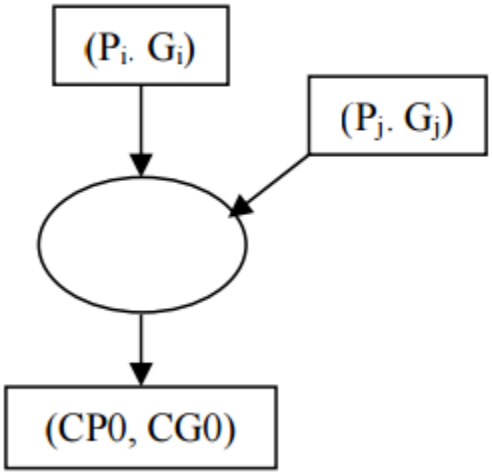

Fig 2. Carry Network.

Post processing Stage:-

This is the concluding step to compute the summation of input bits. It is similar for all the adders and then sum bits are computed by logic operation equation 4& 5:

Ci-1= (Pi and Cin) or (4)

Si=Pi xor Ci-1 (5)

Brent-Kung Adder:-

Brent-Kung adder is a very popular and widely used adder. It actually gives an excellent number of stages from input to all outputs but with asymmetric loading of Intermediate stages. It is one of the parallel prefix adders. It is one of the parallel prefix adders where these adders are the ultimate class of adders that are based on the use of generate and propagate signals. In case of Brent Kung adders along with the cost, the wiring complexity is also less. But the gate level depth of Brent-Kung adders is 0 (log2 (n)), so the speed is lower. The block diagram of 4-bit Brent-Kung adder is shown in Fig. 3.

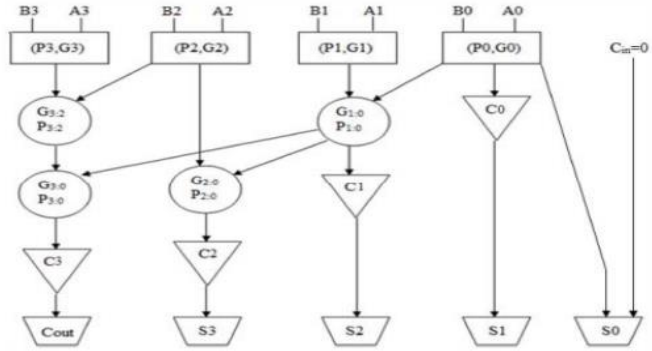

Fig 3. Tree Diagram of 4-bit Brent Kung Adder.

3. Implementation

3.1 4-BIT RIPPLE CARRY ADDER:

This fig. 4 has CMOS Ripple-carry select adders are the simplest and most compact full adders, but their concert is limited by a carry that must propagate from the least - significant bit to the most- significant bit Ripple Carry Adder (RCA) gives the most compact design as-well-as longer computation time.

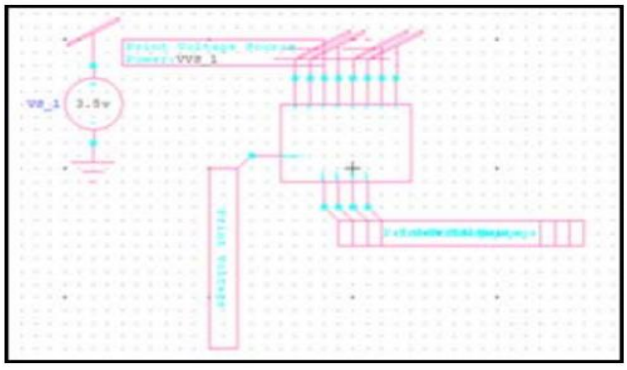

Fig 4. 4-BIT RCA Schematic.

Figure 5 is the output waveform for 4 bit RSA structure. Input is varied from 0000 to 1111 and

corresponding output is observed at each instant of time. Waveform is seen in W-edit window of tanner

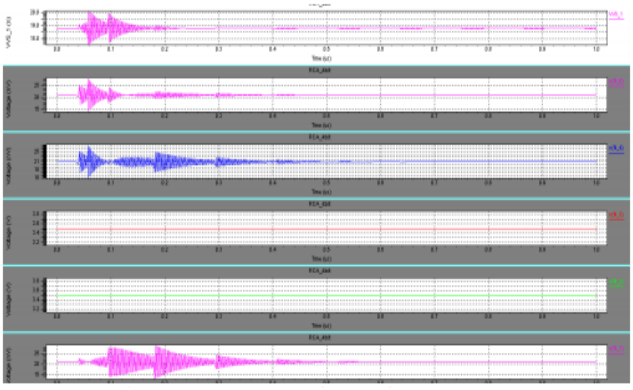

Fig 5. Output Waveform of 4-BIT RCA.

4. Experimental Work

Various adders were designed in Tanner EDA version 13.0 tool using CMOS technology. Power consumption and delay of Ripple Carry Adder and Brent Kung prefix adder 4-Bit word size. The comparison of various adders for different parameters like delay and power consumption is shown in Table I. The result analysis shows that Brent Kung Carry Select Adder shows better results than the Ripple carry adder architectures in terms transient analysis of delay and high speed at different input voltages but with a small powerpenalty. The graphical representation of comparison of RCA and BK CSA for different input voltages for power and delay consumption is shown in fig. Results show BK CSA better results than RCA.

TABLE I. COMPARISON OF RCA AND BK-CSA ADDERS FOR TRANSIENT DELAY AT VARIOUS INPUT VOLTAGES.

Adder	Supply Voltage Transient Delay(sec)				
	3V	3.5V	4V	4.5V	5V
4-Bit RCA	1.23	1.30	0.95	2.31	0.94
4-Bit BK CSA	0.20	0.20	0.16	0.16	0.19

Figure 8 is the graphical representation of comparison of RCA and BK CSA at different input voltages for transient Delay is shown in fig. Results show that BK CSA strongly high speed results than RCA.

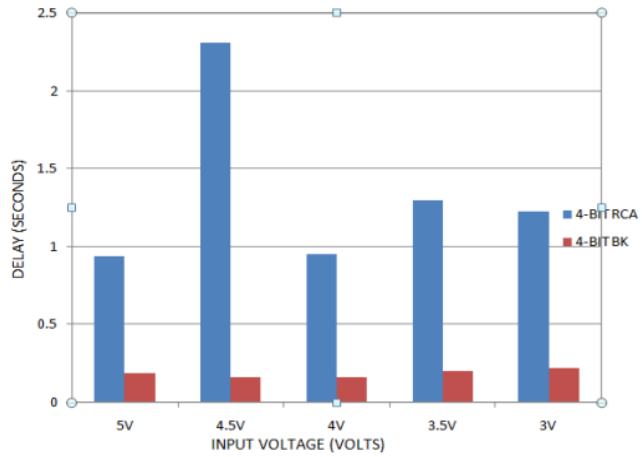

Fig 8. Comparison of RCA and BK CSA Adders for Transient Delay at Various Input Voltages.

Figure 9 is the graphical representation of comparison of RCA and BK CSA at different input voltages for power consumption is shown in fig. Results show that RCA slightly better results than BK CSA.

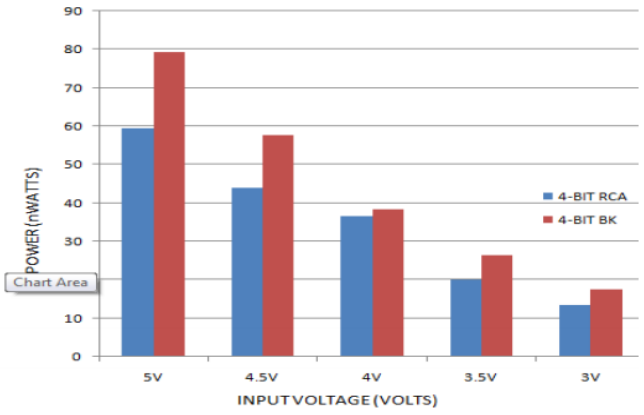

Fig 9. Comparison of RCA and BK CSA Adders for Power at Various Input Voltages.

5. Conclusion

This work can be extended for higher number of bits also. By using parallel prefix adder, delay and power consumption of different adder architectures is reduced. As, parallel prefix adders derive fast results therefore Brent Kung adder is used. The calculated results conclude that BK Carry Select Adder is better in terms of power consumption and high speed whencompared with RCA adder architectures and can be used in different applications of adders like in multipliers, to execute different algorithms of Digital Signal Processing like Finite Impulse Response, Infinite Impulse Response etc.

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Retention Time Reliable Gain Cell Low power operation Speed Data

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Abstract

Memories have occupied increasingly large portions of the die area of VLSI systems-on-chip (SoCs), in general, and of microprocessor. This is due to the large 6-transistor (6T) SRAM bitcell and its area-consuming peripheral circuitry that are the basis for the vast majority of these. In addition, the standby power of ultralow-power (ULP) systems, such as biomedical implants and wireless sensor networks, is often dominated by embedded memories, which continue to leak during the long retentive standby periods that characterize these systems. Logic compatible gain cell (GC)-embedded DRAM (eDRAM) arrays are considered an alternative to SRAM due to their small size, nonratioed operation, low static leakage, and two-port functionality. However, traditional GC-eDRAM implementations require boosted control signals in order to write full voltage levels to the cell to reduce the refresh rate and shorten access times. These boosted levels require an extra power supply or on-chip charge pumps, as well as nontrivial level shifting and toleration of high voltage levels. In this brief, we present a novel, logic compatible, 3T GC-eDRAM bitcell that operates with a single-supply voltage and provides superior write capability to the conventional GC structures.

Keywords: Access speed, Data Retention Time, Reliable, Embedded DRAM, Gain cell, Low power operation.

1. Introduction

In recent years, memories have occupied increasingly large portions of the die area of VLSI systems-on-chip (SoCs), in general, and of microprocessors, in particular, as shown in the latest ITRS edition [1]. This is due to the large 6-Transistor (6T) SRAM bitcell and its area-consuming peripheral circuitry that are the basis for the vast majority of these memories. In addition, the standby power of ultra-low power (ULP) systems, such as biomedical implants and wireless sensor networks, is often dominated by embedded memories which continue to leak during the long retentive standby periods that characterize these systems. 6T SRAM has been the traditional choice for the implementation of embedded memories due to its high-access speed and refresh-free static data retention. However, the 6T bitcell has several drawbacks in modern systems, including its large transistor

count, its impeded functionality under voltage scaling, and the aforementioned static leakage currents from the supply voltage (VDD) to GND. One of the interesting alternative implementations that addresses these limitations, while continuing to provide full CMOS logic compatibility, is gaincell (GC) embedded DRAM (eDRAM), such as the circuit illustrated in Fig. 1(a) [2]–[5]. Most often consisting of two (2T) or three (3T) transistors, GC-eDRAMs provide a reduced silicon footprint, along with inherent 2-port functionality, nonratioed circuit operation, and very low static leakage currents from VDD to GND. However, as opposed to static memories, Reduced silicon footprint, along with inherent two-port functionality, nonratioed circuit operation, and very low static leakage currents from VDD to GND. However, as opposed to static memories, such as SRAM, the data retention of GC-eDRAM depends on dynamically stored charge, and thereby requires periodic, power-hungry refresh operations.

2. Related Work

2.1 EXISTING METHOD

A. 6T SRAM

Basic static RAM circuits can be viewed as vibrations on the designs used for latches and flip-flops more aggressive static RAMs make use of design tricks originally developed RAMs to speed up the system. The value is stored in such as SRAM, the data retention of GC-eDRAM depends

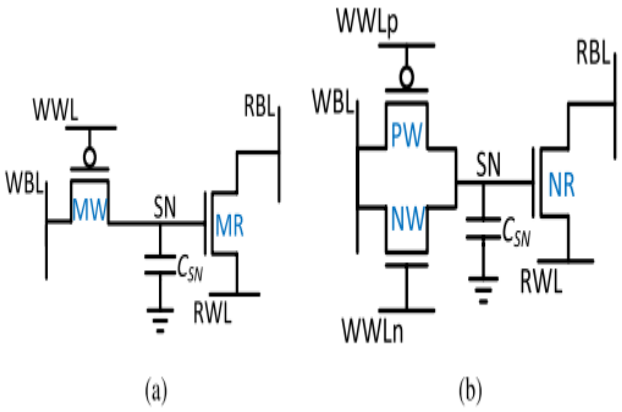

Fig 1. Schematic of conventional and proposed GCs. (a) 2T mixed GC. (b) Proposed 3T GC.

the middle four transistors, of Fig.2 which form a pair on inverters connected in a loop. The other two transistors control access to the memory cell by the bit lines. When select = 0, the inverters reinforce each other to store the value. A read or write is performed when cell is selected. To read, bit and bit are precharged to before the select line is allowed to go high. One of the cell's inverters will have its output at 1, and the other at 0, which inverter is 1 depends on the value stored. The right hand inverter's pull down and the bit line will be drained to through that inverter's pull down and the bit line will remain high. If the opposite value is stored in the cell, the bit lines will be pulled own while bit remains high. To write, the bit and bit lines

are set to the desired value, then select is set to 1.charge sharing forces the inverters to switch values, if necessary, to store the desired value. The bit lines have much higher capacitance than the inverters, so the charge on the bit lines is enough to overwhelm the inverter pair and cause it to flip state.

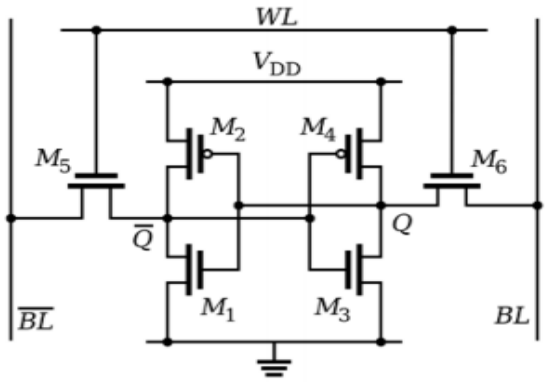

Fig 2: Fig.1 6T SRAM

B. 2T Mixed Gain Cell

2T mixed GC can be implemented with either an NMOS or a PMOS device as shown in Fig.3. Moreover, both MW (write transistor) and MR (read transistor) can be implemented with standard threshold voltage core or high threshold voltage I/O devices in the considered CMOS technology. Due to the voltage drop across MW, a boosted write word line (WWL)voltage is required during write access above for NMOS operation and below for PMOS operation. For a read operation a PMOS MR requires a pre-discharge of the parasitic RBL capacitance followed by raising the read word line (RWL). If the selected bitcell's storage mode (SN) holds a loop value,MR is conducting and charges RBL post a detectable sensing threshold. If SN holds value MR is cut-off such that RBL remains discharged below the sensing threshold. For the NMOS implementation of MR, the operation is exactly opposite i.e. RBL is precharged and RWL is lowered to initiate a read.

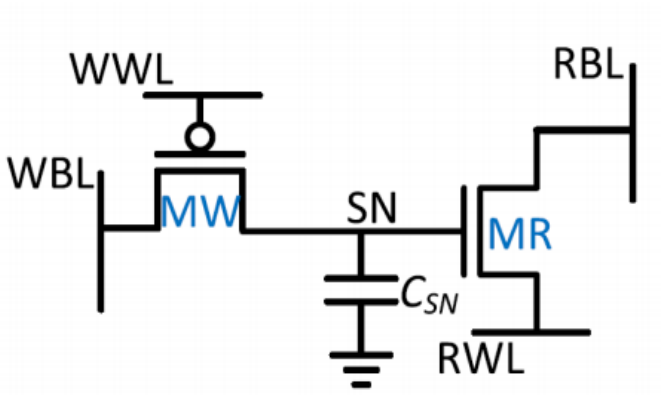

Fig 3. 2T Mixed Gain Cell.

3. Implementation

3.1 PROPOSED METHOD

In this brief, we present a new topology for a 3TGC, featuring a complementary transmission gate in the write port. While the proposed solution is quite straight forward it is novel and its impact in very high. We demonstrate the functionality of the proposed system used in ultra-low power applications such as biomedical sensor nodes and implants. The proposed 3T GC-eDRAM macro is shown to be fully functional with a supply voltage ranging from 600mv to 2.5v.

A. 3T Gain Cell eDRAM

3T GC consists of write port featuring a complementary transmission gate PMOS write (PW) and NMOS write (NW) a storage node (SN) composed of the three transistors, a read port based on NMOS read (NR) and the metal interconnect as in Fig 3. the GC is built that all the transistors operates with standard voltage and is fully compatible with standard digital CMOS technologies. The gates of PW and NW are connected to the world line of PMOS and NMOS WWLp and WWLn. A common write bit line is used to drive the data to the transmission gate during write operations. When the fullswing is given to the cells transmission gate enables the propagation of strong levels to the SN without any need for boosted world line. Read operation is performed by precharging the read bit line (RBL) to and subsequently driving the read word line (RWL) to GND. If the storage node is already high it discharges RBL capacitances or blocking the discharge path if SN is low. IN order to achieve a tradeoff between speed, area, power and reliability, a dynamic sense amplifier can be used to improve the read operation and its performance as described in [5],[6].

B. Operation

The circuit is described with = 900 mv. This voltage was chosen as a good medium voltage between and since the data retention time (DRT) is proved to be efficient in. GC-eDRAM design [8] at this voltage starting with charged WBL is driven low and the world lines WWLp is set to 0 and WWLn is set to. Then a strong 0 level is passed to the SN, during standby, the level on SN deteriorates due to leakage currents dominated by the sub threshold leakage of PW and NW in mature CMOS nodes. Hence in order to extend the retention time WBL is driven to during standby and read cycles thereby significantly reducing the sub threshold leakage through the transmission gate for both stored low and high values compared with the condition where WBL is either driven to either or GND. The write circuitry and read circuitry are described in section IV.A. During readout the 0 level blocks the discharge paththrough NR, maintaining the precharged voltage on RBL. During the next write operation WBL is driven high, resulting in a strong 1 stored on the SN. The subsequent read operation provides a strong gate overdrive to transistor NR, thereby discharging RBL toread a 1. It should be noted that during this operation (Read 1), bitcells storing 1 and sharing thesame column turn on when RBL discharges by more than the of NR, causing it to saturate before it can completely discharge. This phenomenon is common to many GC-eDRAM configurations, as discussed in[8].

C. Data Retention Time

The data retention time (DRT) of GC embedded DRAMS is the time interval for writing a data level in the bit cell to the last moment the data can still correctly read out the stored information. For 2T and 3T cells methodology which are affected by the initially degraded voltage level corresponding to the data values due to the threshold voltage (V_t) drop across the write transistor DRT is primarily limited by the initial charge stored on the internal bit cell capacitance and the leakage currents that degrade the stored voltage level over time. In order to describe this issue a boosted write world line (WWL) voltage is usually employed to pass a full swing level to the storage capacitance. Any how this requires the generation of boosted on-chip voltage, which entails substantial overhead [1]. The magnitude of the voltage boost is set not only to overcome the drop, but also to achieve short write access time which otherwise are typically longer than 6T SRAM implementation. The proposed bitcells provides strong initial data levels for enhanced DRT and robust operation as well as for fast write access time.

3.2 MEMORY MACRO PERIPHERALS

To improve the array performance in terms of access time and power consumption several peripheral techniques were integrated into the designed memory macro in the proposed technique single supply voltage is provided to the circuit which simplifies the implementation of a full memory macro. This is the significant advantage over the other GC eDRAMS that uses conventional bit cells. These bit cells require the use of level shifters to create the desired boosted or negative voltage supply depending on the types of MOS write. The peripheral circuit which is designed for this memory macro and their techniques are described as follows.

A. Readout Circuitry

Large number of ultra low power systems comprising of low voltage embedded memories consists of simple sense inverter. This sense inverter is used for the purpose of reduction in area, robust and low power readout operation however this inverter suffers from very slow data readout as it requires RBL to be discharged or charged for PMOS read device switching the threshold of the inverter. This operation is further impeded by the before mentioned. In order to overcome this limitation the readout path that was integrated into the proposed 3T GC-eDRAM macro cell has two sensing node 1). A faster dynamic sensing mode but it is potentially more error-phrone which acts in dynamic readout mode 2). A slightly slower static mode but more reliable. In both the sensing modes however threshold device PMOS transistors were used in order to allow a faster read access time due to the above mentioned

problem the read out circuitry is provided the supply voltage through the read enable signal in order to save substantial static power because of the leaky low voltage

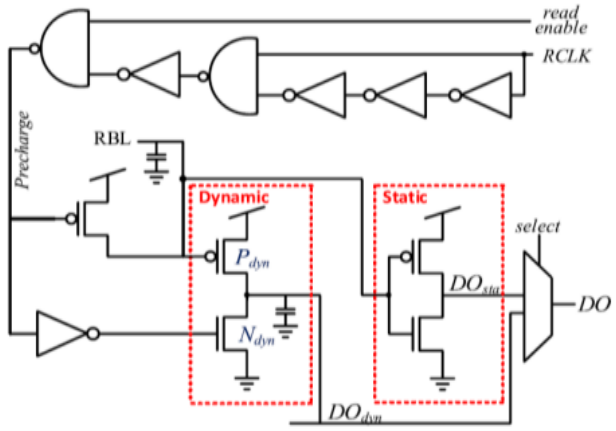

Fig 4.ReadOut Circuitry.

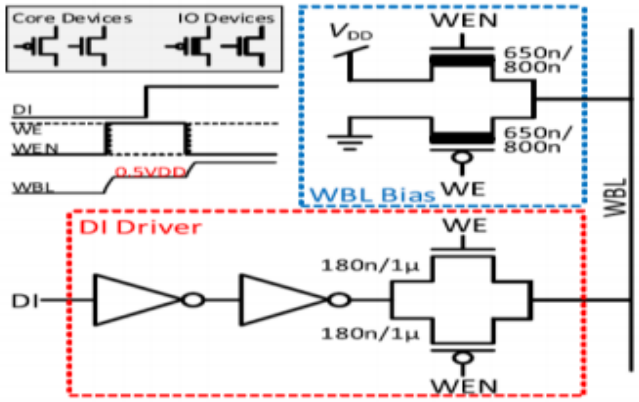

Fig 5. Write Circuitry.

threshold devices the schematic diagram with the two sensing nodes of static and dynamic are shown in Fig. 4.RBL saturation during readout that slows down the charging and discharging operation as the RBL voltage increases and decreases.

The raising edge of the read clock (RCLK) creates a precharge pulse that charges the parasitic capacitance of RBL and discharges the dynamic sense inverter output capacitance through the discharge transistor, . Subsequently RBL is conditionally discharge during read operation turning on to complement the output if high value is stored in the selected cell. Therefore an RBL swing of only one threshold voltage is required to complete a read operation.

B. Write Circuitry

The proposed single supply 3T bit cell provide a significant improvement in write time when compared to the read time, which means it has fast access time, when compared to the readout circuitry. It also has an initial SN level improvement over standard GC implementation the dual transistor write port built by means of transmission gate provides a leakage path to or from the storage node. The write circuitry to implement the median WBL bias during standby and read cycle is shown in Fig.5. The increased aggregated sub- current causes faster degradation of the stored charge, leading to reduced DRT, as compared with a reference 2T cell. In addition, several previous works have shown that the data dependent, asymmetric DRT (for data 0 and 1) of standard GCs can be manipulated to overall enhance DRTs by biasing the WBL at the best case voltage for the weaker data level during standby and read operations . For the proposed 3T configuration, the worst case DRTs of the 1 and 0 levels are similar, and significant deterioration of the

stored levels occurs for both extreme values of WBL bias (VDD and GND).

4. Experimental Work

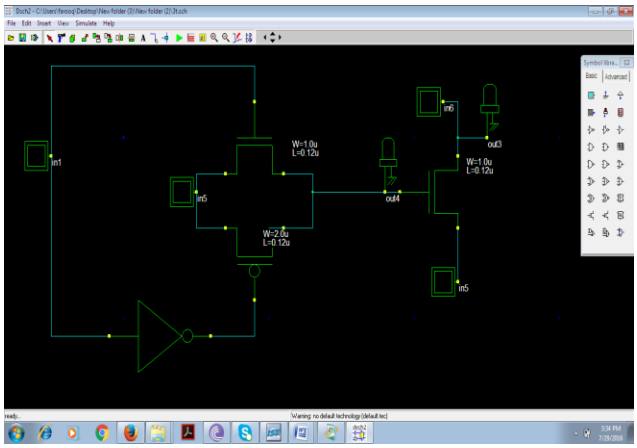

Fig :-6 Circuit of The Project

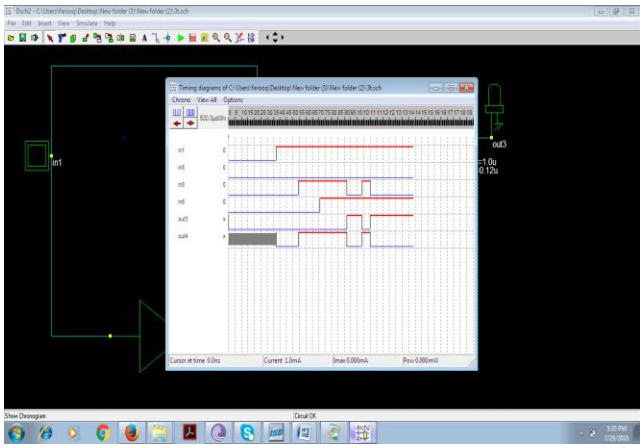

Fig :-7 Out Screes-1

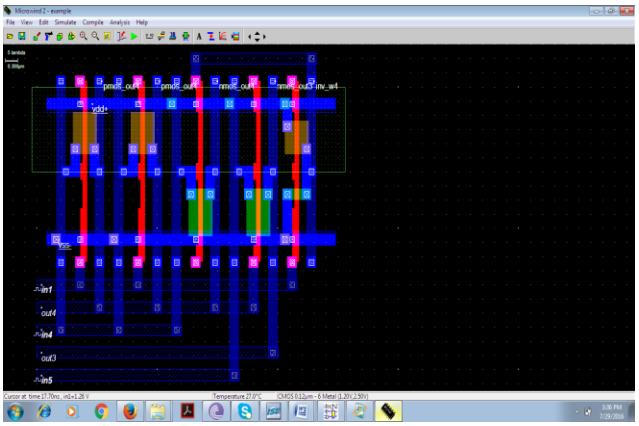

Fig :- Out Screen -2

5. Conclusion

This brief proposes a novel 3T GC eDRAM microcell targeted at ULP systems and providing high storage density. The proposed GC is operated from a single-supply voltage, eliminating the need for boosted voltages, commonly found in prior-art implementations. When compared with 6T SRAM technology and 2T mixed gain cell technology it has less consumption of power and becomes fully functional at the voltage range of 600mv to 2.5v showing a worst case Data Retention power of 4.6 nW at 900mv.The proposed cell exhibits faster write-access than conventional GC circuits, thereby increasing DRTs and reducing refresh power consumption. The average power consumption at write access time is less than that of read access time. Measurement results show full functionality at voltages ranging from 600 mv to 2.5 V with power as much as lower than a previously reported 6T SRAM in the same technology node. Testing is the major

issue in eDRAM technology. So in future various testing method can be used to check the better performance of the circuit.

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Smart Toll Collection using fast tag

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Abstract: - The automated toll collection system using passive Radio Frequency Identification (RASPBERRY PI 2) tag emerges as aconvincing solution to the manual toll collection method employed at tollgates. Time and efficiency are a matter ofpriority of present day. In order to overcome the major issues of vehicle congestion and time consumption RASPBERRY PI 2technology is used. RASPBERRY PI 2 reader fixed at tollgate frame reads the tag attached to windshield of vehicle. The objectdetection sensor in the reader detects the approach of the incoming vehicle's tag and toll deduction takes placethrough a prepaid card assigned to the concerned RASPBERRY PI 2 tag that belongs to the owners' account. This makes tollgate transaction more convenient for the public use.

Keywords— Smart Toll Collection, (RASPBERRY PI 2)

1. INTRODUCTION

In our day to day life, we pay certain amount of tax through toll plaza to the government. The toll gates are mostlyfound on national highways and bridges etc., and we pay standing over a queue in the form of cash, although, themobility of vehicles gets interrupted by this method which takes longer travel time, more consumption of fuel and alsopollution level get increased in that region, instead of that the method commonly used by industries and in advancedcountries is the Electronic Toll Collection System.Electronic toll collection system is the technology that enables the automatic electronic toll collection from theprepaid account registered on the name of vehicle owner, determining whether the vehicle is registered or not andinforms the toll authorities avoiding toll violations. Over last decades, electronic toll collection system have been

Implemented in United States and many other countries with a new improvement in it.By thiswe don't have to carry a handsome amount of cash with us relates to security as well. This system does notrequire any manual operation of toll barriers and

collection of toll amounts, it is completely automated toll collectionsystem. The vehicle owners are registered with their vehicles proper information and their account is created, wherethey can recharge their account with required amount. When the vehicle passes through the toll gate, the information isshared between RASPBERRY PI 2 tag and RASPBERRY PI 2 reader and the amount is deducted from the owners account. This method reducesthe traffic congestion problems, also reduces the travel time and reduces the fuel consumption.

2. IMPLEMENTATION

Software

The raspbian os is used in the raspberry pi board. It is a free operating system that is based on Debian which is particularly optimized for the Raspberry Pi hardware. It comes with over 35,000 packages and pre-compiled software bundled in a simple format for easy installation in the Raspberry Pi. The coding for all the sensors and the robot movement are done using the python coding. Python is preferred since it is a simple and a minimalistic language. It is also free and open source software. This can be used in many platforms such as Linux, VxWorks, and PocketPC etc. Also, it supports procedure-oriented programming as well as OOPS. The web browser is created by using HTML. The static IP address should be configured in the raspberry pi for the Wi-Fi dongle. This assigned static ip address is for connecting with the Wi-Fi of the mobile phone for the live video transmission. Since a normal usb camera is used it must be initially installed in the raspberry pi 2 board using the linux commands.

Raspberry pi

The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support. Raspberrypi block function v01.svg This block diagram depicts Models A, B, A+, and B+. Model A, A+ and the Pi Zero lack the Ethernet and USB hub components. The Ethernet adapter is internally connected to an additional USB port. In Model A, A+, and the PI Zero, the USB port is connected directly to the system on a chip (SoC). On the Pi 1 Model B+ and later models the USB/Ethernet chip contains a five-point USB hub, of which four ports are available, while the Pi 1 Model B only provides two. On the Pi Zero, the USB port is also connected directly to the SoC, but it uses a micro USB (OTG) port. The Broadcom BCM2835 SoC used in the first generation Raspberry Pi is somewhat

equivalent to the chip used in first generation smartphones (its CPU is an older ARMv6 architecture),which includes a 700 MHz ARM1176JZF-S processor, Video Core IV graphics processing unit (GPU), and RAM. It has a level 1 (L1) cache of 16 KB and a level 2 (L2) caches of 128 KB. The level 2 cache is used primarily by the GPU. The SoC is stacked underneath the glued to RAM chip, so only its edge is visible. The Raspberry Pi 2 uses a Broadcom BCM2836 SoC with a 900 MHz 32-bit quad-core ARM Cortex-A7 processor (as do many current smartphones), with 256 KB shared L2 cache. The Raspberry Pi 3 uses a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache.

Power Supply

It supplies various voltages as per requirement to each unit. This portion consist of transformer, rectifier, regulatorand capacitors for filter. The rectifier is used as a bridge rectifier which converts 230V to desired 5V/12V DC.

Stepper Motor

It is for opening and closing of a barrier on the toll gate. It is done when the customer successfully performs thebilling operation through RASPBERRY PI 2 with sufficient balance.

Buzzer

Buzzer will ring when there will be insufficient balance in customer account.

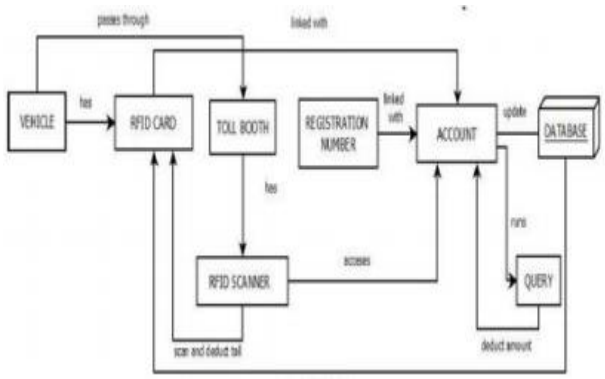

Fig:-1 Flow of the Project

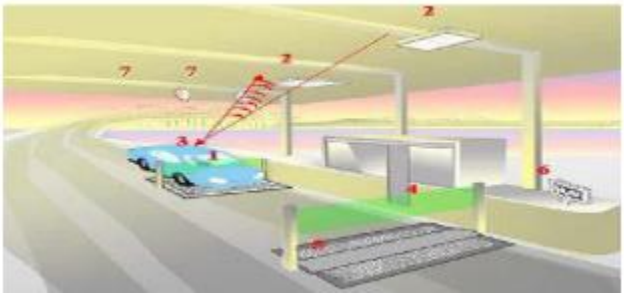

Fig:-2 Live Project

3. EXPERIMENTAL RESULTS

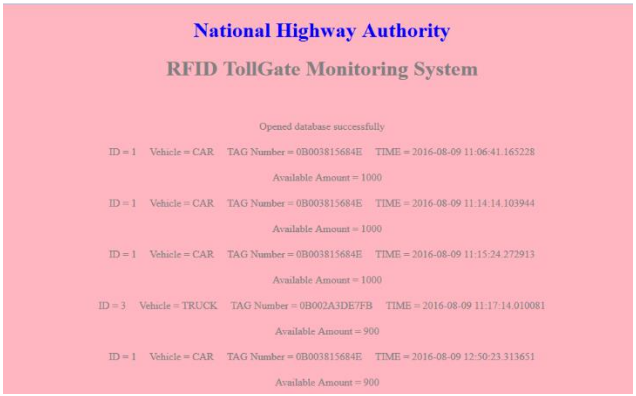

Fig:-3 Home Screen on Web Results

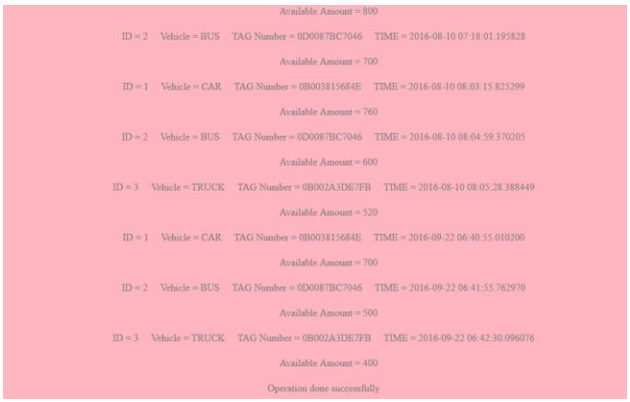

Fig:-4 Payment for Buses

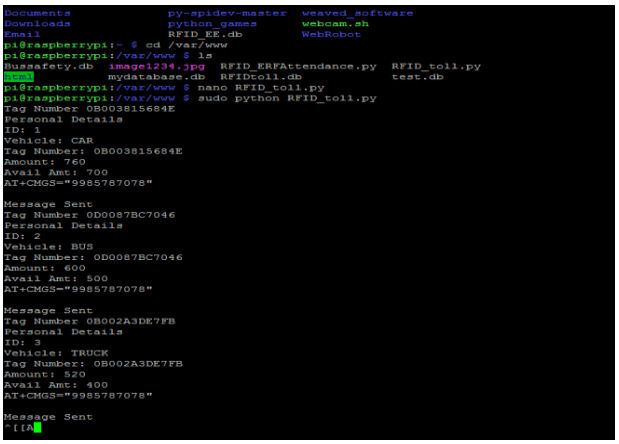

Fig:-5 Results

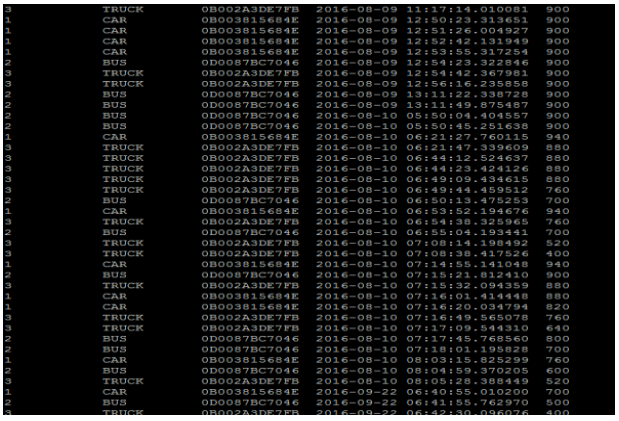

Fig:-6 Results

4. CONCLUSION

The Smart toll collection system in expressway based on RASPBERRY PI 2, a design scheme was put forward. It has characteristics of low cost, high security, far communication distance and high efficiency, etc. It improves technology level of charge and also improves passage ability of expressway. Smart toll collection system is an effective measure to reduce management costs and fees, at the same time, greatly reduce noise and pollutant emission of toll station. In the Smart Toll Collection system, real time toll collection system has been designed. This reduces the manual labor and delays that often occur on roads. This system of collecting tolls is eco-friendly and also results in increased toll lane capacity.One of the most important impacts of technology is the development of sustainable technologiesthat reduce the traffic conjunction and that need of future generation, save energy and time.Our project mainly impact full in these aspects, by saving the time on the toll, and alsofor to save fuel and by regulating the pollution and usage of vehicle at toll gates; as shown itmakes the toll collection payment easy by using automatic toll cash collection process.

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The Smart ATM Monitoring System using Raspi

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Abstract

Automated Teller Machines (ATMs) security is the field of study that aims at solutions that provide multiple points of protection against physical and electronic theft from ATMs and protecting their installations. From anti-skimming defend systems to silent indicate systems, integrated ATM video surveillance cameras and ATM monitoring options, security specialists are ready to help the people get more out of the ATM security and ATM loss prevention systems. The implementation is achieved with the use of Machine-to-machine (M2M) communications technology. M2M communications is a topic that has recently attracted much attention It provides real-time monitoring and control without the need for human intervention. The idea of M2M platform suggests new system architecture for positioning and monitoring applications with wider coverage and higher communication efficiency. The aim of the proposed work is to implement a low cost standalone Embedded Web Server (EWS) based on ARM11 processor and Linux operating system using Raspberry Pi. It offers a robust networking solution with wide range of application areas over internet. The Web server can be run on an embedded system having limited resources to serve embedded web page to a web browser. The setup is proposed for ATM security, comprising of the modules namely, authentication of shutter lock, web enabled control, sensors and camera control.

Keywords:ARM11, Arduino, GSM, ZIGBEE, Vibration Sensor, DC Motor, Buzzer, Spray.

1. Introduction

The Idea of Designing and Implementation of Security Based ATM theft project is born with the observation inour real life incidents happening around us. This project deals with prevention of ATM theft from robberies overcome the drawback found in existing technology in our society. Whenever robbery occurs, Vibration sensor is used here which senses vibration produced from ATM machine. This system uses Arduino controller based embedded system to process real time data collected using the vibration sensor. Once the vibration is sensed, information is passed to ARM11 based master device over zigbee channel where alarm sound starts from the

buzzer. DC Motor is used for closing the door of ATM. A relay will be triggered to leak the gas inside the ATM to bring the thief into unconscious stage. Camera is always in processing and sending video continuous to the PC and it will be saved in computer. RTC used to capture the robber occur time and send the robbery occur time with the message to the nearby police station and corresponding bank through the GSM. This will prevent the robbery and the person involving in robbery can be easily carried.

1.1 LITERATURE REVIEW

There are various existing system are developed such as Security in e-banking via card less biometric ATMs [1] provides high security in authentication which also protects user from unauthorized access. In this model user required to authenticate himself with biometric identification (thumb/ fingerprint/iris etc.), personal identity number (pin) and selection of bank branch from displayed list if necessary. This model is designed for the rural farmers, semi-literate peoples.Protected cash withdrawal in ATM using mobile phone [2] describes a method of implementing two way authentications. Role of biometric technology over advanced security and protection in auto teller machine transaction [3] describe, different biometric techniques related security topics regarding ATM has been discussed. Enhanced voice recognition to reduce fraudulence in ATM machine [4] introduced to reduce cases of fraud and theft due to its methods used in identification of individuals, security based implementation of hidden markov model algorithm (hmm) to calculate speech rate, frequency and modulation pitch detection algorithm (PDA) for pitch calculation of voiceprintsand accent classification (ac) for the accent analysis in voice. Anti-theft ATM machine using vibration detection sensor [5] provides security for the ATM machine itself. When the attacker try to damage the ATM machine vibration detection sensors gets activated. A message is passed to the nearby police stations with the help of GSM modem.

2. Related Work

2.1 Existing Methodology:

The existing system of two-factor authentication using mobile phones, are used to generate the one time password (OTP) [7].By definition, authentication is the use of one or more mechanisms in order to prove that you are who you claim to be. Once your identity is validated, access is granted [6]. Three universally recognized authentication factors exists today: what you know (passwords), what you have (tokens, cards) and what you are (biometrics). Recent work has been done in trying alternative factors, for example somebody you know, a factor that can be applied in social networking.

Two-factor authentication is a mechanism that implements two of the above mentioned factors and is considered stronger and more secure than the traditionally implemented one factor authentication system. For example, withdrawing money from an ATM machine uses two factor authentication: the ATM card (what you have) and the personal identification number (what you know). Passwords are known to be one of the easiest targets of hackers. Therefore, most companies are searching more ways to protect their customers and employees. Biometrics is known to be very securing [7], but is used only in special organizations (such as military organizations) given the expensive hardware needed and their high maintenance costs. As an alternative, banks and companies are using tokens as a way of two-factor authentication. A token is a physical device that generates passwords needed in an authentication process. Tokens can either be software or hardware. Hardware tokens are small devices that can be easily carried. Some of these tokens store cryptographic keys or biometric data. Anytime a user wants to authenticate in a service, he uses the onetime password displayed on the token in addition to his normal account password. Software tokens are programs that run on computers and provide a onetime password that it is changed after a short amount of time (usually 30 seconds). OTP algorithm's security is very important because no one should be able to guess the next password in sequence. The sequence should be random to the maximum possible extent, unpredictable and irreversible. Factors that can be used in OTP generation include names, time, seeds, etc. Several commercial two-factor authentication systems exist today such as RSA Secure ID [7].Multifactor authentication uses more than two form of authentication and it provides higher security [8].

2.2 Proposed Methodology:

In this project we analyzed what is the problem people faced in the existing technology. Especially Multifactor Authentication (MFA) method provides more complexity to the user. This project helps to overcome the problem of complexity and provides easiest way to secure the ATM transaction. Whenever person enters account number onto the ATM machine, the system requires PIN to authenticate the user. If PIN gets verified, it makes a call to theuser's mobile. If the user replied to make a transaction, then transaction process takes place. The proposed system uses GSM modem for call from ATM to the user and getting reply from user to ATM. If user correctly entered amount and secondary password from mobile then transaction takes place. There is no any problem of lost or damaged ATM card. Also if the robbers try to damage ATM machine then the

vibrations are detected by vibration sensor and give an alert message to the nearest police station and switches on the alarm.

3. Implementation

3.1 Hardware Description:-

Microcontroller- Microcontroller can be termed as a single on chip computer which includes number of peripherals like RAM, EEPROM, Timers etc., required to perform some predefined task. AVR is an 8-bit microcontroller belonging to the family of Reduced Instruction Set Computer (RISC). In RISC architecture the instruction set of the computer are not only fewer in number but also simpler and faster in operation. AVR microcontroller executes most of the instructions in single execution cycle. AVRs are about 4 times faster than PICs; they consume less power and can be operated in different power saving modes. Let's do the comparison between the three most commonly used families of microcontrollers. AVR follows Harvard Architecture format in which the processor is equipped with separate memories and buses for Program and the Data information.

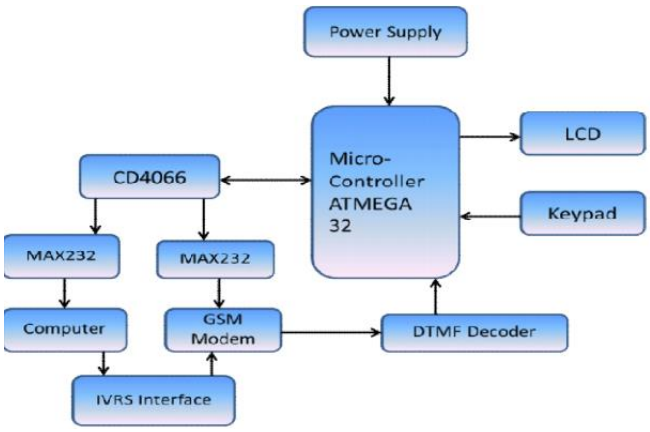

Fig 1: Block Diagram of Proposed System.

LCD- A liquid crystal display (LCD) is a flat panel display, electronic visual display, video display that uses the light modulating properties of liquid crystals (LCs). LCs does not emit light directly. They are used in a wide range of applications, including computer monitors, television, instrument panels, aircraft cockpit displays, signage, etc. LCDs have displaced cathode ray tube (CRT) displays in most applications. They are usually more compact, lightweight, portable, less expensive, more reliable, and easier on the eyes. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in.

DTMF- DTMF stands for Dual Tone Multi Frequency and it is the basis for your telephone system. DTMF is actually the generic term for Touch-Tone (touch-tone is a registered trademark of ATT). Your touch-tone phone is technically a DTMF generator that produces

DTMF tones as you press the buttons.Dual-tone multi-frequency signaling (DTMF) is used for telecommunication signaling over analog telephone lines in the voice-frequency band between telephone handsets and other communications devices and the switching center. The version of DTMF that is used in push-button telephones for tone dialing is known as Touch-Tone.

IVRS- Interactive voice response (IVR) is a technology that allows a computer to interact with humans through the use of voice and DTMF keypad inputs. In telecommunications, IVR allows customers to interact with a company's database via a telephone keypad or by speech recognition, after which they can service their own inquiries by following the IVR dialogue. IVR systems can respond with prerecorded or dynamically generated audio to further direct users on how to proceed. IVR applications can be used to control almost any function where the interface can be broken down into a series of simple interactions. IVR systems deployed in the network are sized to handle large call volumes.IVR technology is also being introduced into automobile systems for hands-free operation. Current deployment in automobiles revolves around satellite navigation, audio and mobile phone systems.

MAX232- MAX232 from Maxim was the first IC which in one package contains the necessary drivers (two) and receivers (also two), to adapt the RS-232 signal voltage levels to TTL logic. It became popular, because it just needs one voltage (+5V) and generates the necessary RS-232 voltage levels (approx. -10V and +10V) internally. This greatly simplified the design of circuitry.

CD4066BC Quad Bilateral Switch- CD4066BC is a quad bilateral switch intended for the transmission or multiplexing of analog or digital signals. It is pin-for-pin compatible with CD4016BC, but has a much lower "ON" resistance, and "ON" resistance is relatively constant over the input-signal range. **KEYPAD-** keypadis a set of buttons arranged in a block or "pad" which usually bear digits, symbols and usually a complete set of alphabetical letters. If it mostly contains numbers then it can also be called a numeric keypad. The keypad Switches are connected in a matrix of rows and columns: The rows of the matrix are connected to four output port lines. The columns of the matrix are connected to four input port lines

Software Description: - The software part deals in programming the microcontroller. In the present work we have used the ORCAD design software for PCB layout design, the CODEAVISIONAVR software development tool to write and compile the source code, which has been written in the C language. The uCFLASH serial device programmer has been

used to write this compile code into the microcontroller. The proteus software is used to simulate the project. The project also uses visual basic for interacting with the user.

4. Experimental Work

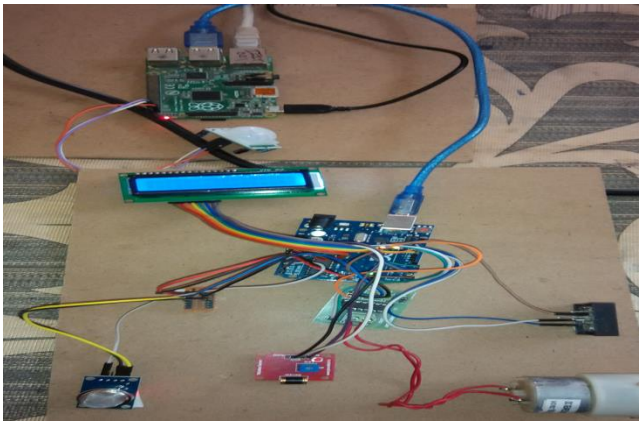

Fig 2: System Experimental Result-1.

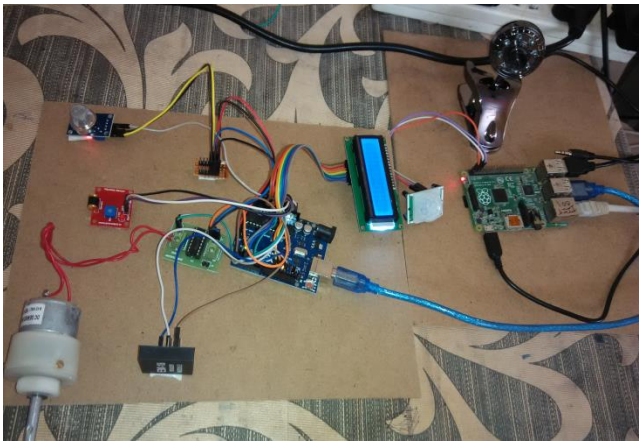

Fig 3: System Experimental Result-2.



Fig 4: System Web Home Page-1.

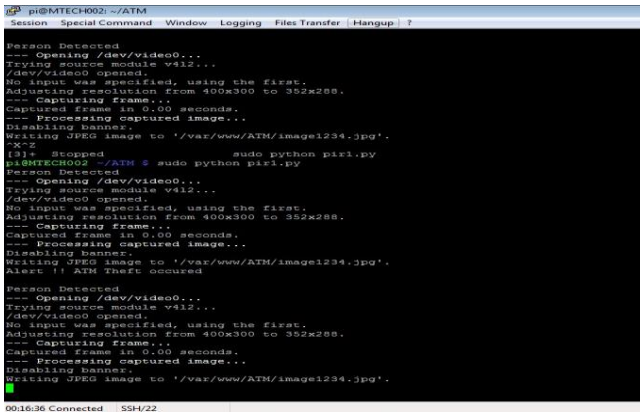

Fig 5: System Process displaying Console.

5. Conclusion

The project "DESIGN AND IMPLEMENTATION OF ANTI-THEFT ATM MACHINE USING RASPBERRY PI" has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used and tested. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM Cortex A8 Processor board and with the help of growing technology the project has been successfully implemented.

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Non-blind RGB watermarking approach using SVD in translation invariant wavelet space with enhanced Grey-wolf optimizer

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Abstract
Sharing or transmitting the digital information in online is increasing day by day since the usage of internet has become a habituation for everyone, which led to the large-scale violation of copyright issues. Now a days, majority of the data is being shared in the form of digital images which is quite easy for the copyright violators to forge and fake those images and then shared for profit. To deal with these copyright violations, digital watermarking came into existence as a potential solution that utilizes the concept of data hiding. This article proposed an approach for a non-blind color image watermarking (NB-CIW) by employing the algorithm named as singular value decomposition in translation invariant wavelet (SVD-TIW) domain. In addition, to further optimize the proposed SVD-TIW algorithm, enhanced grey-wolf optimizer (E-GWO) is presented which is an efficacious optimization approach in meta-heuristic algorithms. Further, to disclose the robustness and effectiveness of proposed NB-CIW using SVD-TIW-EGWO approach, different sort of attacks is enforced on watermarked image and extracted the accurate watermark image. Simulations on various test images with comparison to the state-of-art NB-CIW methodologies demonstrate the superiority of proposed NB-CIW using SVD-TIW-EGWO approach with respect to quality evaluation metrics like normalized cross correlation (NCC), root mean square error (RMSE), structural similarity (SSIM) index and even that of peak signal-to-noise ratio (PSNR) as well.

Keywords Digital watermarking · Wavelet transform · Non-blind image watermarking · Grey-wolf optimizer · Singular value decomposition · Translation invariant wavelet transform

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1 Introduction

Now a day's internet innovation has become unavoidable domain of everybody's life. Massive measure of information is being traded through messages, social sites, and corporate sites in assortment of structures. This multimedia information can be as images, sound records, video documents, content reports and so on. This information is at extraordinary hazard by aggressors at different phases of its transmission. One of the potential strategies for ensuring information is scrambling the information for example changing over the information in some ambiguous organization with the goal that it gets hard to decipher. Anyway, if attacker can figure out how to get key source of encryption, unscrambling the message will disclose the information to him. Therefore, securing the multimedia information from the copyright violators is quite challenging and difficult task. To deal with these copyright violations, digital watermarking came into existence as a potential solution that utilizes the concept of data hiding [3, 9, 11], where a message information which is in the form of digital image is embedded into the cover image without degrading its quality. Thus, it is quite hard for the attackers to identify that the cover images comprise of a message image which is known as watermark. Main objective of digital watermarking is to provide an assurance for the information of copyright owners and authorized people from the copyright violators. Practically, digital watermarking can be obtained in two forms, which includes spatial and spectral domains. In spatial domain-based digital watermarking the message will be embedded into the cover image by altering the pixel information directly. Beside its simplicity and easiness, it has several flaws like lack of imperceptibility, lesser robust against few attacks like rotation, scaling and translation. Spectral domain is also called as transform domain-based digital watermarking, which first converts both cover and watermark images into another form then applies different sort of algorithms to embed the watermark into cover image. This is very robust and provides higher imperceptibility as compared to spatial domain-based digital watermarking approaches. Robustness is referred as the capability to secure any multimedia information modification before the information destruction. This robustness can be computed through NCC values. Imperceptibility is cited as the hidden information detection, which can be defined by the values of PSNR. From the past decades, lots of research was done on both spatial and transform domain watermarking techniques. Among those, discrete wavelet transform (DWT)-based approaches [7, 19] are most popular due to their simplicity in implementation. However, they were failed to obtain higher imperceptibility and accurate extraction of watermark as well. There are few methods, which utilized the concept of singular value decomposition (SVD) [7], the combo of DWT with SVD [13] and hidden markov model (HMM) [1]. But they suffered from lack of robustness and more sensitive against the attacks. To achieve the non-blind watermarking properties, NB-CIW approaches are developed using the DCT transformation. In the [4], authors discussed about Arnold transform for implementing the watermarking with the utilization of DFT-DCT transformation, which reduces the phase hazards of the DCT method. But while implementing this approach to higher resolution images, those are not able to fulfil the robustness to that of compression ratio. As compression ratio not achieving, the images are easily affected by the random attacks. Thus, it provides the ineffective security levels. To overcome these consequences, DCT method needs to be enhanced or replaced. Thus, DWT incorporated with DCT and used by the authors in [16]. This method solves most of the problems, but still robustness is needed to be achieved. Especially it is not applicable to biometric applications. Thus in [12], the authors discussed about watermarking approach for fingerprint and iris datasets, for protecting the confidential image information. They achieved the robustness with the innovation of DWT bases fusion methodologies into it. But artifacts might be introduced while fusing the property features of images. To solve this problem, authors in [25] discussed DT-CWT based multi-resolution

transforms, in which different features such as textures, edges and region of lines considered for both cover and watermark images and fused using different levels of orientations to achieve the efficacious watermarked image. Still, these methods were failed to provide the enhanced imperceptibility with higher robustness while performing the extraction procedure at another end. Further, they suffered from restricted direction in their filtering structure. Thus, to defeat above-mentioned issues, different types of subsample-based filters like contourlets, ridgelets [6], curvelets and shearlets [17] are implemented to achieve the smoothness by implementing these transforms into filters. But the problem arises due to ridgelets and curvelets implementation, as they are not categorized under the multi-resolution watermarking. So, the artifacts can be generated into the cover image, which is unwanted consequence for the application of NB-CIW. In [21] authors have proposed a robust watermarking scheme for biometric applications using redundant discrete wavelet transform (R-DWT), which is an extension for DWT and produces the filter coefficients as same size of input after decomposing it into subbands. However, NB-CIW needs to be enhanced to improve the watermarking efficiency. To overcome this problem, several researchers addressed RDWT with SVD implementation in [8, 15, 23] to obtain further enhanced watermarking capacity with higher imperceptibility and robustness against various attacks. But computational complexity is the major issue in [8, 15, 23] as the authors did not considered any optimization techniques. In [2], authors anticipated image hiding system based on DCT domain with the optimization of message using Arnold transform before embedding into the cover image. Further, they combined both DCT and its variance functions. However, they used binary image as watermark, but in recent days most of the images are in color or RGB. In addition, the quality of extracted watermark is degraded due to the usage of finite set of rules. Author in [24] presented DWT-SVD based approach with oppositional fruit fly optimization algorithm for selecting the optimal position of chosen blocks with lower variance. In addition, gold-code is employed for both embedding and extraction process which can be easily hacked by the attackers. In [14] authors developed DT-CWT-based watermarking through pixel-wise masking. It is based on masking watermark according to characteristics of HVS. The watermark is added to the largest detail bands and weighing function of the watermark is calculated as a simple product of data extracted from HVS model thus it is applicable to only geometrical attacks and results in extremely poor PSNR values. In [20] authors introduced copyright authentication for images using both blind and non-blind embedding methods and developed a hybrid scheme with the help of multi-level DWT transformation. The major drawback of this approach is time complexity and embedding complexity with high execution period. Most of the approaches presented in the literature suffering from poor imperceptibility, robustness and they suited for only several attacks. Further, only few researchers considered color watermark image for embedding. Therefore, this article proposed a NB-CIW methodology which employs SVD-TIW-EGWO approach to achieve enhanced robustness, higher imperceptibility with more confidentiality towards attacks compared to the conventional approaches. The main contributions are summarized as follows:

- Implementation of TIW decomposition for generating the frequency subbands and decomposes the low frequency subband using SVD approach with the utilization of EGWO algorithm. As per authors knowledge, this combining approach has not been applied for the applications of NB-CIW before.
- A novel framework on NB-CIW approach using new embedding and extraction algorithms is presented. In addition, EGWO is employed for the first time for the applications of NB-CIW.

- An enhanced approach of NB-CIW methodology as compared to existing R-DWT [21], RDWT-SVD [8, 15, 23].
- Further, comparative evaluation against various attacks also presented to show the robustness and effectiveness of proposed NB-CIW using SVD-TIW-EGWO approach as compared to existing NB-CIW approaches.

The remaining sections of this article are as follows: section 2 deals about implementation of TIW and its background. Section 3 explains about proposed new embedding and extraction procedure for NB-CIW applications. Section 4 deals about the implementation results and its discussions and comparative analysis using the various qualitative metrics. Section 5 describes the conclusion and possible future works of the proposed approach followed by references.

2 Translation invariant wavelet decomposition

Wavelets are finite energy and limited duration functions generated from one single function called basis function mother wavelet by scaling and shifting in time-frequency domain. Mother wavelet integrates to zero and is square integrable having finite energy. The wavelet function can be scaled and translated over input function. DWT is a type of non-redundant wavelet representation and suitable for images. This is achieved by discretization of dilation and translation parameters. With wavelet based multi-resolution analysis, image can be represented at more than one resolution level. The advantage is that features in an image that might go undetected at one resolution level may be easily located at another level. It is especially useful for processing nonstationary signals. Good time resolution and poor frequency resolution at high frequencies is achieved whereas good frequency resolution and poor time resolution is achieved at low frequencies. This is possible using adjustable window width in DWT but keeping area of the window constant.

Initially consider the DWT filter analysis, to generate the approximate coefficients; the input signal $x[n]$ will be passed through low-pass filter (LPF) with g as its impulse response. Finally, convolution operation will be performed between the input and impulse response is given as

$$y[n] = (x*g)[n] = \sum_{k=-\infty}^{\infty} x[k]g[n-k] \tag{1}$$

Similarly, to generate the detailed coefficients, the input signal $x[n]$ will be passed through the high-pass filter (HPF) with h as its impulse response and convolution operation will be performed between the input and impulse response. It is noted that HPF and LPF both depends on each other and their response contains inverse properties. Figure 1 represents the filter analysis of conventional DWT operation, but this method suffering with the shift variance phenomenon generated by down sampling. Less shifts in the source image caused to more alter in wavelet coefficients. Thus, more fluctuations in wavelet coefficients to the input samples will be induced and causes to generation of improper energy distribution. Thus, DWT is ineffective for embedding and extraction of feature-based subband modelling and this problem can be overcome by modifying the operation of filtering procedure by compensating the down sampling. Therefore, the TIW decomposition is adapted with synthesis and analysis filter banks as shown in Fig. 2. These filter banks are capable of providing the orthogonality to the input subbands which results in less shifts and more redundant, thus the input samples are less

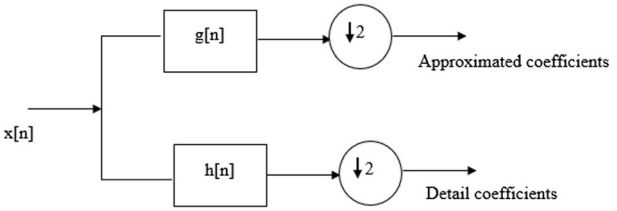

Fig. 1 Filter analysis of DWT

affected by the various sources of noises and more immune to various types of attacks in the field of image processing. Thus, the TIW decomposition is prominent method for NB-CIW as compared to other transformations like fast fourier transform (FFT), DWT and DCT. The operation of TIW transform is as follows:

Consider, the $X(n)$ and $X'(n)$ signals as source data samples and recovered data samples and the input data samples are applied to the LPF with $a[-k]$ response and HPF with $d[-k]$ response. Synthesis filters shows time frequency inverse operation with that of analysis filters and their responses are represented as the $a[k]$ for LPF and $d[k]$ for HPF correspondingly. The coefficients generated from output these filters at j^{th} level will be represented as A_j and D_j. Now this filter performs only convolution operation between the next state output to the frequency response but there will be no down-sampling operation in TIW decomposition. The analysis filter operation of DWT is expressed as follows

$$A_j[k] = \left(A_{j+1}[k] * a_j[-k]\right)\alpha \tag{2}$$

$$D_j[k] = \left(A_{j+1}[k] * d_j[-k]\right)\alpha \tag{3}$$

where $*$ denotes the convolution operation α denotes the down sampling.

Similarly, the outputs of the analysis filter coefficients are applied to synthesis with β as its up-sampling factor as follows:

$$A_{j+1}[\mathrm{k}] = \left(A_j[k]\beta\right) * a[k] + \left(D_j\beta\right)[k] * d[k] \tag{4}$$

As stated in Eq. (4), TIW decomposition does not contain the any sampling operation due to shift variant problems, thus it will be removed from DWT and TIW decomposition can be formed utilizing the LPF and HPF will be formulated as follows:

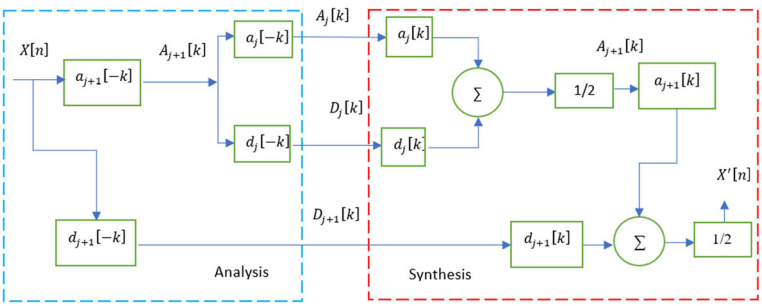

Fig. 2 TIW decomposition filter banks structure

$$a_j[K] = a_{j+1}[K]\beta \tag{5}$$

$$d_j[K] = d_{j+1}[K]\beta \tag{6}$$

By eliminating the down sampling from analysis filter bank as given in Eq. (2) and Eq. (3), TIW decomposition can be formed as follows:

$$A_j[k] = \left(A_{j+1}[k]{*}a_j[-k]\right) \tag{7}$$

$$D_j[k] = \left(A_{j+1}[k]{*}d_j[-k]\right) \tag{8}$$

Similarly, by eliminating the up sampling from Eq. (4), synthesis can be formed as follows:

$$A_{j+1}[k] = \frac{1}{2}\left(A_j[k]{*}a_j[k] + D_j[k]{*}d_j[k]\right) \tag{9}$$

TIW decomposition maintains the fixed unchangeable sampling rate; thus, it is immune to the time fluctuations in filters. This constant nature of sampling rate generates the reliable frequency samples followed by its coefficients; thus, it is more suitable for image processing applications especially for watermarking based encryption standards in which data embedding capacity will be induced significantly. The major drawback presented in the DWT is reducing the resultant image size by half of its original image size due to the down sampling environment. Thus, the TIW will generate the resultant image with its actual image size and the resultant sub-bands also maintain the original size so inhibits perfect data embedding standards. The images consist of texture features in every sub band and it is necessarily to maintain these features with respect to their features. As the TIW provides for perfect data embedding capacity by maintain the size, thus it will maintain the texture features prominently. This property leads to implement the TIW operation for watermarking applications by maintaining the HVS by providing the highest embedding capacity.

3 Proposed model

This section describes the proposed NB-CIW using SVD-TIW-EGWO approach. Figure 3 demonstrate embedding process of SVD-TIW-EGWO approach (discussed in section 3.1. in detail), which produces a prominent quality of watermarked image by embedding watermark image into the cover image. Similarly, extraction process (discussed in section 3.2. in detail) is shown in Fig. 4 for an extraction of watermark image from watermarked image which is obtained using embedding process.

3.1 RGB to YCbCr conversion

Practically, YCbCr color space frequently utilized to carry out vantage of the HVS's low-resolution capability for color regarding luminosity. Hence, this conversion is being utilized widely in the applications of image processing. Assume, a pixel is represented in RGB format with 8-bits/sample and the range of pixel values is from 0 to 255, which is also known as gray range. RGB to YCbCr conversion is done as follows:

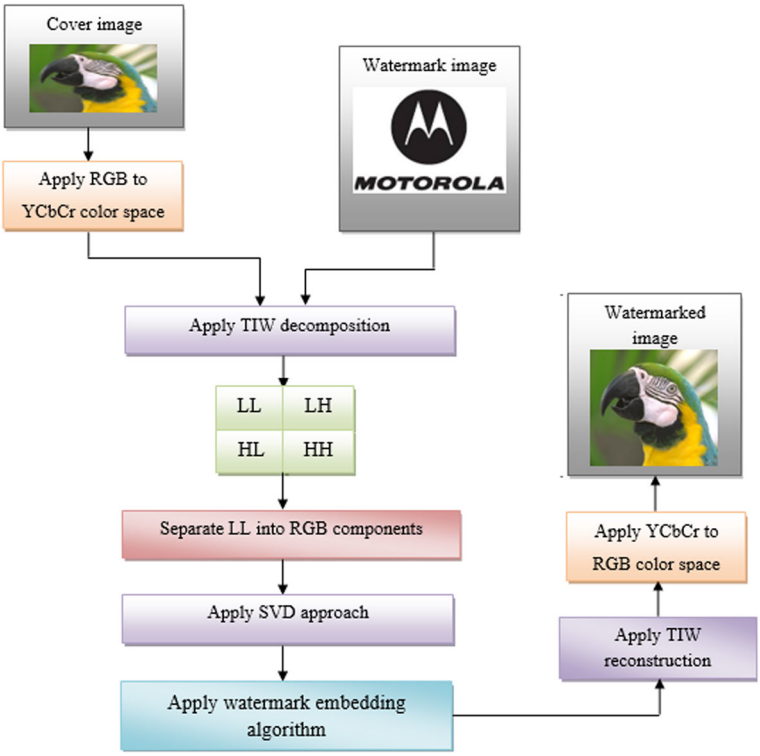

Fig. 3 Proposed block diagram for embedding process

$$Y = 16 + \frac{65.738R}{256} + \frac{129.057G}{256} + \frac{25.064B}{256} \tag{10}$$

$$Cb = 128 - \frac{37.945R}{256} - \frac{74.494G}{256} + \frac{112.439B}{256} \tag{11}$$

$$Cr = 128 + \frac{112.439R}{256} - \frac{94.154G}{256} - \frac{18.285B}{256} \tag{12}$$

3.2 Embedding process

Step 1: Select and read the watermark and cover image as well (both are RGB images).
Step 2: Apply YCbCr colour space conversion to cover image as given in Eq. (10), Eq. (11), and Eq. (12), respectively. YCbCr colour space consists of luminance components, chroma red and chroma blue components. Generally, both chroma components consisting of low intensity components. Thus, in this low intensity pixels, the watermark image information can be perfectly stored without losing its properties.
Step 3: Apply TIW decomposition on components of YCbCr image like luminance, chroma blue and chroma red separately, now it decomposes the image into four subbands named LL, HL, LH, and HH.

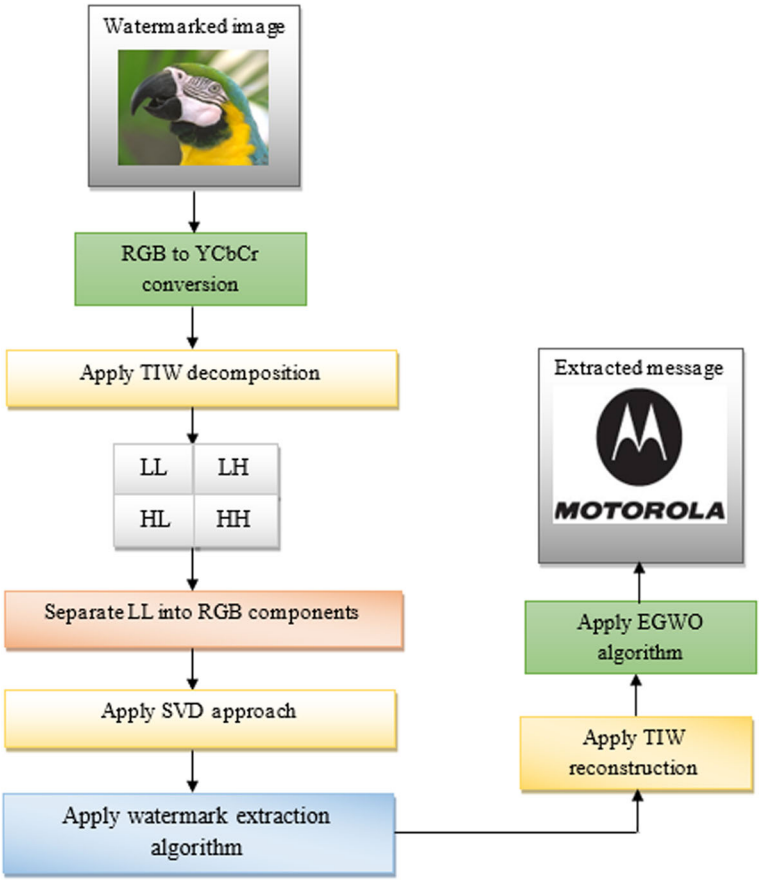

Fig. 4 Block diagram of proposed extraction process

Step 4: Separate R, G, and B components from obtained LL and denote as LL_r, LL_g and LL_b. Apply SVD to get a columns of a matrix with left singular vectors $U_{LL_{r,g,b}}$, diagonal matrix with singular values $S_{LL_{r,g,b}}$, and columns of a matrix with right singular vectors $V_{LL_{r,g,b}}$ for separated R, G, and B components.

Step 5: Apply TIW decomposition to the watermark as well to obtain four subbands named LL1, LH1, HL1 and HH1.

Step 6: Separate R, G and B components and apply SVD to obtain singular components like columns of a matrix with left singular vectors $U_{LL1_{r,g,b}}$, diagonal matrix with singular values $S_{LL1_{r,g,b}}$, and columns of a matrix with right singular vectors $V_{LL1_{r,g,b}}$ of decomposed LL1 of watermark image.

Step 7: Now, use watermark embedding as below:

$$S_{W_r} = S_{LL_r} + \alpha * S_{LL1_r} \tag{13}$$

$$S_{W_g} = S_{LL_g} + \alpha * S_{LL1_g} \tag{14}$$

$$S_{W_b} = S_{LL_b} + \alpha * S_{LL_b} \tag{15}$$

where S_{LL_r}, S_{LL_g} and S_{LL_b} denotes the R, G, B components of obtained diagonal matrix with singular values from step 4 while S_{LL1_r}, S_{LL1_g} and S_{LL1_b} are R, G, B components of obtained diagonal matrix with singular values from step 6. Now, combine Equation (13), Equation (14), and Equation (15) to obtain a modified diagonal matrix $S_{W_{r,g,b}}$ with singular values.

Step 8: Now multiply the altered diagonal matrix with singular values $S_{W_{r,g,b}}$ with columns of a matrix with left singular vectors $U_{LL_{r,g,b}}$ and columns of a matrix with right singular vectors $V_{LL_{r,g,b}}$ obtained from step 4 to get modified LL subband as given below

$$W_{LL_{r,g,b}} = U_{LL_{r,g,b}} * S_{W_{r,g,b}} * V_{LL_{r,g,b}} \tag{16}$$

Step 9: Apply TIW reconstruction to Equation (16) and LH, HL and HH from step 3. Finally, apply YCbCr to RGB color space to get a watermarked image.

3.3 Extraction process

The proposed NB-CIW extraction process on watermarked image is as follows:

Step 1: Read watermarked image obtained by embedding process and converts it into YCbCr color space using Equation (10), Equation (11), and Equation (12) respectively.
Step 2: Apply TIW decomposition to decompose the components of YCbCr it into four subbands named LL2, HL2, LH2, and HH2 separately.
Step 3: Separate R, G and B components from obtained LL2 and apply SVD to get columns of a matrix with left singular vectors $U_{LL2_{r,g,b}}$, diagonal matrix with singular values $S_{LL2_{r,g,b}}$, and columns of a matrix with right singular vectors $V_{LL2_{r,g,b}}$ for separated R, G, and B components.

Table 1 EGWO algorithm

Step 1: Initialization of search agent.
Step 2: Allocate fitness property to gamma, beta and alpha.
Step 3: Encircle the prey $\vec{D} = \left|\vec{C}.\vec{X}_p(t) - \vec{X}(t)\right|$
$\vec{X}(t+1) = \vec{X}_p(t) - \vec{A}.\vec{D}$, where t denotes the current updating iteration, $\vec{A}$ and $\vec{C}$ denoted as coefficient vectors, $\vec{X}$ denotes the wolf's position and $\vec{X}_p(t)$ represents the position of prey node. The $\vec{A}$ and $\vec{C}$ represented as coefficient vectors and they will be calculated as $\vec{C} = 2.\vec{r_2}$ and $\vec{A} = 2\vec{a}.\vec{r_1} - \vec{a}$. Where $\vec{a}$ components are raged from [2, 0] in linearly decremented order for every succeeding iteration. The random vectors are denoted by $\vec{r_1}$ and $\vec{r_2}$ and they will be raged from 0 *to* 1.
Step 4: Begin Hunting
Alfa wolf is used to direct this hunting process. Rarely, gamma and beta also contribute in this hunting procedure. The below derivations describe the process of hunting:

$$\vec{D}_\alpha = \left|\vec{C}_1.\vec{X}_\alpha - \vec{X}\right| \;,\; \vec{X}_1 = \vec{X}_\alpha - \vec{A}_1.\left(\vec{D}_\alpha\right) \quad \vec{D}_\beta = \left|\vec{C}_2.\vec{X}_\beta - \vec{X}\right| \;,\vec{X}_2 = \vec{X}_\beta - \vec{A}_2.\left(\vec{D}_\beta\right)$$

$$\vec{D}_\gamma = \left|\vec{C}_3.\vec{X}_\gamma - \vec{X}\right| \;,\vec{X}_3 = \vec{X}_\gamma - \vec{A}_3.\left(\vec{D}_\gamma\right) \quad \vec{X}(t+1) = \frac{\left(\vec{X}_1 + \vec{X}_2 + \vec{X}_3\right)}{3}$$

Step 5: Attacking prey
Here value of $\vec{a}$ is linearly reduced from the range 2 to 0, it will cause to decrease in $\vec{A}$ additionally.
Step 6: The process described in 2 to 5 steps iterated in finite number of times to achieve the optimized performance of proposed scheme of watermarking.



Fig. 5 Tested cover images for NB-CIW

Step 4: Now, use watermark extraction as below:

$$S_{E_r} = (S_{LL2_r} - S_{LL_r})/\alpha \tag{17}$$

$$S_{E_g} = \left(S_{LL2_g} - S_{LL_g}\right)/\alpha \tag{18}$$

$$S_{E_b} = (S_{LL2_b} - S_{LL_b})/\alpha \tag{19}$$

where S_{LL2_r}, S_{LL2_g} and S_{LL2_b} denotes the R, G, B components of obtained diagonal matrix with singular values from step 3 while S_{LL_r}, S_{LL_g} and S_{LL_b} are R, G, B components of obtained diagonal matrix with singular values from step 4 in embedding process (refer section 3.2.).

Fig. 6 Tested watermark images



Now, combine Equation (17), Equation (18), and Equation (19) to obtain extracted diagonal matrix with singular values $S_{E_{r,g,b}}$.

Step 5: Now multiply the extracted diagonal matrix with singular values $S_{E_{r,g,b}}$ with columns of a matrix with left singular vectors $U_{LL1_{r,g,b}}$ and columns of a matrix with right singular vectors $V_{LL1_{r,g,b}}$ obtained from step 6 in embedding process (refer section 3.2.) to get extracted LL1 subband as given below

$$E_{LL1_{r,g,b}} = U_{LL1_{r,g,b}} * S_{E_{r,g,b}} * V_{LL1_{r,g,b}} \tag{20}$$

Step 6: Apply the TIW reconstruction to Equation (20) and LH1, HL1 and HH1 from step 5 in embedding process (refer section 3.2.) to get extracted watermark.

Cover image	Watermark image	Watermarked image	Extracted watermark
 Parrot			
 Bike			
 Butterfly			
 Flower			
 Fruits			

Fig. 7 Results obtained using R-DWT [21] with various cover images



Fig. 7 (continued)

Cover image	Watermark image	Watermarked image	Extracted watermark
 Parrot			
 Bike			
 Butterfly			
 Flower			
 Fruits			
 Hat			
 Penguins			

Fig. 8 Obtained results using R-DWT + SVD [8, 15, 23] various cover images

Step 7: Apply EGWO algorithm given in Table 1 to optimize the performance of proposed NB-CIW.

3.4 Enhanced Grey wolf optimizer (EGWO)

From [10], by utilizing the fundamental behaviour of Grey wolves', a new algorithm is proposed named as grey wolf optimizer (GWO). In this approach, the properties of image patches are done based on the properties of Beta, Gamma and Alpha. The finest optimization solution is achieved by the Alpha property, which is a leading initiator. The second and third

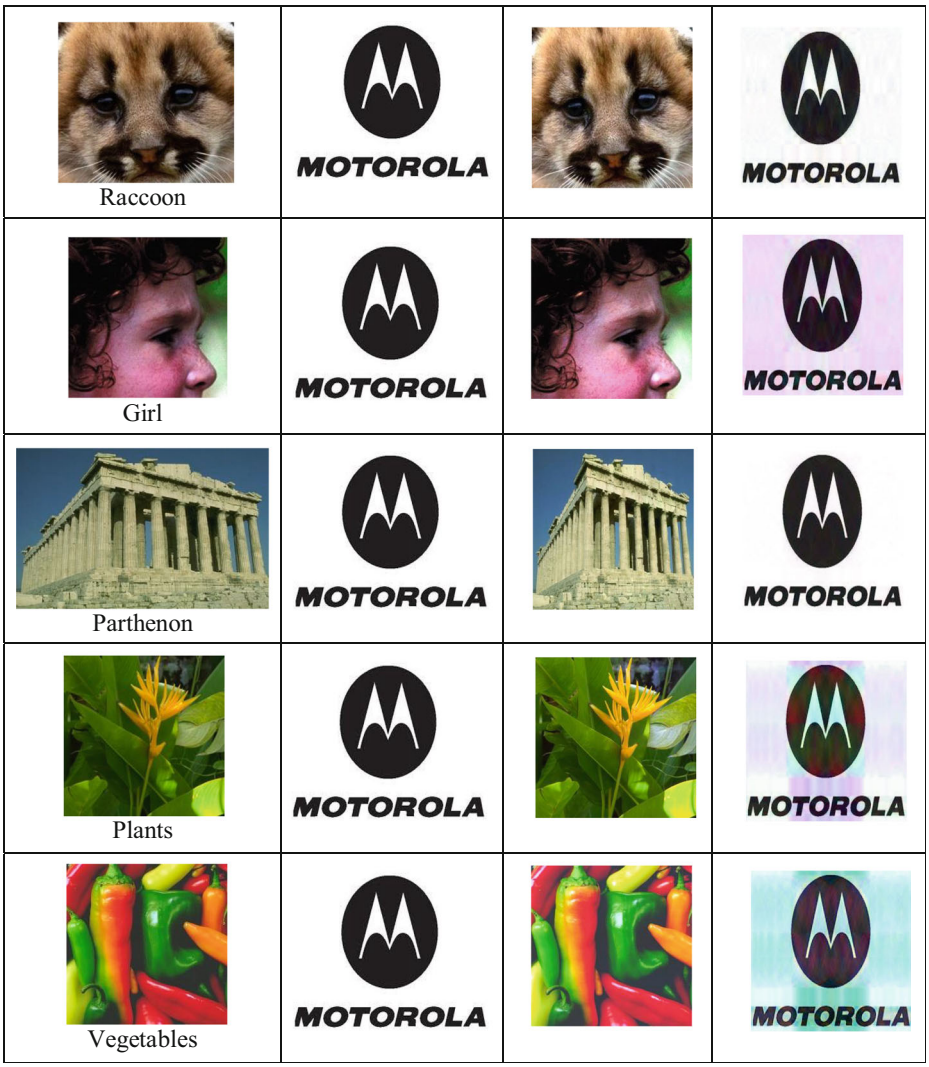

Fig. 8 (continued)

optimization solutions are achieved by the Gamma, Beta, respectively. Initially GWO is utilized to train the weights of multi-layers. Later, [18] explains the use of evolutionary population dynamics (EPD) with GWO, thus the low reliable search agents of GWO method are optimized, respectively. Now this searching procedure is effectively monitored by Beta,

Cover image	Watermark image	Watermarked image	Extracted watermark
 Parrot			
 Bike			
 Butterfly			
 Flower			
 Fruits			
 Hat			

Fig. 9 Results obtained using proposed NB-CIW methodology using SVD-TIW-EGWO approach

Gamma and Alpha parameters and calculation of these parameters on the source data is performed by selectively using the GWO approach [22]. Thus, amazingly fast searching capacity is achieved by maintaining the cumulative adjustment between global and local search procedures [5].



Fig. 9 (continued)

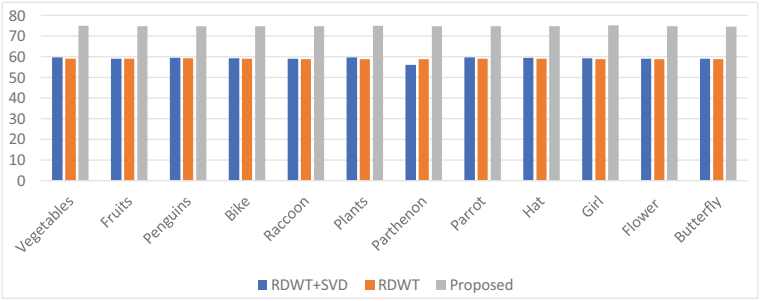

Fig. 10 Performance of PSNR values for R-DWT [21], R-DWT + SVD [8, 15, 23] and proposed NB-CIW methodology

4 Results and discussion

This section deals about the detailed discussion on the obtained results of proposed NB-CIW using SVD-TIW-EGWO embedding and extraction process as compared to existing NB-CIW methodologies. Figure 5 shows that input RGB images used as cover images for NB-CIW which includes 'vegetables', 'fruits', 'penguins', 'bike', 'raccoon', 'plants', 'pathenon', 'parrot', 'hat', 'girl', 'flower' and 'butterfly'. The watermark images are demonstrated in Fig. 6. For evaluating the performance of existing and proposed NB-CIW methodologies, image quality metrics like PSNR, SSIM, RMSE and NCC are utilized where PSNR performance discloses the imperceptibility, RMSE, SSIM and NCC values demonstrate the robustness and effectiveness of NB-CIW algorithm. Further, no attack and attack scenarios are considered for quality assessment of proposed NB-CIW using SVD-TIW-EGWO approach as compared to existing NB-CIW using R-DWT and R-DWT + SVD approaches.

4.1 Performance of proposed NB-CIW using SVD-TIW-EGWO approach

4.1.1 No attack scenario

In this, we utilized R-DWT [21] and R-DWT + SVD [8, 15, 23] methodologies for the comparative analysis. Figure 7 demonstrate the obtained results of NB-CIW using R-DWT approach, where 1st column represents all the cover images used for testing, 2nd column discloses the watermark image used for embedding and extraction process. Watermarked images are given in 3rd column and extracted watermark images are shown in 4th column,

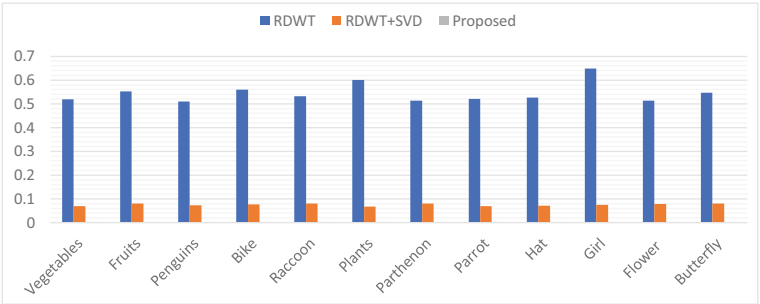

Fig. 11 RMSE values obtained using R-DWT [21], R-DWT + SVD [8, 15, 23] and proposed NB-CIW methodology

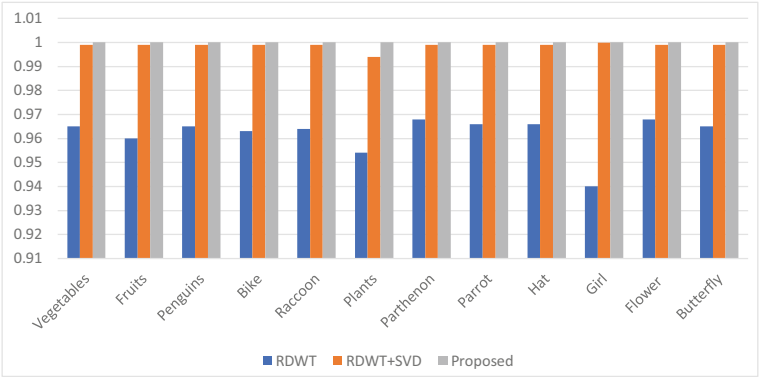

Fig. 12 SSIM index values obtained using R-DWT [21], R-DWT + SVD [8, 15, 23] and proposed NB-CIW methodology

respectively. It is shown that all the obtained watermarked images are suffering from lack of imperceptibility as the watermark message is clearly visible in watermarked images which results in lesser PSNR values. Further, extracted watermark image also not accurate as the embedded watermark image which results in lower robustness. Similarly, test results for various cover images using R-DWT + SVD [8, 15, 23] is given in Fig. 8. However, the watermarked images obtained using R-DWT + SVD discloses superior performance over R-DWT, the extracted watermark is suffering due to lesser RMSE and SSIM values, which results in lower robustness. Further, it also has some amount of distortion on it. Practically, one can easily identify the watermark image which is embedded into cover image if there is lack of imperceptibility and robustness.

To overcome the limitations of existing R-DWT and R-DWT + SVD by enhancing the imperceptibility and robustness as well, our proposed NB-CIW methodology using SVD-TIW-EGWO approach results is depicted in Fig. 9, which provides an excellent imperceptibility for both watermarked image and extracted watermark image as well (see 3rd and 4th column in Fig. 9). As compared with existing NB-CIW methodologies, the effectiveness and robustness of proposed NB-CIW methodology using SVD-TIW-EGWO is quite superior and can be adopted easily with the applications of NB-CIW in real-time as well

Table 2 PSNR (in dB) values obtained using R-DWT, R-DWT + SVD and proposed NB-CIW methodology for various cover images in no attack scenario

Cover image name	RDWT	RDWT+SVD	Proposed
Vegetables	59.64	59.05	**74.99**
Fruits	59.08	59.13	**74.81**
Penguins	59.45	59.2	**74.79**
Bike	59.277	59.01	**74.76**
Raccoon	59.04	58.93	**74.86**
Plants	59.78	58.93	**75.09**
Parthenon	56.011	58.92	**74.81**
Parrot	59.71	59.1	**74.88**
Hat	59.6	59.01	**74.76**
Girl	59.37	58.94	**75.23**
Flower	59.13	58.94	**74.779**
Butterfly	59.08	58.94	**74.62**

Table 3 Values of RMSE with different tested cover RGB images using existing and proposed NB-CIW methodologies in no attack scenario

Cover image name	RDWT	RDWT+SVD	Proposed
Vegetables	0.519	0.07	**0.002**
Fruits	0.552	0.08	**0.00211**
Penguins	0.51	0.073	**0.0021**
Bike	0.559	0.076	**0.00211**
Raccoon	0.531	0.08	**0.00211**
Plants	0.6	0.068	**0.002**
Parthenon	0.514	0.081	**0.00214**
Parrot	0.52113	0.069	**0.00211**
Hat	0.526	0.0712	**0.00217**
Girl	0.649	0.075	**0.0019**
Flower	0.51332	0.079	**0.0021**
Butterfly	0.547	0.08	**0.0022**

since it utilizes RGB images as watermark whereas most of the existing NB-CIW methodologies employed for binary watermark images. Quality analysis of these methods with respect to watermarking quality evaluation metrics is shown in Figs. 10, 11 and 12, respectively where PSNR is calculated for the obtained watermarked images to the cover images and displayed the graphical analysis in Fig. 10. The values of PSNR are just above 74 dB with the proposed SVD-TIW-EGWO approach whereas the existing R-DWT got just above 58 dB and R-DWT + SVD got just near to 60 dB. This shows that proposed NB-CIW methodology using SVD-TIW-EGWO obtained higher imperceptibility and robustness against the existing NB-CIW presented in the literature.

Figure 11 shown the graphical analysis of RMSE values from R-DWT, R-DWT + SVD and proposed NB-CIW methodology using SVD-TIW-EGWO. It is observed that values of SVD-TIW-EGWO got lower error values as compared to existing NB-CIW methodologies using R-DWT [21] and R-DWT + SVD [8, 15, 23]. The values of RMSE for the displayed output results in Figs. 7, 8 and 9 are 0.521 with [21], 0.069 with [8, 15, 23] and with SVD-TIW-EGWO is 0.00211, respectively. Similarly, another quality metric, SSIM index values are shown in Fig. 12, where the proposed SVD-TI-EGWO achieved a value of 1 for almost every tested RGB image. The values of R-DWT and R-DWT + SVD are slightly lower than the

Table 4 SSIM index values obtained using existing and proposed NB-CIW methodologies for various tested cover RGB images in no attack situation

Cover image name	RDWT	RDWT+SVD	Proposed
Vegetables	0.965	0.999	**1**
Fruits	0.96	0.999	**1**
Penguins	0.965	0.999	**1**
Bike	0.963	0.999	**1**
Raccoon	0.964	0.999	**1**
Plants	0.954	0.994	**1**
Parthenon	0.968	0.999	**1**
Parrot	0.966	0.999	**1**
Hat	0.966	0.999	**1**
Girl	0.94	0.9999	**1**
Flower	0.968	0.999	**1**
Butterfly	0.965	0.999	**1**

Table 5 Extracted watermark image and performance analysis with NCC in the attack situations

Attack	R-DWT	R-DWT + SVD	Proposed
Gaussian Noise (variance = 0.1)	0.9586	0.9801	**0.9901**
Rotation (-50^0)	0.7133	0.98	**0.99**
Scaling (2 factor)	0.911	0.9812	**0.995**
Compression	0.9112	0.98	**0.99**
Resizing	0.9844	0.978	**0.9901**
Histogram equalization	0.9523	0.978	**0.991**
Median filtering (3 × 3 mask)	0.9641	0.974	**0.99**
Motion blur ($\theta = 45^0$, $L = 15$)	0.8867	0.976	**0.99**
Sharpening	0.99	0.98	**0.9901**
Flipping	–	–	**0.99**

proposed values. All the three-quality metrics tabular forms demonstrated in Tables 2, 3 and 4, respectively. And we also highlighted the best value in bold letter for identification purpose.

4.1.2 Attack scenario

This subsection describes the performance evaluation of existing and proposed NB-CIW methodologies with several attacks like geometrical attacks like rotation, scaling, and translation. Further, non-geometrical attacks like Gaussian noise, compression, median filtering, motion blur, sharpening, flipping and histogram equalization also considered to disclose the effectiveness and robustness of proposed NB-CIW using SVD-TIW-EGWO approach as compared to existing NB-CIW using R-DWT and R-DWT + SVD approaches. Tables 5 and 6 demonstrate the performance analysis of proposed NB-CIW using SVD-TIW-EGWO approach under various sources of attacks. Usually these attacks will be generated by the attackers to detect the original information, so here we are considering prototype of those attacks. In Table 5, the NCC outcome of the proposed NB-CIW using SVD-TIW-EGWO approach is compared to existing NB-CIW methods like R-DWT [21] and R-DWT + SVD [8, 15, 23]. The comparison results show that the proposed method has maximum accuracy and improved by 15% with conventional schemes. In Table 6, the PSNR metric of the proposed NB-CIW using SVD-TIW-EGWO approach is compared with the existing NB-CIW methods like R-DWT [21] and R-DWT + SVD [8, 15, 23]. The comparison results show that proposed SVD-TIW-EGWO approach has maximum quality for both the watermarked image and extracted image as well even in case of attack scenario and improved the imperceptibility by 20% with comparison to the existing NB-CIW methods.

Table 6 Extracted watermark image and performance analysis with PSNR in the attack situations

Attack	R-DWT	R-DWT + SVD	Proposed
Gaussian Noise (variance = 0.1)	42.24	43.05	**61.3**
Rotation (-50^0)	44.53	46.79	**61.3**
Scaling (2 factor)	42.52	46.02	**67.87**
Compression	43.43	45.95	**50.82**
Resizing	44.34	46.8	**61.29**
Histogram equalization	44.30	46.79	**50.81**
Median filtering (3 × 3 mask)	42.89	46.09	**61.32**
Motion blur ($\theta = 45^0$, $L = 15$)	29.79	29.89	**30.65**
Sharpening	44.29	47.0	**49.47**
Flipping	–	–	**50.80**

5 Conclusions

This article proposed a new NB-CIW approach based on SVD in TIW domain. Additionally, EGWO algorithm also implemented which is a metaheuristic approach for optimizing the performance of proposed NB-CIW methodology. Further, to show the robustness and effectiveness of proposed NB-CIW, different types of attacks also applied on to the watermarked image and extracted the watermark almost similar quality as embedded. Simulation result shown the superiority of proposed NB-CIW using SVD-TIW-EGWO approach with compared to the state-of-art NB-CIW methodologies for various test images. The quality evaluation metrics like NCC, RMSE, SSIM and PSNR also computed and shown that proposed NB-CIW methodology with SVD-TIW-EGWO holds more embedding capacity.

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Design of CCAA for Optimized Difference Patterns

G. S. K. Gayatri Devi, S. Krishna Veni

Abstract*: Difference patterns find applications in target tracking radars for accurate target detection. Such patterns must be generated with minimum sidelobe levels to reduce the effect of interfering signals like clutter, jamming signals. The present work is focused on designing concentric circular arrays(CCA) of practical elements producing low sidelobe difference patterns using thinning. Simulated results are presented for 6 ring and 7 ring concentric circular antenna arrays.

Keywords* : Concentric circular antenna arrays (CCAA), Differential Evolution Algorithm, Difference patterns, Peak Sidelobe level.

I. INTRODUCTION

Difference patterns are employed in radars for accurate target detection. Usually linear arrays are the first choice for antenna designers owing to their design simplicity. Concentric circular antenna arrays are steadily gaining more importance in antenna design because of their compact antenna structure and a beam which remains constant in the azimuthal plane. They are preferred than linear arrays as they offer more degrees of freedom to the antenna designer. These are used in various applications like radio direction finding, air and space navigation, mobile, sonar, radar and wireless communication applications [1].

Antenna arrays can be designed to obtain different types of patterns like sum patterns, difference patterns, sector beams, ramp patterns [2]-[5], stair case patterns and so on. Low sidelobe patterns are necessary to reduce problems that arise due to Electromagnetic Interference. Such patterns can be generated by different techniques like choosing proper array excitations, by varying spacing between elements [6]. Another way is to thin array elements. Thinning [7]-[8] allows sidelobe reduction at reduced number of active elements thus lowering antenna cost, weight and design complexity.

Several works were contributed in the field of difference pattern generation from circular arrays. Bayliss [9] developed a two parameter difference pattern with nearly equal side lobes similar to those of Taylors sum pattern for a circular aperture antenna. The resultant pattern has angle sensitivity that is in proportion with the given side lobe level. Elliot [10] proposed a perturbation technique which modifies the Taylor-type linear and circular aperture distributions to generate sum and difference patterns. The resultant patterns have arbitrary side lobe topography. Hansen [11] presented a synthesis method for linear and circular planar arrays that provide pencil beams and difference patterns with variable side lobe level based on placing zeroes. In [12] Ares Rengarajan, A. Vieiro and E. Moreno have shown a method to design an aperture distribution that results in difference patterns with random sidelobe levels. This method can be used for designing both linear as well as circular apertures. The resulting patterns also possessed low directivity loss low mutual coupling problem. Several synthesis techniques were described Elliot [13] for getting inputs that result in required radiation patterns. Using these techniques, both sum and difference patterns with scattered deep nulls can be generated from both linear and circular arrays. Aperture distributions, for turned ON elements of huge thinned circular arrays with diameters between 25 to 133.3λ, for producing difference as well as sum patterns were given by Keizer in [14]. Iterative Fourier Transform method is made use of for yielding patterns with low sidelobes. Although several works were reported in open literature for synthesizig difference patterns with low sidelobe taper, it is worth to mention that very limited literature is available on generation of difference patterns from thinned CCA of dipoles.

Optimized difference patterns for different lengths of linear arrays were generated using DE algorithm in [15]. In the present work, dipole antenna arrays are thinned and an amplitude distribution is designed for ON elements to yield low sidelobe difference patterns. The optimum amplitudes and thinning coefficients are derived using Differential Evolution algorithm.

II. DIFFERENTIAL EVOLUTION ALGORITHM

Differential Evolution (DE) is a population based stochastic, optimization technique. It is an effective and proficient global optimizer in continuous search domain. Any practical optimization technique should have three characteristics namely finding true global minimum, faster convergence and few control parameters. Differential Evolution algorithm has all these features. It was first proposed by Storn and Price [16]-[17].

It is a powerful search technique which is successfully applied in many fields like mechanical engineering, communications, pattern recognition etc. The algorithm offers following advantages:

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- It can easily handle non-linear, non-differentiable complex fitness functions.
- It is a parallel search technique which searches the solution space from different points.
- It offers a way of solving the problem without using its gradient.
- It has the capability to find true global minima regardless of the initial parameter values.
- It has few easy to choose as well as robust control parameters which influence the convergence of the algorithm.
- Good convergence speed in finding optimum value.

A key advantage which prompts the antenna array designers to go for DE is its high computational efficiency which allows the optimum design of large antenna arrays.

In DE, the candidate solutions are called vectors. The important feature that makes a DE algorithm different from other population based techniques is differential mutation operator and trial parameter vectors. The algorithm initially takes samples at random, multiple locations from the objective function. The initial population vectors are generated according to the prefixed parameter bounds. For performing an efficient exploration of the solution space, DE employs a difference between the parameter vectors. The vectors are iteratively updated. New vectors are generated by altering existing vectors. DE performs this by taking the scale difference of two randomly chosen vectors from the initial population. These newly generated vectors compete with the initial population vectors of same index. These undergo fitness evaluation, if they result in better fitness compared to parent vectors, these survivors will act as parents for next generation. The process continues till the convergence criterion is met. The solution with best fitness is taken as the optimum solution.

III. PROBLEM FORMULATION

A 'm' ring CCA of dipoles is shown in figure 2. Here r_m indicates radius of mth ring, N_m indicates the number of dipoles in m^{th} ring and d_m is the interelement spacing where m=1,2,…M.

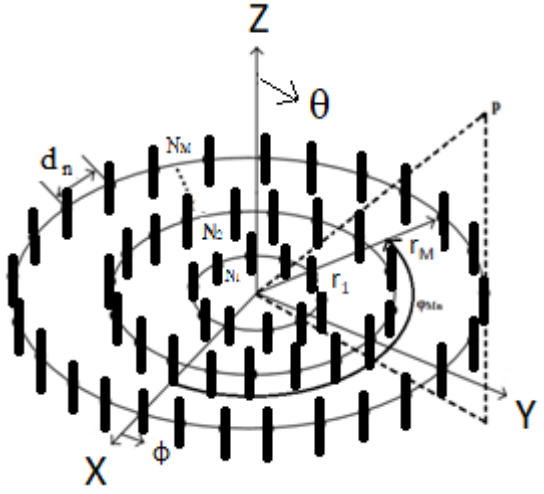

Fig. 1.Geometry of concentric circular array of dipoles

The generalized expression for the array factor [17] is given by

$$E(\theta,\varphi) = \sum_{m=1}^{M}\sum_{n=1}^{N_m} I_{mn}\, A_{mn} \exp\left(jk\, r_m \sin\theta \cos[(\varphi - \varphi_{mn})]\right) \quad (1)$$

Here

M = number of rings

N_m = number of elements in ring m

A_{mn}= Amplitude excitation of nth element of mth ring

I_{mn} = excitation of nth element of mth ring= $\begin{cases} 1 & ON \\ 0 & OFF \end{cases}$

r_m = radius of ring 'm'

φ_{mn} = angular position of nth element of mth ring

$$= \frac{2\pi(m-1)}{N_m} \quad (2)$$

$k = \frac{2\pi}{\lambda}$

θ = elevation angle

φ = Azimuthal angle

In 'u' domain

$$E(u)_{|\varphi=constant} = \sum_{m=1}^{M}\sum_{n=1}^{N_m} I_{mn}\, A_{mn} \exp\left(jkr_m\, u \cos(\varphi - \varphi_{mn})\right)$$

here u=sin(θ)

The expression for radius of mth ring is given by

$$r_m = m\frac{\lambda}{2} \quad (3)$$

The spacing between two adjacent elements is assumed to be nearly $\frac{\lambda}{2}$ i.e. $d_m = \frac{\lambda}{2}$.

The number of equally spaced elements present in ring 'm' is given by N_m=8*m (4)

All the elements have uniform excitation phase of zero degrees. For attaining the difference patterns, half the array must be excited in out of phase. Hence the resultant expression for the array factor is given by

$$AF1(u) = |E_1(u) - E_2(u)| \quad (5)$$

where

$$E_1(u) = \sum_{m=1}^{M}\sum_{n=1}^{N_m/2} I_{mn}\, A_{mn} \exp\left(jkr_m u \cos(\varphi - \varphi_{mn})\right)$$

and

$$E_2(u) = \sum_{m=1}^{M}\sum_{n=\left(\frac{N_m}{2}+1\right)}^{N_m} I_{mn}\, A_{mn} \exp\left(jkr_m u \cos(\varphi - \varphi_{mn})\right)$$

In the above equations, φ is assumed to be 0°.

Now the field equation for dipole antenna is given by

$$AF2 = \frac{\cos\left(\frac{kl}{2}\cos\theta\right) - \cos\left(\frac{kl}{2}\right)}{\sin\theta} \quad (6)$$

Where l=λ/2

The total array factor now becomes

$$AF = AF1 * AF2 \quad (7)$$

IV. METHOD OF SIDELOBE REDUCTION

It is possible to generate patterns with reduced sidelobe levels by exciting ring elements non-uniformly. Thinning is another method for sidelobe level reduction. Both techniques are made use of in this paper for getting optimum results. The optimum results are found using DE algorithm.

The objective function which is to be minimized for finding the optimum solution is as follows:

$$Fit = w1 * (PSLL_o - SLL_d) + w2 * (FF_o - FF_d) \quad (8)$$

where

$PSLL_o = Max\left[20\log\left|\frac{AF(u)}{AF_{Max}(u)}\right|\right]$

= Obtained Peak Sidelobe level

u ϵ side lobe region.

SLL_d =Desired Sidelobe level

$AF_{max}(u)$= Main beam peak value

FF_o is the obtained Fill factor, FF_d is the desired Fill factor. Fill factor is defined as the number of turned on elements divided by total number of elements present. 'w1' and 'w2' are weighing factors for controlling the amount of significance given to each term in eq.(8).

V. RESULTS

This section presents the results obtained for a 6 ring CCAA and 7 ring CCAA using the problem defined above. Fig. 2 depicts the radiation pattern for a 6 ring CCAA. The peak SLL obtained is -20.2376dB. The total number of 'ON' elements is 88 out of 168 total number of elements. The Fill Factor in this case is 52.38%. The element layout is shown in fig. 3. A 'o' symbol indicates an 'OFF' element and a '*' symbol indicates an 'ON' element. Table I and II present the radii of each ring and amplitude excitations of elements in each ring respectively.

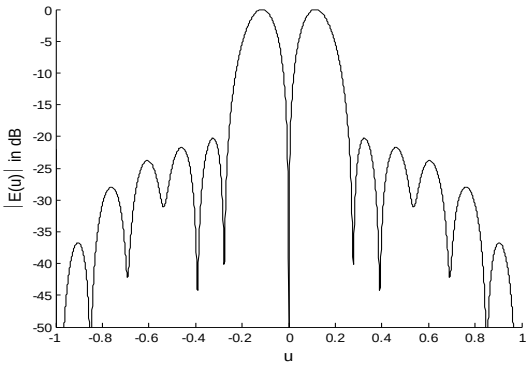

Fig. 2.Radiation pattern for a 6 ring CCAA

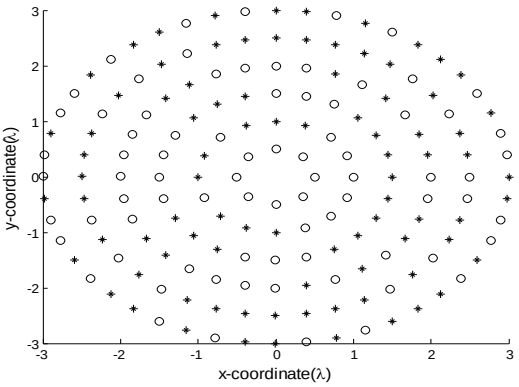

Fig. 3.Geometry of concentric circular array of dipoles

Table- I: Ring radii and number of elements per ring for 6 ring CCAA

Ring number	Radius (wavelengths)	Number of elements in each ring
1	0.5	8
2	1.0	16
3	1.5	24
4	2.0	32
5	2.5	40
6	3.0	48

Table- II: Element excitations of each ring for a 6 ring CCAA

Ring Number	Excitation values
1	-0.899,-0.100,-0.102,-0.385,0.385,0.102,0.100,0.899,
2	-0.805,-0.768,-0.818,-0.519,-0.841,-0.671,-0.285, 0.100, 0.100,0.285,0.671,0.841,0.519,0.818,0.768, 0.805,
3	-0.637,-0.100,-0.774,-0.716,-0.100,-0.897,-0.449, -0.714,-0.872,-0.751,-0.549,-0.409,0.409,0.549, 0.751,0.872, 0.714,0.449, 0.897,0.100,0.716,0.774, 0.100,0.637,
4	-0.900,-0.855,-0.793,-0.866,-0.797,-0.855,-0.824, -0.801,-0.696,-0.157,-0.348,-0.894,-0.879,-0.862, -0.230,-0.871, 0.871,0.230,0.862,0.879,0.894, .348,0.157,0.696, 0.801, 0.824,0.855,0.797, 0.866, 0.793,0.855,0.900,
5	-0.831,-0.149,-0.563,-0.113,-0.100,-0.899,-0.197, -0.100,-0.890,-0.880,-0.100,-0.846,-0.706,-0.679, -0.840,-0.650,-0.813,-0.663,-0.169,-0.835,0.835, 0.169,0.663,0.813, 0.650,0.840,0.679,0.706, 0.846, 0.100,0.880,0.890,0.100,0.197,0.899,0.100,0.113, 0.563,0.149,0.831,
6	-0.780,-0.383,-0.841,-0.809,-0.243,-0.471,-0.219, -0.874,-0.853,-0.880,-0.106,-0.897,-0.900,-0.505, -0.100,-0.893,-0.212,-0.749,-0.145,-0.900,-0.891, -0.868,-0.899,-0.875, 0.875,0.899,0.868,0.891,0.900, 0.145,0.749,0.212,0.893,0.100,0.505,0.900,0.897, 0.106,0.880,0.853,0.874,0.219, 0.471,0.243,0.809, 0.841,0.383,0.780,

Fig. 4 portrays the radiation pattern for a 7 ring CCAA. The peak SLL obtained in this case is -20.5898dB. Fig. 5 shows the corresponding element layout. The Fill Factor in this case is 50%. Table III and IV represent the ring radii and element excitations respectively.

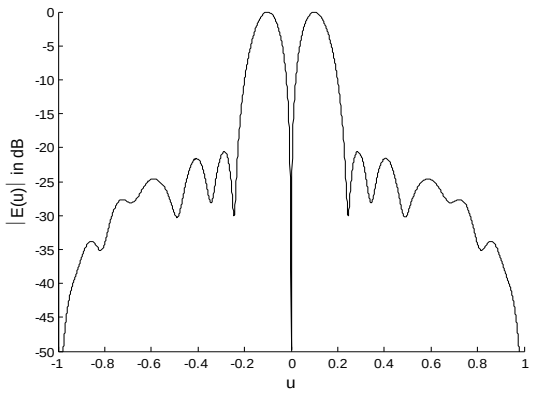

Fig. 4.Radiation pattern for a 7 ring CCAA

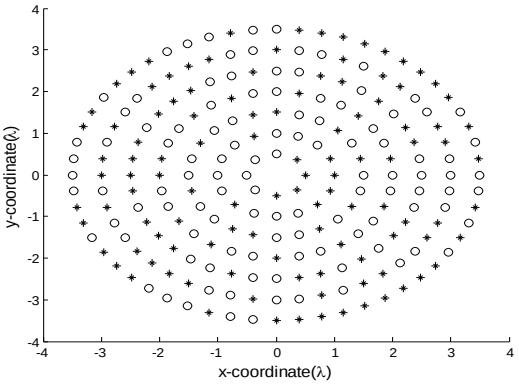

Fig. 5.Element layout for a 7 ring CCAA

Table- III: Ring radii and number of elements per ring for 7 ring CCAA

Ring number	Radius (wavelengths)	Number of elements in each ring
1	0.5	8
2	1.0	16
3	1.5	24
4	2.0	32
5	2.5	40
6	3.0	48
7	3.5	56

Table- IV: Element excitations of each ring for a 7 ring CCAA

Ring Number	Excitation values
1	-0.101,-0.885,-0.885,-0.752,0.752,0.885,0 .885,0.101,
2	-0.100,-0.864,-0.105,-0.100,-0.652,-0.875 ,-0.899, -0.895, 0.895,0.899,0.875,0.652,0.100,0.105, 0.864, 0.100,
3	-0.101,-0.809,-0.100,-0.497,-0.801,-0.874 ,-0.897, -0.552,-0.102,-0.820,-0.777,-0.900,0.900,0.7 77,0.820, 0.102,0.552,0.897,0.874,0.801,0.497,0.100,0 .809, 0.101,
4	-0.652,-0.206,-0.900,-0.731,-0.103,-0.204 ,-0.900, -0.899,-0.766,-0.216,-0.761,-0.295,-0.607,-0. 674, -0.108,-0.392, 0.392,0.108,0.674, 0.607,0.295,0.761, 0.216,0.766,0.899, 0.900,0.204,0.103,0.731,0.900, 0.206,0.652,
5	-0.154,-0.330,-0.668,-0.100,-0.406,-0.819 ,-0.855, -0.281,-0.809,-0.326,-0.851,-0.900,-0.834,-0. 208, -0.826,-0.139,-0.100,-0.303,-0.100,-0.899,0. 899, 0.100,0.303,0.100, 0.139,0.826,0.208,0.834,0.900, 0.851,0.326,0.809,0.281, 0.855,0.819,0.406,0.100, 0.668,0.330,0.154,
6	-0.280,-0.100,-0.208,-0.514,-0.114,-0.393 ,-0.156, -0.695,-0.899,-0.673,-0.101,-0.900,-0.439,-0. 614, -0.796,-0.845,-0.100,-0.899,-0.868,-0.496,-0. 217, -0.268,-0.363,-0.899,0.899,0.363,0.268,0.21 7,0.496, 0.868,0.899,0.100,0.845,0.796,0.614,0.439,0 .900, 0.101,0.673,0.899,0.695,0.156, 0.393,0.114,0.514, 0.208, 0.100,0.280
7	-0.888,-0.748,-0.777,-0.427,-0.245,-0.238 ,-0.467, -0.256,-0.771,-0.102,-0.531,-0.620,-0.100,-0. 896, -0.898,-0.163,-0.899,-0.518,-0.723,-0.123,-0. 101, -0.689,-0.186,-0.662,-0.133,-0.857,-0.702,-0. 226, 0.226,0.702,0.857,0.133, 0.662,0.186,0.689,0.101, 0.123,0.723,0.518,0.899,0.163, 0.898,0.896,0.100, 0.620,0.531,0.102,0.771,0.256,0.467, 0.238,0.245, 0.427,0.777,0.748,0.888

VI. CONCLUSION

Difference patterns are generated in general by using linear arrays owing to their simplicity. Concentric circular antenna arrays of dipoles are employed in the present work to generate low sidelobe difference patterns. It is evident from the results that the generated difference patterns have lowest possible sidelobes. The number of active elements is also low thus reducing weight and cost. All results are simulated using Matlab software.

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Video Surveillance System for Pedestrian Crossing using Matlab

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Abstract

Pedestrian detection and monitoring in the surveillance framework are important for several services covering irregular event detection and human gait, congestion or overcrowded evaluation in a surrounding environment, gender classification, fall detection for in elderly human beings and so on. The processing of the image segmentation algorithm plays an important role in monitoring the travelling target at the fixed footbridge, which supports the visually disabled or the elderly. Different morphological filtering processes increase the efficiency of moving people segmenting the film. This technique uses a Gaussian detector histogram and they observe objects. This work allows the physically disabled to comfortably navigate the pedestrian and allows automated vehicles.

Keywords: *SVM Classification, PCA, Image Processing, Morphological Operations, Pedestrian*

1. Introduction

Monitoring cameras are available in shopping malls, ATM terminals, public parks, factories, banks, institutions, clinics, traffic signals, etc. The three key elements of the stage are static background, moving items, static and active components of the scene and moving objects. Video detection is a flourishing area for object monitoring with introducing video encoding technology. Human video surveillance is a time-consuming process. The machine must therefore analyses the video and extracts the information needed. Many machine-learning techniques can detect various items automatically, such as individuals, vehicles, animals and hardware. Analysis or evaluation of a specific industry site is called video monitoring. The importance of this device is to allow individuals with physical disabilities to reach the traffic signal incredibly safely. Video control value extends in many regions designated as missile detection, defense, medical laparoscopy, and the moving nature of robot during a building collision, avoidance of road and forest accidents.

Applications in innumerable fields such as crowd prediction, congestion processing, camera monitoring, robotic vision and self-driven vehicles are present in detecting feeder in a picture or in a camera [1, 2]. The identification of human beings is a strenuous activity owing to their diverse forms and poses, which demands a comprehensive function to differentiate them from the image. An example of such a feature source is the histogram of oriented gradients, which we strive to develop and implement as part of this project. The context background subtraction method is a widely successful method chosen for the work. Among the different methods. This paper presents algorithms for tracking footpaths and identifies the person or car and other objects. They test the work using image recognition methods for the segmentation and action identification using the qualified prototype matching. Multiple video cameras are mounted and data has to track this. This device operates with autonomous vehicles and protects other vehicles from collisions.

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2. Background works

There are three process forms used primarily in the tracking of moving objects. These techniques are the method of frame subtraction, the method of background subtraction, and the method of optical flow [3]. They take the discrepancy between two sequential images using the Frame subtraction procedure [4] to test the existence of moving objects. The measurement is basic and quick to create in this process. In this process, however, a full description of moving object is difficult to get; hence, the identification of moving object is not reliable. In the optical flow process, the optical flow field is determined. They conduct the clustering as per the image's optical flow propagation model. The complete movement knowledge of the moving body is found and they observe the moving object from the quantity of measurement. Low anti-nose efficiency renders it inadequate for real-time use. The context subtraction method is the process by which they observe the distinction between the subject and the context picture using a basic algorithm for moving objects.

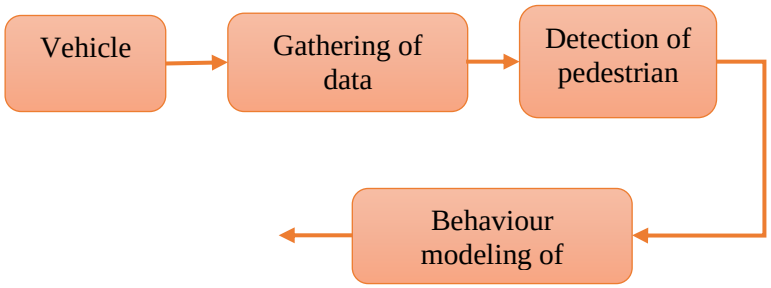

Fig. 1 Block diagram of the existing work

It is therefore very vulnerable to shifts in the natural world and therefore has a weak capacity to resist intervention. One benefit of this approach is that it will have the most comprehensive context knowledge for the object [5]. Dynamic background modeling is mixed in the background subtraction system with the dynamic threshold selection method based on the background subtraction in a single static camera situation. They change the history based on detailed object identification. Part of the current work was committed to collecting images of pedestrian passageways along the zebra crossings. This study [6] explores the characteristics of foot identification and behavioral interpretation. The conduct examination involves eye look, voice, posture, action of the body and side. To tackle these tasks, it uses sophisticated computer training methods. Figure 1 describes the current process workflow.

3. Materials and methods

The proposed work in Figure 2 captures video data and partitions them into separate frames. For each frame, the background can be subtracted and we can contrast the foreground for each frame. Gradient process histogram is helpful for generating a histogram of multiple objects for multiple gradients. It labels the extracted foreground objects using a computer-viewed Kernel it labels the extracted foreground objects using a computer-viewed Kernel it monitors Identified objects at various levels or levels depending on behaviours. Histogram of directed gradients (HoG) is a valuable tool for object identification. The identification and shape of this local entity has been calculated by histogram. At first, oriented and horizontal gradients without smoothing are known. They then calculate the magnitude and gradients. Table 1 lists the various characteristics to distinguish segmentation artefacts. They can use table 2 for object first stage identification in the first search stage.

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Table 1. Case structure considered for the proposed algorithm

Case structure	
Feature	Positive values
Traffic flow	Low, Normal, High
Vehicle detected	True, False
Speed of detected	Vehicle null, Slow, Normal, Fast
Number of positive intentions	Few, Normal, High
Time waited	Short, Medium, Long
Type of pedestrian	Slow Group, Slow, Normal, Fast

Table 2. List the objects used for classification

Pedestrian	Classification recognition	Visually impaired
		Blind
		Bicycle
		Vehicle
		Wheel chair

After the image classification, Table 3 lists the category of keywords in the second quest for classification. We see the essence of pedestrians who want to use the pedestrian in Table 4.

Table 3. List of activities for second search

Pedestrian	Detection recognition	Action
		Activity
		Gesture
		Gait
		Behaviour

Table 4. Types of pedestrians

Adults	**Disabled**
Elderly	Injured
Children	Visually impaired
Groups of children	Bicyclists
People carrying heavy object	

The theoretical walking speed for ordinary signals is roughly 1.2m / second and the NRPA Handbook 048 gives 2m / second for the fat walking for pedestrians. Machine

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learning copies the physical interaction of human activity through electronic vision and image comprehension.

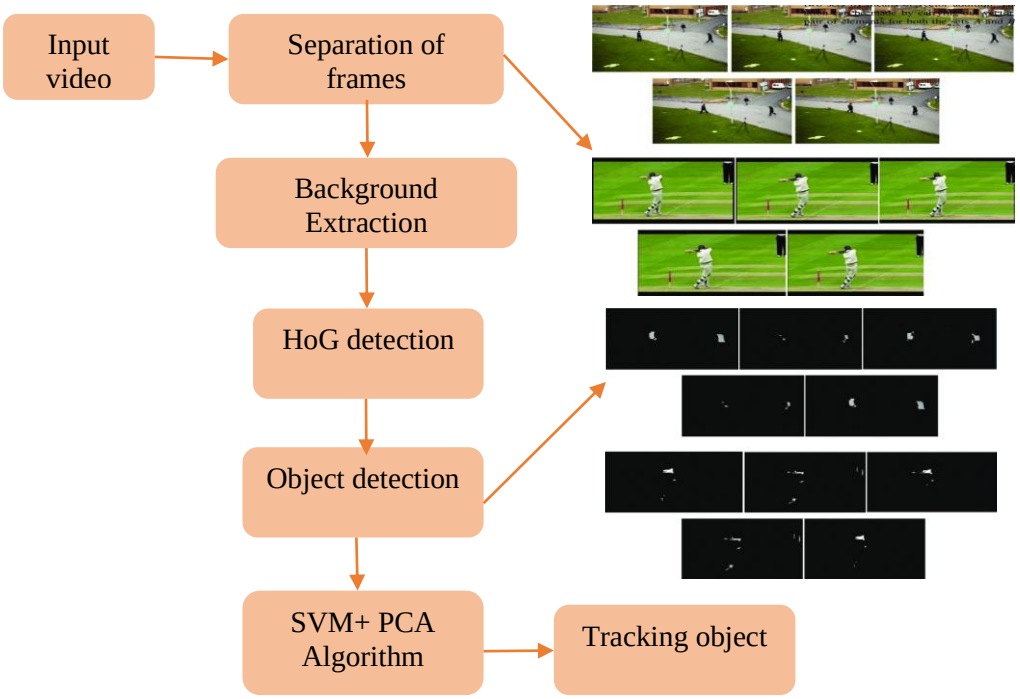

Fig. 2 Block diagram of the proposed work

HOG Extraction: After deployment, we can introduce the HoG function extraction process from scratch

1. Computation of gradients: The most popular way of measuring gradient is simply to add the differential derivative mask in both the *x* and *y* directions. This approach involves the filtering of the picture strength data in both horizontal and vertical directions with the kernels [-1 0 1].

2. Orientation Binning: By weighting the orientation of each pixel of the cell into pre-defined orientation bins, a cell histogram is generated. The cells are normally square (we stick to rectangular for convenience), but may be rectangular or round. The weighting of the orientations may be achieved either by the gradient itself.

3. Block division and normalisation: cells must be clustered together to influence shifts in lighting and comparison. Then the whole HOG descriptor is the vector of the cell histogram normalisation components from all block areas.

There are two main geometries of blocks: R-HOG rectangular blocks and C-HOG circular blocks. R-HOG blocks are typically square grids, defined by 3 parameters: cell number per block, pixel number per cell, and channel numbers per cell histogram. C-HOG has two variants: one with a single core and the other with separated angled cells, several angular / radial bins, core bin radius and additional radial expansion factor can represent which. It normalises such blocks by four major methods: the L1 standard, the L1 square root standard, the L2 standard and the L2 standard, accompanied by the L2 Hys. We will explore and pick the right model.

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Motion and object detection: Object detection is the first step in identifying instances of semantic objects in a class including individuals, houses, vehicles, etc. in a video series. Frame-to-frame difference, context subtraction, and motion tracking using optical movement methods are the various ways to entity identification. These methods usually use derived features and algorithms to classify entity category instances. They classify the method of object detection into two groups. First, entity identification, which primarily involves three approaches such as context subtraction, visual flow and spatiotemporal filtering. Second, classification of artefacts uses mainly visual characteristics as a tool dependent on the form, gesture and texture. Motion detection is one of the video security concerns, since it not only extracts moving artefacts, it is also essential for many applications like object-based video encoding, human motion recognition and human machine interaction. The next step is motion segmentation after object recognition. This stage is used to detect areas that fit moving targets such as people or vehicles. It primarily focuses on the detection of moving areas from video frames and the development of a database to track and analyse actions. Motion detector is used to detect a change in the location of a subject relative to its environment or to detect a change in the environment relative to an object. Electronic motion sensors may track activity from the physical world.

Improving PCA classification efficiency: in this article, we used the Principal Component Analysis (PCA) to enhance the performance of classification issues. This evaluation model comprises two steps; it measures the weight of each feature in the first step using a method of weighting the feature. They then pick the features with weights greater than a pre-defined threshold. The chosen functions would then be subject to the second stage. In the second stage, they change variances of characteristics before the variation of the characteristics correlates to their value. By taking full advantage of phase 2, we expect the PCA efficiency in classification problems to improve.

Classification Training: Based on the literature review completed, in our project, we chose a linear kernel SVM. We kept the default value of the error cost of 1. We tried to use weighted SVMs but could not do so in this task because of technical problems with MATLAB. The SVM help is one of the most common supervised learning algorithms used in both classification and regression issues. That being said, they mainly use it in Machine Learning for classification problems. The aim of the SVM algorithm is to build the best line or decision line that can divide n-dimensional space into groups such that the new data point can easily be positioned in the right section. This best boundary of judgement is called a hyperplane. SVM picks the severe points / vectors to support the hyperplane construct up. These severe cases are considered vectors of support and thus algorithms are considered vector support. Take into account the diagram below in which two separate classifications are categorised by decision boundary or hyperplane which is shown in Figure 3.

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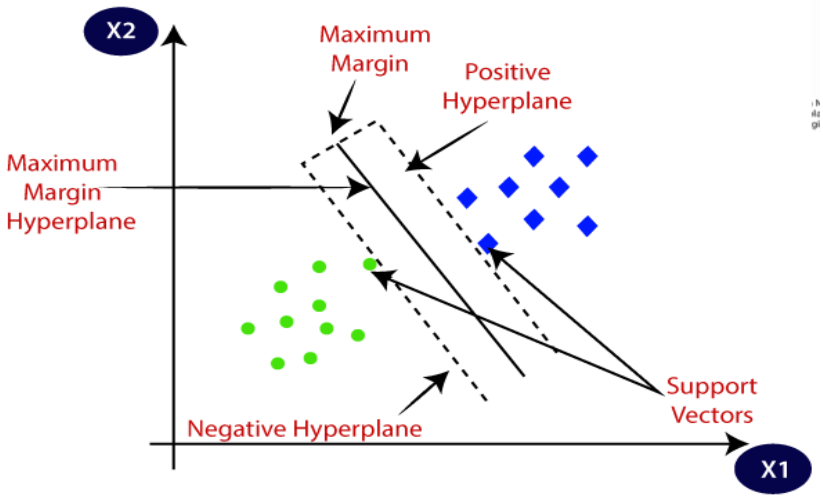
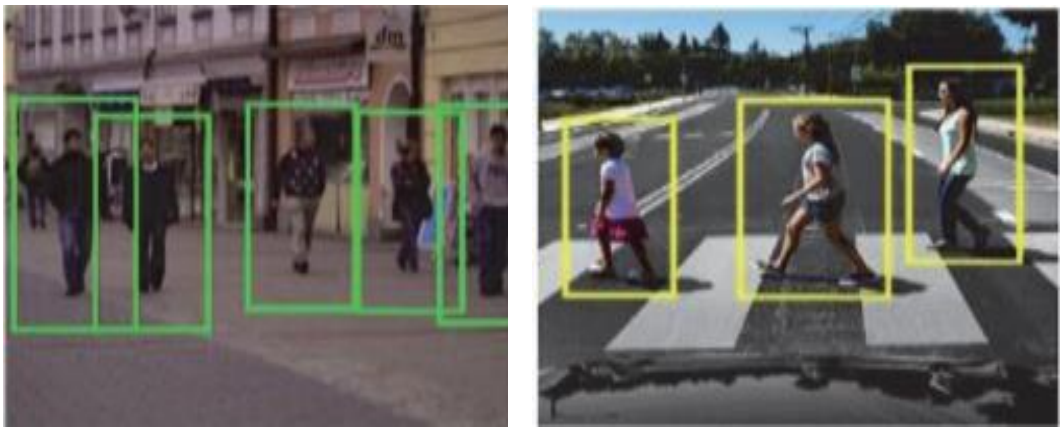


Fig. 3 Decision boundary or hyperplane of Training the Classifier

Tracking Object: Tracking of objects in a video series involves recognising the same object in a frame sequence with the special characteristics described by the entity. In particular, video surveillance systems often obey the identification method. Tracking takes place from one frame to the next, utilising kernel-based tracking, point-based tracking, and silhouette-based tracking algorithms.

4. Results and Discussion

For both the formation and checking of our SVM, we used MIT and INRIA Pedestrian data collection. One of the major tasks of video monitoring is to identify the existence of pedestrians in a video sequence, i.e. to find all human objects. This problem corresponds to areas, the smallest rectangular boundary boxes in the human series. They have identified human activity in certain surveillance applications utilizing study of trajectories, individual locations and historical or previous experience of the scene. We can see instances of pedestrian identification and monitoring in Figure 4.



(a) (b)



(c) (d)

Fig. 4 : Example of detection and tracking of pedestrians. (a) Detecting outdoor pedestrians walking along the lane. (b) Football ADAS identification. (c) The pedestrian detector is centred on the channel function detector aggregate. (d) Real-time traffic identification car and pedestrian.

5. Conclusion

On the basis of the literature survey, most of the techniques available proposed by previous researchers can detect and track objects either in the individual camera view or in multiple cameras. Though its trackers are reliable, they are also inefficient because of their strong computational demands and vice versa. They carry the pedestrian walking detection scheme out via multiple classifiers throughout this work, and the detection rates of several of the current methods to date are workable. The monitoring system measures human behaviors by various characteristics. The gradient system histogram is being used to track objects along with their speed increase. They can also use this approach for various applications involving object tracking.

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An EfficientFrequency Multiplier with DLL-Based Clock Generator for SoC Applications

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Abstract: Any implementation of something like a specific form of the multiplier in automated frequency measurement systems depends primarily on the overall permitted variance of both the output frequency of that same transducer. Therefore, it will be usually best to always use frequency multipliers of that first category in transducers with such a slight variance. The suggested edge incorporates optimal speed and reliable activity that used an organizational structure as well as an unselected overlap. The suggested hybrid digital edge solution provides broadband with low-energy and low-area benefits as well as being a potential candidate for low-energy frequency summaries in deep CMOS sub-micrometer. A charge pump was substituted by a counter to integrate the automated interface. The overall system consists of all the resources for doing the operation of stable clock pulses for SoC applications as well as the frequency multiplier. In this paper, the frequency multiplying method is carried out how to use a clock amplification system based on an edge combiner, which is carried out using the C2MOS logic.

Index Terms: Low power, frequency multiplier, phase detector, clock

I. INTRODUCTION

The systems of low power and low-area (TX) transmitters are important regarding short-range communications e.g. wireless transmission networks, body area networks, and certain other battery-operated applications. Such low-power systems have relaxed vibration, spectral purity, and architecture criteria. Phase-locked TXs (PLL) are indeed effective and area-efficient compared to the traditional mixer-based TX direct update design. The energy demand in a frequency synthesis can indeed be reduced by operating the PLL in lower frequencies and by using frequency multiplier circuits without the loop to build the modified RF carrier .The power requirements in a frequency synthesis can be decreased by operating the PLL in lower frequencies.

The strategy of low power architecture is often used to reduce SoC power usage. The power demand is categorized into static or dynamic. Few low power architecture approaches including Dual Voltage Supply (dual V_{dd}) and Dual Threshold (dual V_{th}) Single Threshold CMOS (MTCMOS) are being used to minimize static power usage. To minimize dynamic power requirements, a low power modeling approach termed Dynamic Voltage Scaling and Dynamic Frequency Scaling has been used by regulating the voltage and frequency at workload to minimize dynamic power requirements. Frequency clock generation with a frequency multiplier is needed for scaling by using PLL (Phase Locked Loop) or DLL (Delay Locked Loop). DLL is safer than PLL because of higher cost cycles and latency aggregation in PLL. The DLL-based clock generator for the multiplier is therefore used and comprised of a pulse generator, a power logic, and even an edge combiner. Therefore it is more suited for realistic use [1-2].

To address this issue, multiple DLL-based clock generators were introduced. The DLL clock generator consists of the DLL center and the frequency multiplier and is normally split into two blocks: Pulse Generator and Edge Combiner. If multiplication of variable frequencies is needed, a multiplication ratio control circuit is introduced. Multiphase clocks are

produced employing an input clock in the DLL path. The pulse generator produces the number of pulses needed by the multiplication-ratio signal generator from multiple-phase clocks to combiner circuit produces a multiplied clock by using the pulses chosen. In addition, the N/2 number of multiphase clocks is the full operation for both the frequency multiplier. Because while the frequency generator gathers several clocks, jitter aggregation sometimes does not happen. However, the frequency multiplier can adjust multiplication ratios quickly. Furthermore, the conceptual range or performance load of the frequency multiplier should be expanded to raise the multiplication ratio [8-10]. Moreover, the average clock frequency is significantly diminished.

The main contributions and organization of this paper are summarized as follows: In section, 2 we describe background details of DLL based clock generators details. The section 3 proposed work. The section 4 deliberates results and discussions. Finally in section 5 we concluded the paper.

II. BACKGROUND WORKS

In [3], the author's paper envisages a high level of complications and a time-consuming workload for the development of multimedia applications. Many of the DVS algorithms, which are a productive and useful technique for classifying these DVS algorithms by outstanding multimedia applications, have been advocated for real-time use. In this paper, they advocate the new offline linear programming technique for regulating the low energy usage for multimedia processing tasks within delays. Due to the lower energy content accessed, they examined the greatness of DVS algorithms. Subsequently, they enhance the LP formulation to build an online DVS algorithm for multimedia real-time, based entirely on powerful sequential linear programming.

In [4] the authors study conventional stepping voltage system and involve a delay margin to ensure that all possible device and wiring process deviations and temperature inconsistency continue at a certain level of firmness. This margin is needed if the critical path is to be changed because of such improvements. Furthermore, because of the slower interconnection delay, a critical path changes from operating voltage to each other with voltage particularly in comparison to the logical delay. To ensure a faultless operation with a high limit, technological scaling challenges both process variation and interconnect delay. Such a margin is insufficiently converted into upward voltage and corresponding energy. In addition, voltage-scaling features of certain critical paths are followed by logical programming and delay lines interconnected to perform the same delay sequences as the actual critical path.

In [5], the authors present a delay-locked (DLL) clock generator with several unique advantages over the traditional phase-locked-loop generator, namely no jitter growth, fast locking, the balance of loop production and the easy combination of the loop filters. To overcome the conservative DLL-based system's constrained locking range and frequency multiplication problem, they suggest a reset circuitry phase detector and a new frequency multiplier. It is made in a CMOS process of 0.35μm. Our DLL clock initiator covers an area of 0.07 μm and is 42.9 mW power consumption. It has an operating range of 120 MHz-1, 1 GHz and a cycle to cycle jitter of 1 GHz is accurate. The Die area, peak to peak and R.M.S. jitter are the smallest possible three parameters of comparison. These parameters pertain to those of multipliers with high-frequency clocks.

In [6], the authors offer a frequency multiplier composed of a monolithic local CMOS oscillator in the DLL technique that organizes a low noise 900 MHz carrier frequency. This example supports the necessity of a dual-mode-137 AMPS / TDMA standard. In [7], the Author DLL-based frequency synthesizer. A delay-locked loop is designed for the Mode-1 UWB system. With the acceptable 528-MHz input frequency, this frequency synthesizer delivers less than 9.5-ns adjustment time. This frequency of reference uses broad bandwidth and rapid sales architecture. Besides, a discreet time model and DLL's analytical model for phase noise are foreseen in this work. Research results demonstrate high availability with predicted adjustment time and phase noise.

III. PROPOSED MODEL

The block diagram for binary frequency-shift-keying (BFSK)/amplitude multiplication frequency changes with small area penalties. Because only another PD-N is applied for each edge combiner differential result while the cumulative multiplication rate is too high by one, the edge combiner's performance load rises slower than even for the combiner unit. The primary requirement of the multiplier is to get the required clock signals that are generated from the DLL clock generator and simultaneously D flip-flop gets the multiphase clocks. Because of control logic, the correct pulses are obtained with logic. All the phase clocks are delivered during the time of neighbor clocks that are delayed by the same period, which in return produces pulses from the clock signals. Eventually, whenever the multiphase clocks move through the multiplication rate control logic, device-timing distortion will arise, which in turn will produce pulses appropriate for high frequency, consumes less quantity of power and area with various clock speeds.

For signal synthesis, various methods can be employed, in which either an oscillator is worked directly at the target frequency or a sub-harmonic. Even though the activity of an oscillator at the target frequency might be the most power-efficient choice, relying on process technology it often provides a range of disadvantages. The frequency of the transistor oscillation is restricted to that of the highest level, the phase noise as well as the tuning region based on the efficiency variable as well as the tuning range of the resonator. Besides, with all the multiplication factor the edge loading decreases quickly.

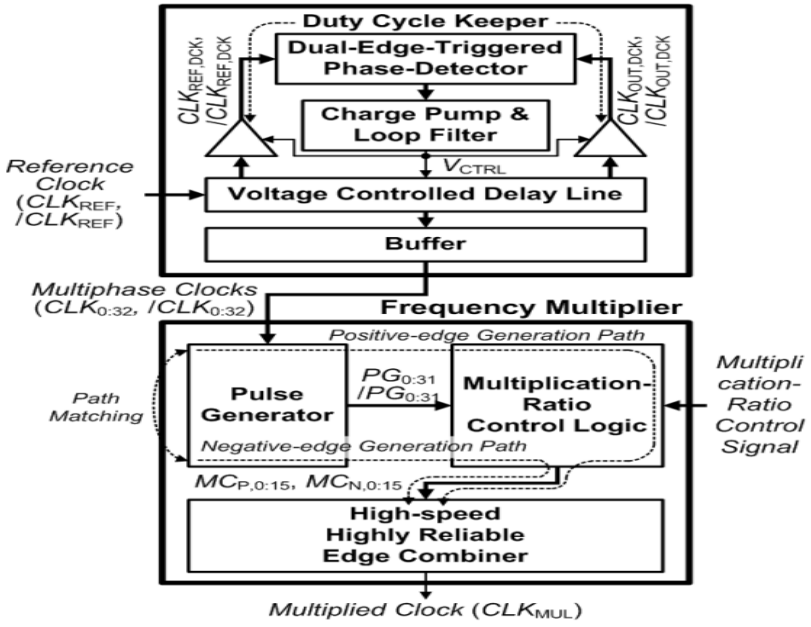

Figure 1: Overview of System clock operation

The diagram below displays two multipliers that can also during operation for performing multiplications with high speed. In fig.2 (a) The PLL arrangement indicates that the reference clock correlation. As illustrated in fig. 2(b) contains counter and clock divider with software constructs are presented.

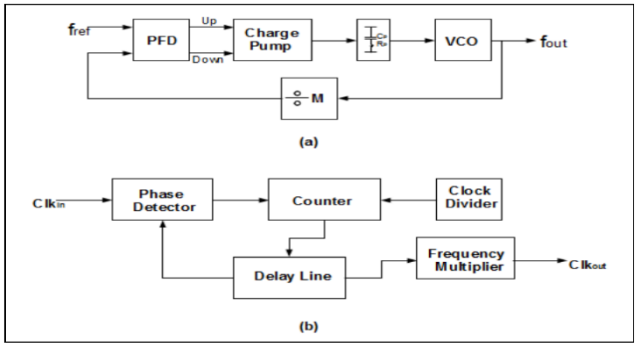

Figure 2: Process of Frequency multiplication (a) Circuit relies on PLL (b) Circuit relies on DLL

In Fig.2, the reference clock frequency is linked to the reference clock for a bit-controlled delay line produced with the original delay sensitive signals for configurations. In comparison to either the non-ideal transition properties, the effects of the high-frequency approximation would be further varying from those in the previous ideal signals review, as the influence of parasite responsive components throughout the HBT decreases to reduce circuit output to higher frequencies. Further, in saturation regions, additional charges are added into the transistor foundation, impacting the clipping at high frequencies of the upper half-wave of the collector present. Since consistently the eight pulse is contrasted either with the reference clock and according to the phase difference, a new UP or DOWN signal is produced. This input process is followed for the period of locking time slot among variations in the unit when it is locked.

Sub-system with Frequency multiplier:

A. Clock Divider: This module produces clock pulses that are running at low speeds that is very much needed for subsystem working. By sub-system divisor unit is the input to which produces the frequency output clock equivalent to the operation of required clock/4. This comprises serially linked flip-flops of T type to reach the necessary clock frequency. The waveform of the clock divider is shown in Figure 3 below.

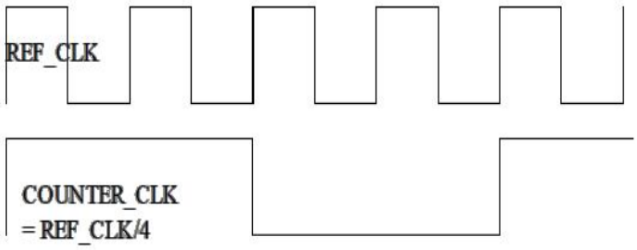

Figure 3: Clock waveform operation of divider unit

B. Phase Detector: The Phase Detector has been used to obtain a phase connection from either the delay line here between reference clock input as well as its delayed variant. To maintain a perfect synchronization relation for maintaining a consistent clock period without any delay for the model correspondingly. Figure 4 demonstrates the schematic diagram below. The phase detector circuit reflects the design of MS flip-flop.

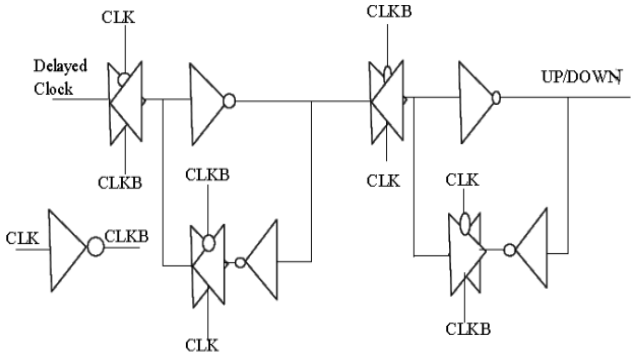

Figure 4: Circuit associated with Phase Detector

C. Up-Down Counter: All other versions generate a certain output amount, as well as the respective amplitudes, which are identical. There seem to be optimum biasing levels from which the sixth harmonic amplitude is optimum, however, the 4th and 8th harmonic amplitudes are marginal and the evaluation of the signal has complied. Its operation mainly relies on the delayed pulse with one unit that is more reference to the phase detector unit generates several pulses makes it as a counter. As somewhat of a consequence, it reduces the delayed phase by rendering the delay section. Figure 5 below displays 5 counter waveforms, respectively.

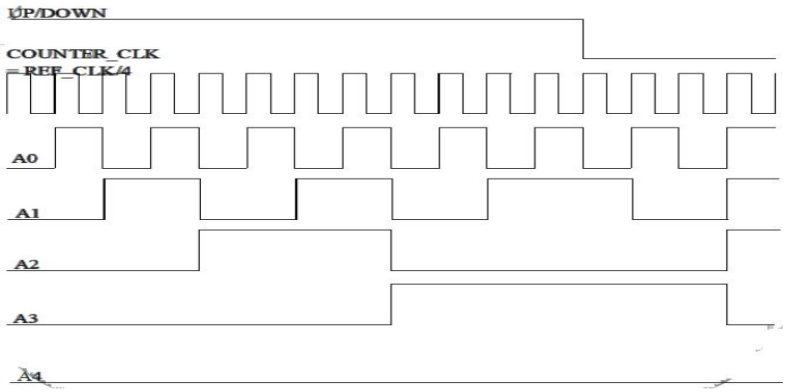

Figure 5: Up-Down Counter Waveform

IV. RESULTS AND DISCUSSION

All the results are simulated with the help of Xillinx ISE design suite and coding is done with Verilog HDL.

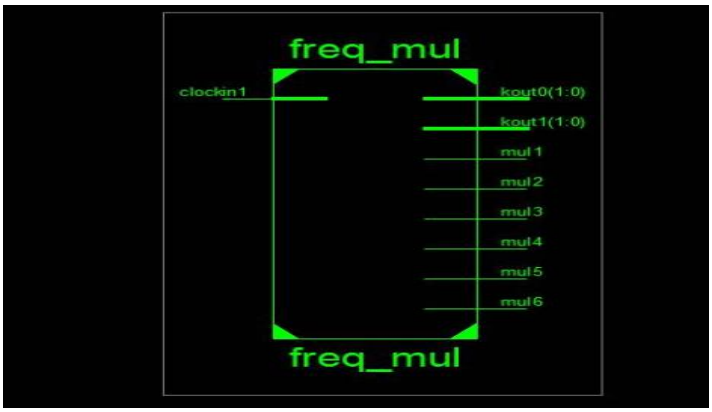

Figure 6: RTL schematic

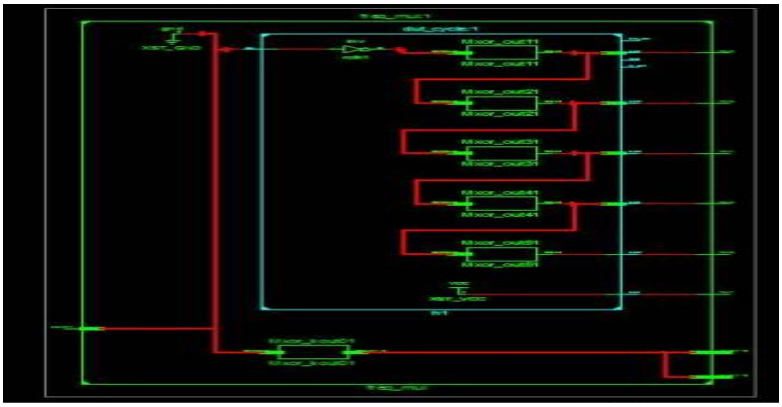

Figure 7: Technological view

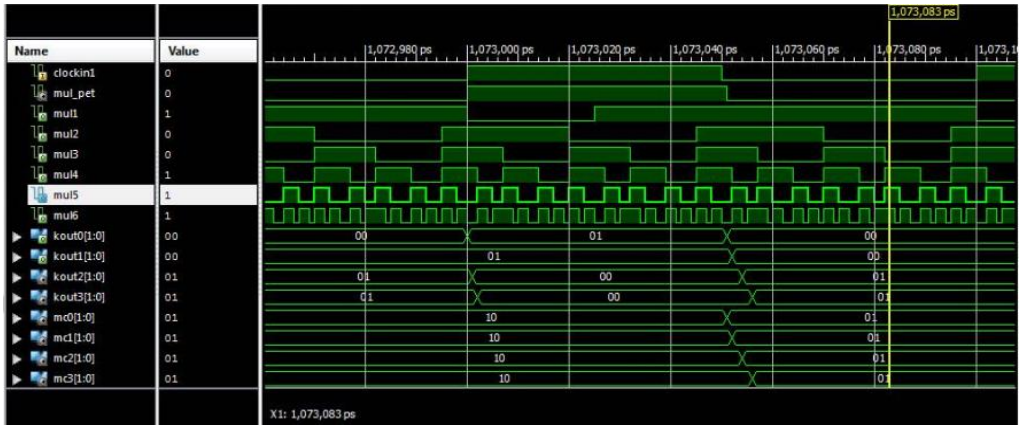

Figure 8: Simulation output wave for DLL based frequency multiplier

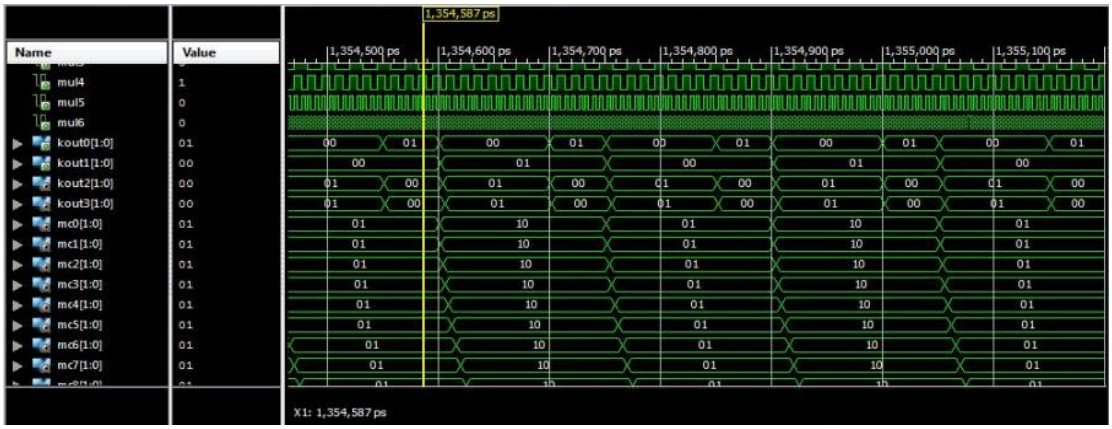

Figure 9: Simulation output wave for Dual edge trigger counter



Figure 10: Simulation output wave for 32-different phase generator

V. CONCLUSION

In this paper, a frequency multiplier is recommended for a DLL clock generator. There seems to be no PLL component in this design rather than this counter and the clock divider is inserted into the framework. The optimized pulse generator, as well as the Multiplication Rate Control Logic, was suggested to increase the delay among positive and negative paths. Eventually, a computational review to verify the output is done. It is evident in contrast with other designs that this system absorbs less power than others do in the same phase.

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TENSOR COMPLETION WITH DCT BASED GRADIENT METHOD

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Abstract

Tensor Completion from a limited number of non-distorted observations, has enticed researchers interest. The color image has been considered as the three dimensional tensor. Low rank property in Optimization has been used to recover the tensors in the image. The Low rank prior alone not enough to tensor completion. The traditional tensor truncated nuclear norm approaches have been able to approximate the real rank of the tensor, but these are low rank prior approaches. Here a transformation-based optimization method has been proposed to complete the tensors of the image. The Discrete Cosine Transformation (DCT) has been used as transformation method. The tensor singular value decomposition (t-SVD) and accelerated proximal gradient line (APGL) approaches have been considered. The Full Reference metrics i.e., peak signal to noise ratio (PSNR) and structural similarity (SSIM) have been used to evaluate the proposed approach. The obtained results are superior to the existing algorithms. The PSNR and SSIM have been recorded as 27.30 dB and 0.8845 respectively.

Keywords: Tensor Completion, Tensor Singular Value Decomposition, Discrete Cosine Transform, Convex Optimization**.**

I. Introduction

An image lies in a low-dimensional space, estimating missing values in images has been considered as low-rank matrix approximation problem [I]. The Low rank matrix approximation approaches have been used to solve the corrupted input image of two-dimensional manner. The color images formed with three-dimensional space, to apply these approaches the image has to be separated as channels. These separated channels have been processed using the state-of the art methods. Again, results have to be combined [II, III]. Here recent researchers the considered color image as the 3D data and formulated the problem as the Low Rank Tensor Completion [II, III, IV, V]. Tensor completion is the process of recovering the corrupted tensors of a color image. Tensor Completion has various applications such as machine learning, compressed

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sensing and pattern recognition. The low rank minimization problem [II] to tensor completion has been formed as sum of metricized nuclear norm of a tensor.

$$\min_{\mathcal{J}} \sum_{k=1}^{n} \|\mathcal{J}_k\|_* subject\ to\ \mathcal{J}_\Omega = \mathcal{M}_\Omega \tag{1}$$

where I_k denotes the tensor unfolded along the kth mode tensor, $\mathcal{M}_\Omega$ represents the incomplete tensor. Ω indicates the known elements set. kilmer et al. [VI] proposed a novel approach named tensor singular value decomposition (t-SVD) to perform the singular value decomposition on color images. Xue et al. [3] proposed a method incorporating the bothtruncated nuclear norm minimization [VII] and the t-SVD to an extension of matrix case. The objective function written as

$$\min_{\mathcal{J},\mathcal{W}} \|\mathcal{J}\|_* - tr(\mathcal{A}_l * \mathcal{W} * \mathcal{B}_l^T) \tag{2}$$

$$subject\ to\quad \mathcal{J} = \mathcal{W}, \mathcal{W}_\Omega = \mathcal{M}_\Omega$$

The truncated nuclear norm minimization alone not sufficient to recover the missing areas in two-dimensional case. By utilizing a transformation based truncated nuclear norm approach can recover the images with more structural and texture information [VIII, IX]. It has been extended to tensor case, [V] proposed an approach. The Discrete Cosine Transformation (DCT) has been incorporated with the Xue et al. proposed method. Here a DCT based Accelerated Proximal Gradient Line (APGL) approach has been introduced to tensor completion. It is providing the excellent recovery in the structure information of the image even the missing ratio is more than 80 %.

The paper alignment has been done as the section 1 started with the introduction to tensors and literature review. Section 2 provided some basics of tensors and properties. Section 3 discussed the methodology to proposed approach. Section 4 has been accommodated with the results and discussion. Section 5 Carried out the conclusion.

II. Notations and Preliminaries

The italic capital letters indicates the tensor, normal capital letters are indicates the matrix, italic small letter indicates the vector and the normal small letter indicates the scalar. The image tensor will be $\mathcal{J} \in \mathbb{C}^{(n1 \times n2 \times n3)}$. The tensor contains the horizontal, lateral and frontal slice. The frontal slice $\mathcal{J}(:,:,k)$can be represented as the $\mathcal{J}^k$. The block circulant matrix and unfolded tensor have been written in eq.3 and eq.4.

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$$bcirc(\bar{\mathcal{I}}) = \begin{bmatrix} I^{(1)} & I^{(n3)} & \dots & I^{(2)} \\ I^{(2)} & I^{(1)} & \dots & I^{(3)} \\ . & . & \dots & . \\ . & . & \dots & . \\ . & . & \dots & . \\ I^{(n3)} & I^{(n3-1)} & \dots & I^{(1)} \end{bmatrix} \tag{3}$$

$$unfold(\mathcal{I}) = \begin{bmatrix} I^{(1)} \\ I^{(2)} \\ . \\ . \\ . \\ I^{(n3)} \end{bmatrix} \tag{4}$$

Definition: Tensor Product[X] Let $\mathcal{X} \in \mathbb{R}^{n1\times n2\times n3}$ and $\mathcal{Y} \in \mathbb{R}^{n2\times n4\times n3}$. The tensor product between *X*and *Y* can be written as

$$\mathcal{X} * \mathcal{Y} = fold(bcirc(\mathcal{X}).unfold(\mathcal{Y})) \tag{5}$$

where . indicates the matrix product.

Definition: Tensor Transpose [X]The transpose of a tensor $X \square R^{n1 \square n2 \square n3}$ becomes as X^T with order *n*2´*n*1´*n*3. The frontal slice need to be transposed and then reversing the order of the frontal slices from 2 to n3.

$$(\mathcal{X}^T)^{(1)} = (\mathcal{X}^1)^{(T)}$$
$$(\mathcal{X}^T)^{(i)} = (\mathcal{X}^{n3-i+2})^{(T)}, i = 2,3,..,n3. \tag{6}$$

Definition: Identity Tensor [X]The identity tensor $\mathbf{I} \in \mathbb{R}^{n1\times n2\times n3}$ contains the first frontal slice $n \times n$identity matrix, remaining frontal slices contains all zeros.

Definition: Orthogonal Tensor [X] A tensor $\mathcal{X} \in \mathbb{R}^{n1\times n2\times n3}$ orthogonal if it satisfies

$$\mathcal{X}^T * \mathcal{X} = \mathcal{X} * \mathcal{X}^T = \mathbf{I} \tag{7}$$

Theorem: T-SVD [X] Let $\in \mathbb{R}^{n_1\times n_2\times n_3}$ by applying TSVD the *X* decomposed as the $\mathcal{U} \in \mathbb{R}^{n_1\times n_1\times n_3}, \mathcal{S} \in \mathbb{R}^{n_1\times n_2\times n_3}$ and $\mathcal{V} \in \mathbb{R}^{n_2\times n_2\times n_3}$. The Fig 1. provides the basic multiplication order of T-SVD.

$$\mathcal{X} = \mathcal{U} * \mathcal{S} * \mathcal{V}^T \tag{8}$$

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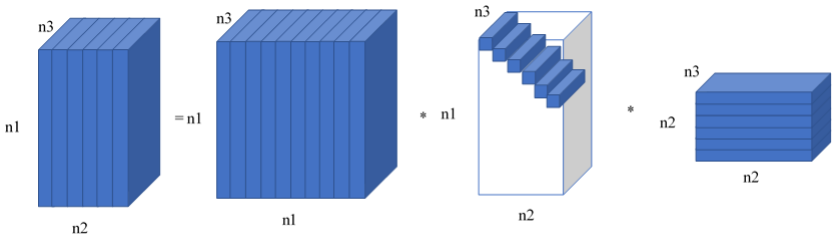

Fig. 1: Basic Structure of T-SVD

Definition: Tensor Singular Value Thresholding[III] Let T-SVD of tensor $X \in R^{n_1 \times n_2 \times n_3}$ will be $U*S*V^T$. The Singular Value Thresholding (SVT) has been applied to each frontal slice of the tensor $\mathbb{S}$.

$$\mathcal{D}_{\mathcal{T}}(\mathcal{X}) = \mathcal{U} * \mathcal{D}_{\mathcal{T}}(\mathcal{S}) * \mathcal{V}^T \tag{9}$$

III. Tensor Completion With DCT Based Optimization

The DCT has been used in image compression, image de-noising and designing the transform coders etc., wang et al. [VIII] extended the DCT with gradient based optimization towards the image completion. Ping-Ping Wang et al. The n-dimensional DCT has been calculated by utilizing the separability property n times the one-dimensional DCT will be calculated. Here the image contains the three spaces, first images has been divided in to 8×8 blocks and applied the two-dimensional DCT, then applied one dimensional DCT to the same block. The one-dimensional DCT and two dimensional DCT can be written as

$$\mathbb{C}(j) = \alpha(j) \sum_{i=0}^{n-1} u(i) cos\left[\frac{\pi(2i+1)j}{2n}\right] \tag{10}$$

where $\alpha_j = \sqrt{\frac{1}{n}}$ if j=0 else $\sqrt{\frac{2}{n}}$

$$\mathbb{C}_{j_1,j_2} = \alpha_{j_1}\alpha_{j_2} \sum_{i_1=0}^{n_1-1} \sum_{i_2=0}^{n_2-1} c(i_1,i_2,j_1,j_2)\mathbf{I}_{i_1,i_2} = C_{j_1,j_2} * \mathbf{I} \tag{11}$$

where n_1,n_2 and n_3 are the size of the image block. $\alpha_{j_1} = \sqrt{\frac{1}{n_1}}$ if $j_1 = 0$ else $\sqrt{\frac{2}{n_1}}$, $\alpha_{j_2} = \sqrt{\frac{1}{n_2}}$ if $j_2 = 0$ else $\sqrt{\frac{2}{n_2}}$. The cosine basis function written in eqn.11

$$c(i_1,i_2,j_1,j_2) = cos\left(\frac{\pi(2i_1+1)j_1}{2n_1}\right) cos\left(\frac{\pi(2i_2+1)j_2}{2n_2}\right) \tag{12}$$

After obtaining the coefficients the selection has been considered. Based on the selection mask the values have been considered in the inverse DCT. here the selection mask S_{pq} considered based on p and q values. p=1,2,3and q=1,2,3

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$$S = \begin{cases} S_{pq} = 1 & if \quad p \geq 1,2,3 \quad q \geq 1,2,3 \\ S_{pq} = 0 & Otherwise \end{cases} \tag{13}$$

The inverse DCT has been applied to the block to retain image I_k. The optimization process goes as in eqn. 15,16 and 17.

Update $\mathcal{I}_{k+1}$:

$$\mathcal{I}_{k+1} = arg\min_{\mathcal{I}} \|I\| + \frac{1}{2t_k} \|\mathcal{I}_k - (\mathcal{M}_k - (t_k \nabla f(\mathcal{I}_k)))\|_F^2 \tag{14}$$

The eqn. 14 has been solved by utilizing the T-SVT. i.e.,

$$\mathcal{I}_k = \mathcal{U}_i \mathcal{D}_\tau(\mathcal{S}_i) \mathcal{V}_i^T \tag{15}$$

where $\mathcal{D}_\tau(\mathcal{S}_i) = diag(max(\sigma_t - \tau),0)_{1 \leq t \leq r}$, $i = 1,2,..,n_3$

Update t_{k+1}:

$$t_{k+1} = \frac{1 + \sqrt{1+4t_k^2}}{2} \tag{16}$$

Update M_{k+1}:

$$\mathcal{M}_{k+1} = \mathcal{I}_{k+1} + \frac{t_k - 1}{t_{k+1}} (\mathcal{I}_{k+1} - \mathcal{I}_k) \tag{17}$$

Algorithm: DCT with t-SVD and APGL for Tensor Completion

Observation: $\mathcal{I}, \Omega, \Omega_c, \lambda, \gamma, R$;

Initialization: $t = 1, \mathcal{M} = \mathcal{I}, k = 1$;

Calculate the gradient of f(I) to the Equation (22)

$$[\mathcal{U}, \mathcal{S}, \mathcal{V}] \leftarrow T - SVD(\mathcal{M}_k - t_k \nabla f(\mathcal{I}_k)$$

update $\mathcal{I}_{k+1}, t_{k+1}, \mathcal{M}_{k+1}$;

k=k+1;

Until $\| \mathcal{I}_{k+1} - \mathcal{I}_k \| \leq \epsilon$

Output: The Recovered Image $\hat{\mathcal{I}} = \mathcal{I}_{k+1}$

IV. Results and Discussion

Parameter Settings: The DCT block size considered as 8´8, the minimal rank is 1 and the maximum rank is 20. The lambda and tolerance values have been considered as 0.01 and 0.0001 respectively. In the image randomly 80% of tensors have been corrupted. These corrupted images have been recovered with the proposed approach

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and the results have been evaluated. The Full-Reference Image Quality Assessment Measures (FR-IQA) i.e., PSNR and SSIM have been used to evaluate.

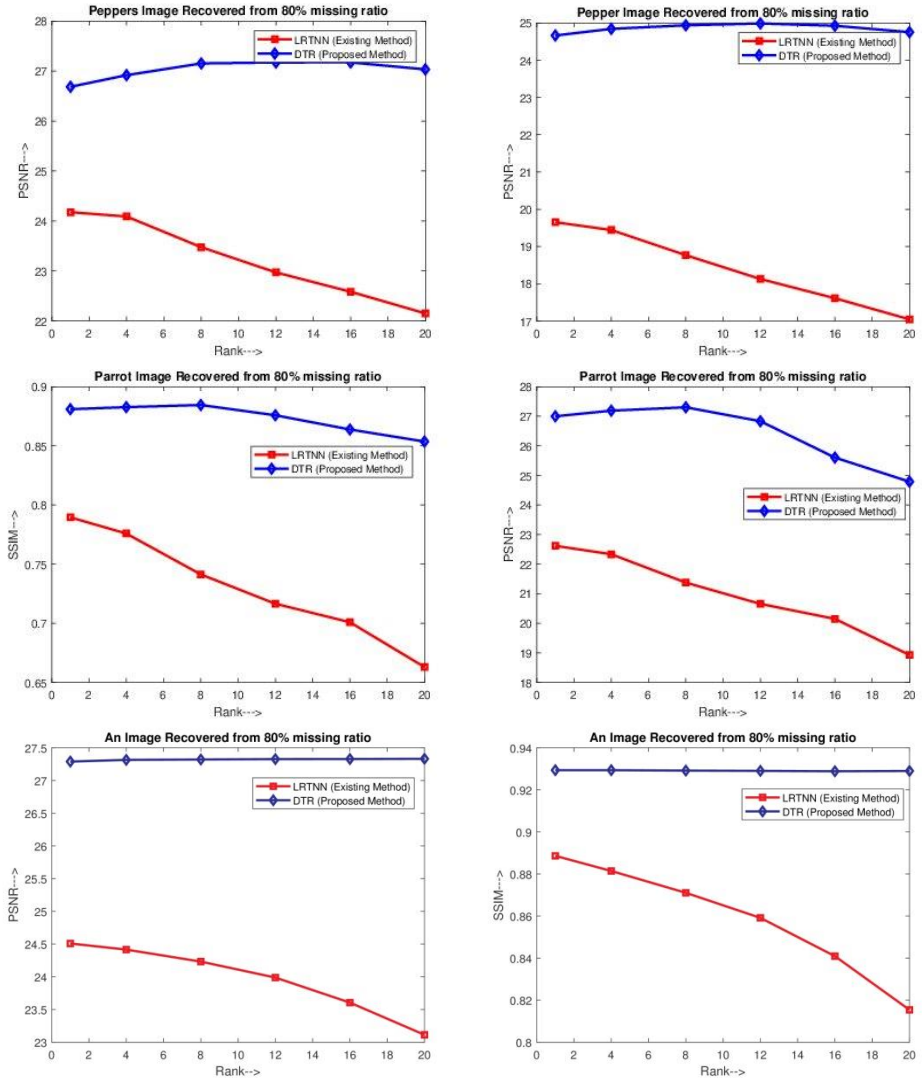

Figure 2: Recovered images from 80% missing ratio

Fig2. consists of two images evaluated with PSNR and SSIM, Fig 2 a) and c) have been plotted with PSNR vs rank. The proposed method has high values in comparison with the existing LRTNN method. The maximum PSNR value obtained at Rank 8 i.e. 27.30 dB to parrot image. The Fig 2 b) and d) shows the SSIM vs Rank, the SSIM value attain the maximum at rank =8 as 0.8845. To the existing LRTNN method got PSNR as 22.61 and SSIM as 0.7895. The DCT transformation has the feature of energy compaction and smoothing gives the scope in recovering of structure information.

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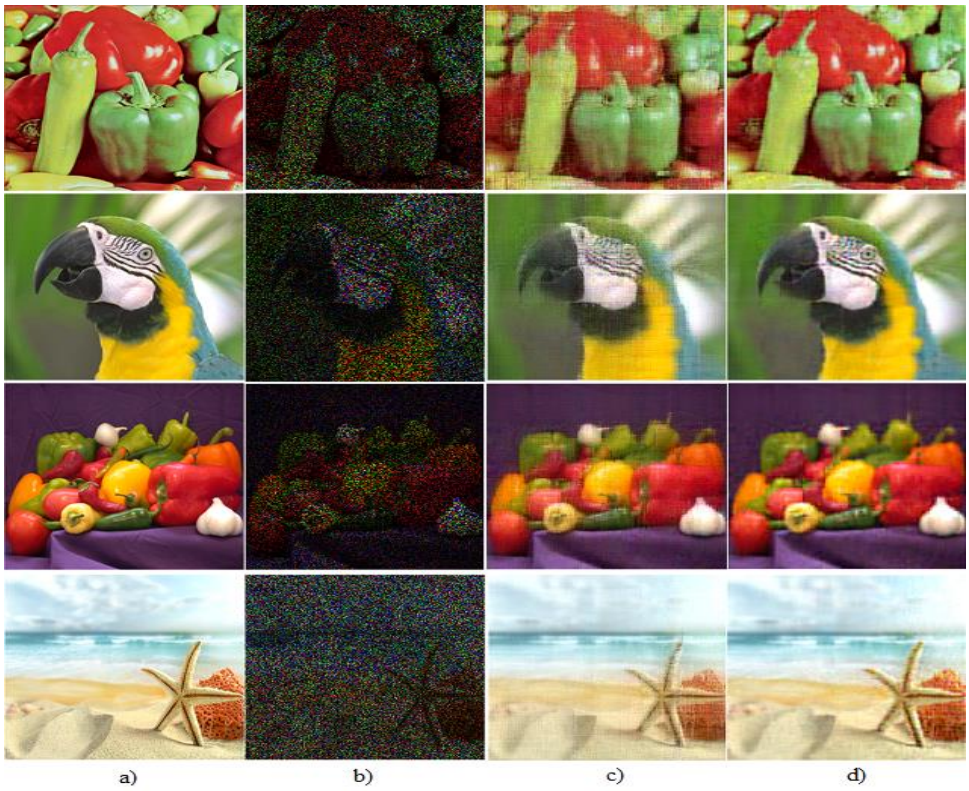

Fig. 3: a) Original Image, b) 80% missing in the image, c) Recovered using Low Rank Tensor Completion using Truncated Nuclear Norm Regularizer, d) Recovered from DCT based TSVD Optimization method

V. Conclusions

The proposed approach DCT transformation based APGL Optimization has been recovering the tensors missing in the image. The T-SVD and the truncated nuclear norm have been utilized instead of other existing methods. The recovery has been evaluated using the FR-IQA measures named PSNR and SSIM. The improvement values PSNR and SSIM are 5.92 dB and 0.1433 respectively. The DCT based TSVD optimization method has been outperformed.

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ANALYSIS OF HSI COLOR MODEL ON CHAOS THEORY IN SPATIAL DOMAIN

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ABSTRACT

Image Steganography is the process of embedding text in images such that its existence cannot be detected by Human Visual System (HVS) and is known only to sender and receiver. This paper presents a novel approach for image steganography using Hue-Saturation-Intensity (HSI) color space based on Least Significant Bit (LSB). The proposed method transforms the image from RGB color space to Hue-Saturation-Intensity (HSI) color space and then embeds secret data inside the Intensity Plane (I-Plane) and transforms it back to RGB color model after embedding. The said technique is evaluated by both subjective and Objective Analysis. Experimentally it is found that the proposed method have larger Peak Signal-to Noise Ratio (PSNR) values, good imperceptibility and multiple security levels which shows its superiority as compared to several existing methods.

1. INTRODUCTION

The word steganography is derived from two Greek words; "stegano" meaning protected and "graphia" meaning writing. It can be defined as the process of writing messages in a way in which the presence of secret message is known only to sender and receiver. Steganography require a carrier object, secret data and embedding algorithm. It may also need an encryption algorithm and secret key in some cases in order to increase the security levels of steganography. Applications of steganography includes secure transmission of top secret documents between national and international governments, securing online banking and voting systems, secret communication between criminals and terrorists and sending Trojan horses and viruses to attack on systems etc.[1-7].

1.1 Steganography VS Cryptography

Steganography and Cryptography both techniques are used for data confidentiality (protection of information from unwanted parties).However there also exists some differences between them that is described below.

i. Cryptography is the practice and study of secure communication but Steganography is an art as well as a science of covert communication.

ii. The main focus of Cryptography is to keep the contents of the data secret while Steganography aims to keep the existence of the data secret.

iii. Security in cryptography is achieved by converting the secret data into non-understandable form while in steganography; security is achieved by hiding data in apparently harmless carriers to hide the existence of data.

iv. Cryptography provides us secure communication by using a key to read the information. An intruder is unable to remove the used encryption but he/she can easily modify the encrypted file and can make the encrypted file meaningless which cannot be easily understood by the receiver. On the other hand, Steganography provide us a method of covert communication that can be removed only if the carrier object in which data has been embedded, is modified. The confidentiality of hidden data will remain as it is, until and unless a suspicious user is succeeded in finding a method for detecting it.

v. The final endeavor of cryptography is a cipher text but the final output of steganography is a stego object.

vi. To break the cryptography, we compare some sections of the plaintext with the sections of the cipher text but in breaking steganography we compare the cover object with the stego object plus some possible sections of the message.

Since the rise of Internet one of the most important factors of information technology and communication has been the security of information. Cryptography was created as a technique for securing the secrecy of communication and many different methods have been developed to encrypt and decrypt data in order to keep the message secret. Unfortunately it is sometimes not enough to keep the contents of a message secret, it may also be necessary

to keep the existence of the message secret. The technique used to implement this, is called steganography [1]. Steganography is the art of hiding messages in a medium called cover object in such a way that existence of message is undetectable. Imperceptibility is clearly is the most important requirement in steganographic schemes [2]. The cover object could be a digital image, an audio file, or a video file. The secret message called payload could be a plain text, an image, a video file or an audio. Steganographic methods are classified into spatial domain embedding and frequency domain embedding. In frequency domain, images are transformed into frequency components by using DCT, FFT or DWT and then messages are embedded either in bit level or in block level [3]. In spatial domain LSB replacing is the most widely used data hiding method. However most of the LSB Techniques are prone to attacks [4, 5]. Because of low computational complexity and high embedding capacity this paper mainly deals with LSB Steganography method.

1.2 Types of Steganography w.r.t carrier object

Steganography embeds secret data into digital carriers like image, audio, video etc such that it cannot be easily detected by the Human Visual System (HVS). There are five types of steganography on the basis of carrier object that is used for embedding the secret data. These types are briefly described and its diagrammatic representation is given in Fig.1.

1.2.1 Image Steganography

The type of Steganography in which image is used as cover object is called Image Steganography. Generally, the techniques in this method modify the image pixels for hiding secret information. Images are considered to be the best cover objects/carriers for hiding information because it contains large amount of redundant bits.

1.2.2 Network Steganography

The type of Steganography in which network protocol (TCP, IP, UDP and ICMP etc) is used as cover object is called Network Steganography. In this method, information is hidden in some fields of the Header of TCP/IP packet that are optional or never used.

1.2.3 Text Steganography

Text Steganography uses text as a carrier for hiding secret information. In this technique secret message is hidden in the nth letter of every word of carrier text. Unlike other types of steganography (audio, video, network and image), Text steganography is much more difficult because of less redundancy in the text. Text steganography is preferable for simple communication where less memory is needed.

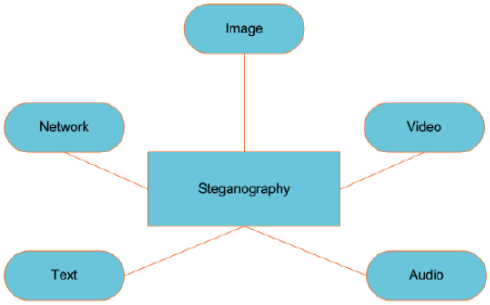

Figure 1: Types of Steganography w.r.t carrier object

2. LITERATURE REVIEW

The simplest method to hide secret data inside a cover image is LSB. In this method the least significant bits of the carrier image pixels are replaced with the secret data bits. Payload capacity of LSB method can be increased if more than 1 LSBs are used for message embedding but it brings noticeable changes in the carrier image. LSB method is simple to implement but it is vulnerable to many statistical attacks like RS, image processing operations and Chi-Square analysis etc.

Adnan Abdul-Aziz Gutub proposed a more robust steganographic technique in which one channel is used for indication while other two channels are used for embedding secret data in a predefined cycle manner which enhances the robustness of proposed method. The experimental results show us the high payload capacity and better imperceptibility of the proposed algorithm. This method also avoids the key exchange overhead.

In [19], the authors propose a robust method which embeds variable bits in image pixels depending on the pixel value and value of mean and standard deviation (SD). Two bits are inserted in the image pixel if (mean–SD/2) is greater than pixel value; 3 bits are stored if (mean +SD/2) is greater than pixel value otherwise 4 bits are stored in each pixel value. Chaotic effect is also obtained in the proposed method by using random traversing path which make the attack loathsome but nothing is given about generating the random traversing path.

Grover et al., presents an adaptive edge based LSB substitution technique which hides three(3) bits of secret data in edgy pixel and two(2) secret bits in non-edgy pixels in blue channel of the RGB image. This method has high payload capacity and is more robust as compared to simple LSB substation method because secret data is divided into two sets first and then it is embedded in cover image starting from the

central pixel and traversing through the whole image which increases its robustness.

In the authors proposed a new method to embed secret data in the GREEN or BLUE channel of carrier image on the basis of secret key bits and RED channel LSB. This method adds one more level security to the existing LSB method by utilization of secret key. The RED channel LSB and secret key bit is xored and then a decision is taken on the basis of its result to replace the LSB of GREEN or BLUE channel. The proposed method has the same payload, more robustness and better security as compared to simple LSB method. However the secure key exchange of secret key is an open challenge and is an extra overhead of proposed method.

Ibrahim and Kuan have developed a SIS (Steganography Imaging System) which uses a secret key to enhance the security of the proposed system. The authors have made use of zipping to zip the secret key and secret data in order to increase the payload. The zip file is then converted into bits stream and hidden in cover image. The proposed algorithm has high payload capacity and better quality of stego images but this technique is proposed only for BMP format images.

Thanikaiselvan and Arulmozhivarman have proposed a more robust approach for color images in transform domain based on Reversible Integer Haar Wavelet Transform (RIHWT) and Graph Theory (GT). The proposed method applies RIHWT on RED, GREEN and BLUE channels separately and selects wavelets coefficients based on Graceful Graph (GG) for randomly scattering the secret data in wavelets coefficients. Three different unique keys are used for encoding and decoding of secret data in the proposed method. Key1 is subband selection key for selecting one of the sub bands i.e. LL, LH, HL and HH; Key2 is for selecting coefficients inside the selected subband randomly on the basis of GG; Key3 is for deciding the number of bits to be stored in selected coefficients. The proposed method gives us promising results in terms of imperceptibility, robustness and payload.

3. PROPOSED ALGORITHM

All the communicating bodies want the confidentiality, integrity and authenticity of their secret information. Different approaches are used to cope with these security issues like digital certificate, digital signature and cryptography. But these methods alone cannot be compromised. Steganography is the best solution to these problems as it hides the existence of secret data. This paper proposes a novel image steganography LSB based technique for RGB images using color space exchanging from RGB to HSI. The secret data is embedded in I-Plane of HSI color model using LSB method. Finally the resultant image is retransformed to RGB color model to make the stego image.

3.1 Color Models

Color models are also known as color systems or color spaces. The main goal of these color spaces is to represent all colors in a standard way. A color model is a way of representing a set of colors mathematically. The most popular color spaces are RGB, YCbCr (Luminance Component, Chroma Blue difference, Chroma Red difference) and CMYK (Cyan, Magenta, Yellow and Black), HSI (Hue, Saturation and Intensity).

The HSI color model is derived from RGB color space that represents colors the way the human eyes perceive and interpret colors. Human eye describes colors by its hue, saturation and intensity. Hue represents a pure color i.e. pure red, yellow etc. Saturation gives us a measure of the degree to which a pure colour is diluted by white light. Intensity is the brightness of a color.

3.1.1 Why HSI Color Model for Embedding

The proposed method uses HSI color space for information hiding because of the following reasons.

„« Processing an image in RGB color system is relatively more difficult and time consuming. All the three values of a particular pixel need to be read, the intensity is then calculated, the desired changes is made, new RGB values are recalculated and stored.

„« The brightness information in RGB color space is embedded in its each layer which indicates that all the three layers are strongly correlated to one another and any changes to one of its layer will have its corresponding effect on other layers.

„« To generate a particular color in RGB colour space, all the three components must be of equal bandwidths.

„« RGB is not an efficient color space when we are concerned with real-world images.

„« To simply processing, programming and end user manipulations.

Embedding Algorithm

Input: Cover Colour Image, Secret data

Output: Stego Image

Step 1: Take the cover RGB image and secret data.
Step 2: Convert the RGB image into HSI color model using section 3.1.2 formulas.
Step 3: Convert the secret data into 1-D array of bits.
Step 4: Take a pixel from I-Plane and replace its LSB with a secret bit.
Step 5: Repeat Step 4 until and unless all secret bits are encoded in the I-Plane pixels.
Step 6: Convert the HSI image into RGB color space using the formulae of section 3.1.3.
Step 7: Write the stego image.

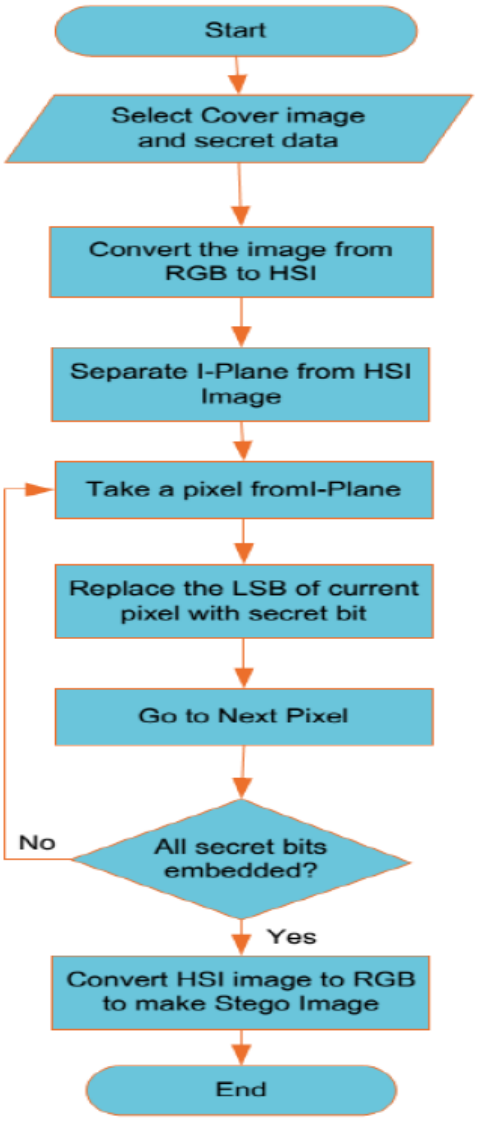

Figure 2: Embedding Algorithm Flowchart

CONCLUSION

A secure LSB technique for image steganography has been proposed in this paper using the concept of non-linear dynamic system (chaos). The chaotic system is highly sensitive to initial values and parameter of the system. The proposed algorithm provides added security to the base steganography technique. Application of separate chaotic sequence for encryption of each part of secret image provides an added security from attacks. The proposed technique uses host image files in spatial domain to hide the presence of sensitive information regardless its format. Performance analysis of the proposed technique after comparing with 3-3-2 LSB technique is quite encouraging. The proposed technique is applied to JPEG files; however it can work with any other formats. Further work includes adapting the free parameters of the logistic chaotic map using soft computing techniques as chaotic systems are highly sensitive to initial conditions.

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PEV BASED FILTER BANK FOR DIGITAL HEARING AID APPLICATION: PEVFB

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Abstract

Designing an electronic circuit with low power and small area are two important concerns for signal processing designers. Though fast emergence of the new technologies and several reviews over signal and speech processing, the difficulty cannot be fulfilled for the hearing impaired people. Many filter bank algorithms have been discussed on the hearing aid design to extend the efficiency. The conventional design of cascaded Direct Truncation (DT) data path is mainly based on the design of Full Precision Static Floating Point. In this paper, we introduce Static Floating Point Sample Rate Converter (SFP-SRC) with Linear Phase Finite Impulse Response (LPFIR) for hearing aid applications. The Sampling Rate Conversion is done before or after the LPFIR filter with upsampling and downsampling factors. In order to increase efficiency of DSP systems, filter bank algorithms need more than one sampling rate. The proposed method provides minimum delay and excellent Signal to Noise Ratio (SNR) performance when compared to Post Truncation (PT) data path. In order to obtain better performance, many experiments have been conducted. The proposed SFP-SRC is suitable for hearing assistance applications. Hence, it is implemented on 1/3 octave analysis filter bank with umc-90nm CMOS technology at 24 KHz.

Keywords : Finite Impulse Response, Filter bank algorithms, Digital hearing aid, DSP algorithms

I. Introduction

In recent years, novel techniques of Digital Signal Processing (DSP) algorithms like Noise reduction, Auditory Compensation, Sub-band calculation, Echo Cancellation, and Speech Enhancement are applied repetitively [XVI]. DSP

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algorithms are used for implementing hearing aid devices to enhance speech precision in availability of noise [XXI]. Auditory compensation provides the solutions to the person who are severely affected from the hearing illness. Figure.1 describes the block diagram of a typical hearing aid design [XIII].

Hearing aid includes a filter bank which has a several bands and at the output a compressor to balance the loss of audibility. Several low power algorithms are implemented such as Co-efficient Decimation, Frequency Response Masking and ANSI filter. For the hearing imparedpepope hearing thresholds normalyhighfor high frequency sounds is advanced when compared to the reference speechintensities. Hearing aid does the capability of enhancing the input sounds to equivalent audiogram values. For different frequency levels, sound inputs are adjusted at to achieve the exact sounds. Various algorithms have been discussed about Non-uniform, Uniform, Interpolated FIR, ANSI S1.11and Quasi 10 ms and Octave ([III], [VII], [XI], [XXVI], [XXVII], [XXIX] and [XVIII]) for digital hearing aids. Each design has its distinct architecture with corresponding merits and demerits. Variable filter banks are discussed in [XXIX], [XXVIII] and [XII]. The Frequency Response Masking (FRM) filter banks are described in [XXV] and [XVIII] for reducing the filter complexity and group delay.

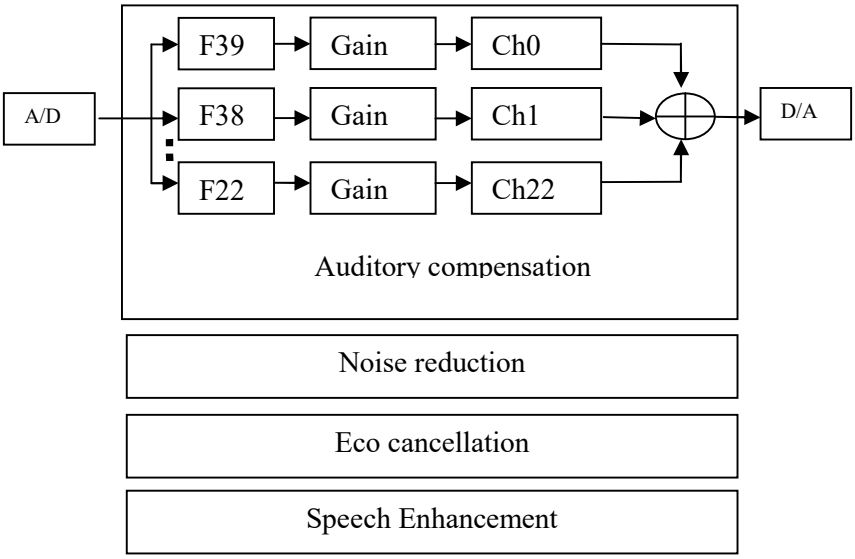

Fig 1. Block diagram of a Typical Hearing Aid [XIII]

Rapid increase of emergimg methods, more multifaceted algorithms may be incorporated in the hearing aid applications to enhance performances of the DSP circuits. Though the implementation of the DSP algorithms, to modify the complexity restricts signal processing algorithms. The fundamental blocks of filter are adder, multiplier, shifter and accumulator. Some of the DSP algorithms such as Fast Fourier Transform (FFT), Direct Cosine Transform (DCT) and the Data path of the DSP are

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used in manyapplicaations. The synthesis of high level and fixed point circuits verification for analyzing the range and precision are discussed in [I], [II], [XIV], [XV], [V] and [XIX]. In the Floating Point Arithmetic (FPA) design, high precision is implemented with a large dynamic range exponents and Mantissa. Hence the floating point arithmetic is helpful for the algorithms which are dealt with unsolvable issues due its high precision.

The parallel and cascaded data path are important in the filter design. The cascaded adder-multiplier-accumulator data path is used in Linear Phase FIR filter. The cascaded data path maintains comparable operations per cycle with limited access of hardware accordingly when compared to the parallel datapath. When compared to Post Truncation (PT) method or Full Precision (FP), Direct Truncation (DT) which is cascaded is expensive and Speedy. In a digital hearing aid must consume low power usage than processor with other applications. The complicated data path has a cycle dual Multiply and Accumulator (MAC) with 24-bit for reasonable accuracy Audio signal processing. The Static Floating Point arithmetic is used to provide optimal SQNR performance.

A High precision LPFIR filter is used in [XX]. It comprises of embedded shifter with one-bit, DT adder, 16-bit DT multiplier, shifter and accumulator. The two interval 1-bit shifters are used for better hardware utilization and parallel structure of the filter data path. This filter is implemented on 18-band quasi ANSI S1.11 1/3 octave analysis filter bank. The Silicon area is diminished to 8.3%. The rest of the paper is organized as follows. Section II discusses the PEV analysis. Section III provides the proposed SFP-SRC filter bank to digital hearing aids. Section IV discusses about the results. Section V concludes the paper.

II. Experimental Study

A compact DSP for multi core systems which is fully programmable is described in [VI]. It performs light weight arithmetic-static floating point Arithmetic. Various software techniques have been extensively discussed to deminish computation complexity in the algorithm and round off noise is encountered in the proposed design. A power efficient computing platform is proposed in [XXII] for hearing aids. It consists of four processing elements. Those elements have RISC processor with various power competent accelerators. Those hardwired accelerators include truncated multiplier and static floating point for improving the SNR and diminish the hardware difficulty. This method reduces the data path, area and improves SNR reasonably than Psot truncation method. In FPA, every data manipulation normalizes its value before obtaining the results. DSP designers generally choose the fixed point arithmetic. Though, this method does not suitable for the FIR filter due to its high attenuation parameter constraints. The stop band attenuation of ANSI filter bank (for Example) is 60 dB at least. Therefore the optimal design is a combination of the floating point arithmetic and integer arithmetic [XX].

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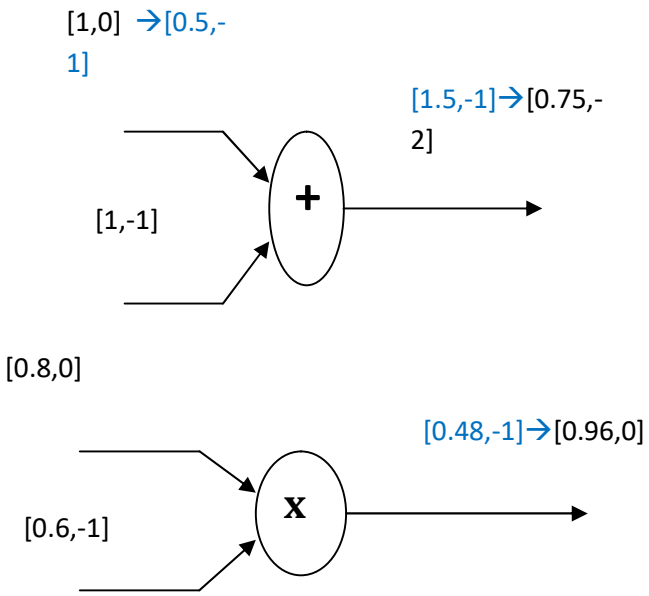

Fig 2. PEV Analysis (a)Addition and (b) Multiplication

The DSP algorithms are represented by Data Flow Graph (DFG), in VLSI signal Processing, nodes includes inputs & outputs, adders, multipliers and the data dependency occurs at in between nodes. In order to achieve high precision word length, the Satic floating point arithmetic is suitable [XX].

Peak Estimation Vector (PEV) [VI] : [M, r] of each node is evaluated in the DFG. M denotes the maximum value that cause change in the output and r is a radix point and a non-negative integer shown in Fig 2. (a) and (b).

M x 2-r = M/2 x 2-(r-1)

[M, r] = [M/2, r-1]

The PEV analysis of nodes in DFG is estimated by the following rules [VI]:

a. Addition rule:

'r' should be identical before performing the addition or subtraction operation and the equation becomes

[M1, r] + [M2, r] = [M1 + M2, r]; Add M1 and M2 by keeping r as such.

b. Multiplication rule:

The equation becomes,

[M1, r1] x [M2, r2] = [M1 x M2, r1 + r2]; Multiply M1 and M2 by adding r1 and r2.

c. Normalization rule:

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M associated with radix point 'r' should be sustained as a fractional value among 0.5 to 1. If the M is divided by 0.5 then the r is added with (-1). If the M is multiplied by 0.5 the n r is added with (+1).

In Fig2., the adder has input different M values and different r values. But in the PEV analysis the added output shuld be the r value. hence it is normalized with 0.5 to 1. The first input ([1,0]) of the adder is normalisedi.e M is multiplied by 0.5 and adding -1 with the r. The normalized values becomes [0.5, -1]. The output of the adder is also normalised by 0.5. In the multiplier, there is no need to normalize the input because the multiplier output is the added cmbination of r1 and r2. Hence, directly we can get the output by multiplying M1 and M2 and simply adding the r1 and r2.

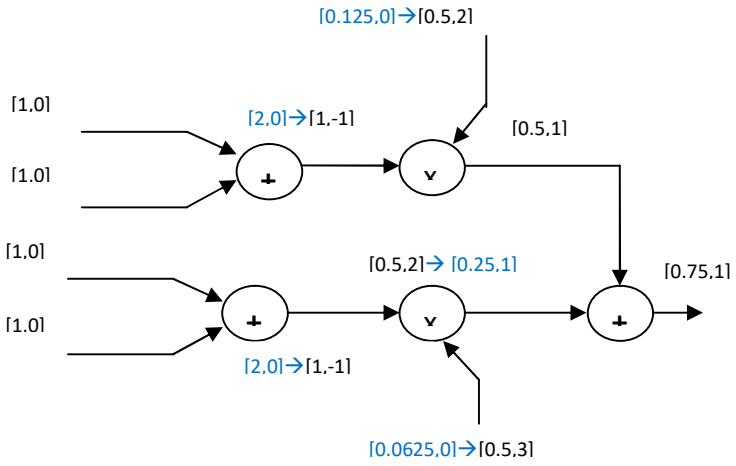

Fig 3. PEV Analysis for FIR Filter

The ouput of the multiplier is then normalized by 0.5. the final values are: [0.96,0]. Figure. 3 shows the PEV analysis of DFG of LPFIR filter. Assume that all input values are normalized to [1, 0]. Two co-efficient values h1 and h2 are considered as 0.125 and 0.0625 respectively. Initially, the coefficients are normalized as [0.5, 2] and [0.5, 3] by normalized rule. After the computation of addition node by its addition rule, the output values are normalized. Hence, [2, 0] is normalized as [1, -1]; Then using multiplication rule, the multiplication values are evaluated as [0.5, 1] and [0.5, 2]. The multiplication output [0.5, 2] is normalized to [0.25, 1]. Finally, the values [0.5, 1] and [0.25, 1] are added and hence the filter output is calculated by PEV analysis. This proposed method provides more effective bits which are stored instead of zeros in the limited word length. This shows that the coefficient value of SFP has better accuracy than fixed point arithmetic. Fig 3. shows the Direct Truncation data path for 16-bit LPFIR filter. It includes two adders and one multiplier for the data path. After applying the PEV analysis the output becomes same for all the nodes of operation.

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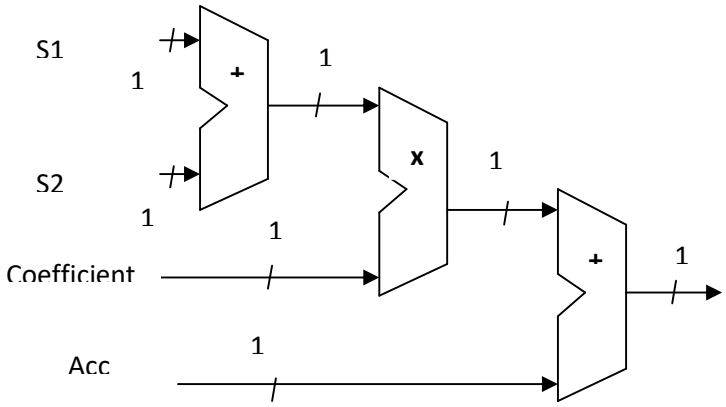

Fig 4. 16-bit Direct Truncation Data path

III. Proposed PEB Based Filter Bank

In DSP algorithms,several sub-blocks with individual sample clock rates are necessary for interfacing each block together. Sampling rate coverters are utilized in many applications such as digital audio resampling, biomedical applications, CORDIC, Software Defined Radio, etc. If the design needs m operations per cycle,then the reduction of sample rate with respect to the input signal by a factor X.

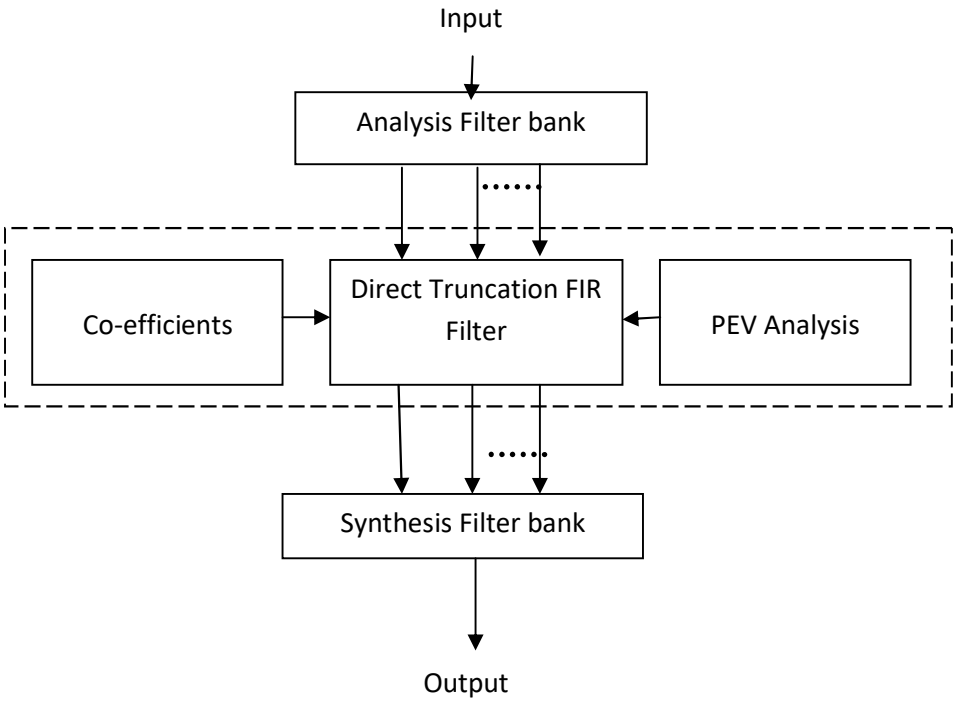

Fig 5. Block Diagram of Proposed PEVFB

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The arithmetic bandwidth is reduced from its mf_s to mf_s /X operations per second. However, the sample rate converter is obtained when resampling a signal at a lower rate, in order to permit the signal to pass through a channel with limited bandwidth. Sample rate converter is connected to the LPFIR filter to improve the efficiency and consume less power consumption. This SFP-SRC filter bank is suitable for hearing aid applications. The input and output of the LPFIR filter are connected with sample rate converter. The block diagram for the SFP-SRC is shown in Fig4.

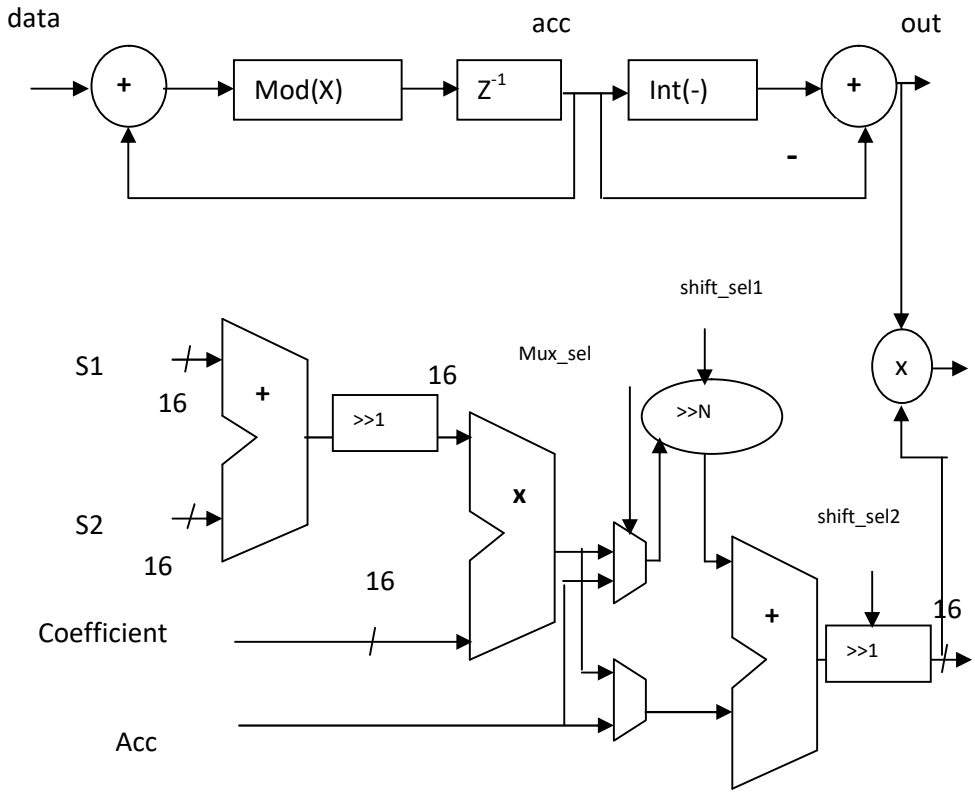

Fig 6. Proposed FIR Filter with DT

In the proposed filter design three shifters such as two one bit shifters for normalization and one N-bit shifter are inserted by the application of PEV analysis into filter deign. Along with the two adders and one multiplier, two (2:1) multiplexers are also used for the selection of the accumulator values. Multiplexer selects the input according to input select Mux_sel. S_1, S_2 are two operands of the filter. The value of the accumulator is denoted as acc. Coefficient represents filter coefficients which are predefined. The sample rate Converter produces the output value according to the input sample frequency f_{sinput} and output sample frequency $f_{soutput}$. The ratio is estimated using the formula $f_{sinput}/ f_{soutput}$. Then the output value is multiplied by the

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every output of the LPFIR filter design. Then, the next output of the filter is divided by factor X then multiplied by the sample rate converter. Hence, the sample rate is reduced by half and the number of computation is also decreased due to sample rate converter. to noise ratio. The SFP-SRC technique is less complex when compared to traditional techniques. PEV analysis provides more effective bits which are stored instead of zeros in the limited word length. The sample rate is minimized using sample rate converter. The structure is designed in the MATLB tool and it is implemented in Vertex 5. The results are compared with other filter bank methods. Comparison Table. 2 shows that this proposed method is well suitable for hearing aid applications.

IV. Implementation Results

The results are implemented in the Matlab Simulink Tool and the outputs are verified in the Xilinx ISE 14.1. Table. 1 states that the proposed filter bank provides better results compared to the other filter banks. By observing the results, the area an be reduced 12% in proposed method when compared to direct truncation method. The proposed method achieved 5% of less power than direct truncation. Signal to noise ratio also provides better results by using the proposed method. Table. 2 shows performance comparison with different arithmetic. F1, F2 and F3 are the filters of ANSI filter bank. The SNR performance of the 16 bit Floating point integer data path, only the SNR performance of filters F1,F2 and F3 was best. However, worst performance in the gate count and the energy. The proposed filter bank provides better SNR performace and energy. The simulation and implementation results validate the achievement of the proposed minimum area, delay and high-precision 16-bit direct truncation SFP A–M–S–Accdatapath. Fig 5. shows the performance comparison of various filters with the proposed filter. Fig 6. shows the simulation results of 16-bit linear phase FIR Filter with PEV Analysis.

V. Conclusion

An efficient architecture Static Floating Point Sample Rate Converter (SFP-SRC) with Linear Phase Finite Impulse Response (LPFIR) for audio and speech signal processing is proposed in this paper. The basic idea behind the design of filter bank to reduce the complexity and low power consumption. This paper provides better performance in signal. This technique evaluates many combinations by conducting many experiments which results in better performance. From the results, it shows that 12% reduction in area and 5% power savings compared to the traditional methods. The proposed PEVF is suitable for hearing assistance applications. Hence, it is implemented on 1/3 octave analysis filter bank with umc-90nm CMOS technology at 24 KHz. In this paper, various filter bank techniques are reviewed based on the following aspects: Algorithms used for design, Number of sub-

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bands,Various Performance metrics such as area, power, delay and noise, Simulation tools used to implement the filter bank design.

Table 1.LPFIR Data path

ANSI S1.11	**SNR (dB)**	**Area (Gate Count)**	**Power (µW)**
Parallel Integer Arithmetic	0	39267	142.234
Direct Truncation, LPFIR	-1.2	34218	86.571
Direct Truncation SFP-SRC (Proposed)	**-2.6**	**32611**	**82.323**

Table. 2 Performance Comparison with Different Arithmetic (implemented in Quasi ANSI S1.11 Filter bank)

Performance	**Delay (ns)**	**Area (gate count in %)**	**SNR (dB)**			**Energy**		
			F1	**F2**	**F3**	**F1**	**F2**	**F3**
Floating Point, A-M-Acc with integer arithmetic	11.7	77.1	28.1	34.2	35.4	74.0	79.8	79.6
Post Truncation, A-M-Acc, with integer arithmetic	13.9	57.4	15.9	16.3	16.9	48.1	52.3	52.6
Direct Truncation, A-M-Acc, with integer arithmetic	52.7	11.1	13.9	18.2	19.8	25.2	32.9	33.9
Direct Truncation, A-M-Acc, with SFP arithmetic with SRC	**58.5**	**13.2**	**12.1**	**15.1**	**17.2**	**17.2**	**29.7**	**41.3**

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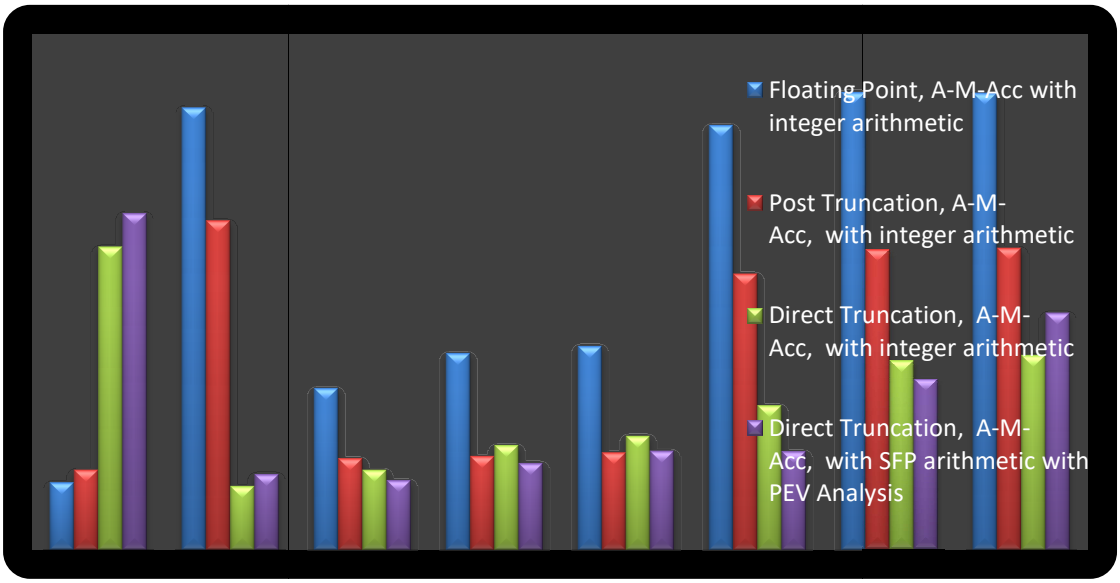

Fig 7.Performance Comparison with Different Arithmetic

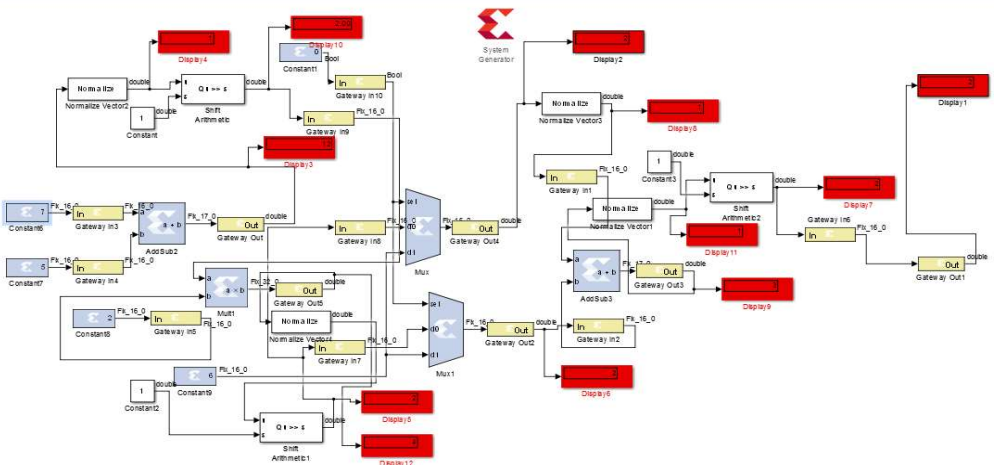

Fig 8. Simulation Results of 16-Bit Linear Phase FIR Filter with PEV Analysis

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DESIGN SLM OF PAPR REDUCTION TECHNIQUES OF OFDM SYSTEM

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Abstract - Due to multiple application of OFDM signal like military HF radio links, BRAN, DAB and DVB-T and there was need to change from analogy domain data sending to digital domain data sending, also changing of single carrier to multiple sub carriers' data transmission. Orthogonal frequency division multiplexing (OFDM) plays tremendous advantages including channel conversion due it orthogonality of the sub carriers, special efficiency and robustness against ISI and ICI. One worst disadvantage of OFDM is high PAPR at the transmitter which reduces the peak power for transmission. OFDM consist of large number of independent subcarriers, as a result of which the amplitude of such a signal can have high peak values. The Selected Mapping (SLM) technique is one of the promising PAPR reduction techniques for OFDM. This technique however increases the computational and phase search complexity and PAPR reduction performance is largely dependent on the selection of random phase sequences. In this paper, a new SLM method which rotates the phase of input data after IFFT by using matrices generated from complex Hadamard code is proposed. After phase rotation, clipping technique is used to further reduce the PAPR. From simulation results, we can find that the proposed method has lower PAPR than conventional SLM combined with clipping technique.

1. INTRODUCTION

OWING to the high spectral efficiency and the immunity to multipath channels, orthogonal frequency-division multiplexing (OFDM) is a promising technique for high rate data transmission [1], [2]. This transmission technique has been adopted for a number of applications, such as the standard for digital radio audio broadcasting (DAB), the standard for digital video broadcasting (DVB), the standard for asymmetric digital subscriber line (ADSL) service over twisted-pair phone lines , and the IEEE 802.11a standard for wireless local area networks.

One major disadvantage associated with an OFDM system is the high peak-to-average power ratio (PAPR) of the transmitters output signal, where the range of PAPR is proportional to the number of subcarriers used in the system. Due to the high PAPR feature, an OFDM signal may suffer from significant intermodulation distortion and undesired out-of-band radiation [3], when it is passed through a nonlinear device, such as a transmit power amplifier.

The conventional solution to the PAPR problem is to back-off the operating point of the nonlinear power amplifier. Although simple, this approach usually causes a significant power efficiency penalty.

ORTHOGONAL Division Multiplexing (OFDM) is a technique widely used in many digital communication systems such as digital broadcastings, WLANs and 4G Mobile communication. Due to its resilience to multi path fading and high spectral efficiency it provides high and better bit rate. It also accommodate large number of sub carriers subjected to orthogonality as when compared to conventional Frequency Division Multiplexing. It utilizes multiple carriers that are modulated simultaneously. Though they overlap, owing to the orthogonality of sub-carriers they can be demodulated using correct time windowing at the receiver. OFDM is very effective against inter symbol interference and frequency selective fading providing high spectral efficiency Conventional modulation schemes such as Quadrature Amplitude Modulation (QAM) and Phase shift keying at low symbol rates are used to modulate each sub carrier. Data rates in accordance with the conventional single carrier modulation schemes in the same bandwidth are maintained. The major drawback of this system which reduces its efficiency is the distortion of the signal caused at the High Power Amplifier (HPA) of a transmitter called as Peak-to-Average-Ratio (PAPR). PAPR causes performance degradation. HPA non-linearity causes in band distortion giving rise to high BER, leading to inter channel interference.

Orthogonal frequency division multiplexing (OFDM) is the key technology which is employed in 4G wireless communication systems such as Long Term Evolution (LTE), worldwide interoperperbility for microwave access (WiMAX) and Long Term Evolution Advanced (LTE-A) . OFDM are forms of multicarrier transmission for broadband wireless communication systems i.e. it has a large bandwidth up to about 20MHz. The background behind OFDM is that it divides the frequency spectrum into subcarriers and the subcarriers are made mutually independently orthogonal to each other to avoid interference. The data in each subcarrier are transforming from serial to parallel channel for

simultaneous transmission in different channel. The Inverse fast Fourier transform (IFFT) is used to produce orthogonal data subcarriers where the input data samples are modulated either by (e.g. QAM or PSK) and after they are jointly correlated. The FFT transform the cyclic prefix time domain signal to it equivalent frequency spectrum. OFDM has significant challenge due to symbol time been less than the delay spread leading to InterSymbol interference (ISI) which is overcome by cyclic prefix or guard band concept.

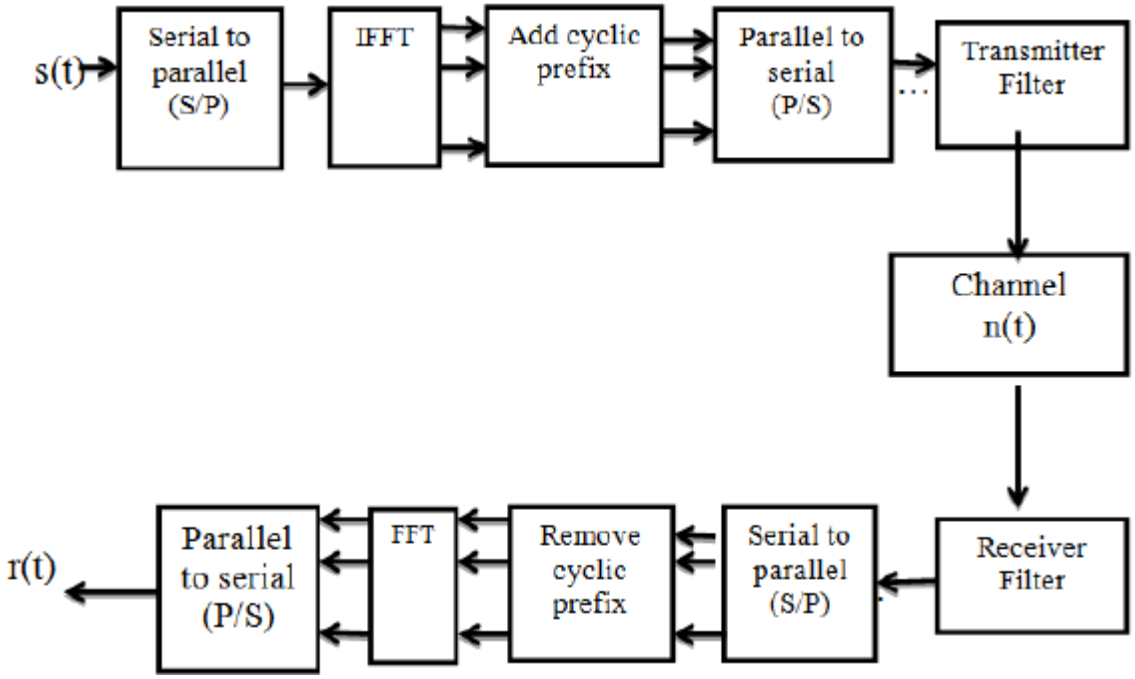

Fig -1: Block diagram of OFDM system

2. PEAK TO AVERAGE POWER RATIO (PAPR) FOR OFDM SIGNAL:

In OFDM system, the main drawback is high peak to average power ratio (PAPR).The high PAPR is significantly caused due IFFT operation where data symbols across subcarrier add up to produce high peak power value. This causes the signal amplifiers to operate into the nonlinear region leading to in band distortion and out of band radiation. The in-band distortion degrades system performances and out of band radiation causes the adjacent channel interference (ACI) due to neighbor band effect and degradation of bit error rate (BER) performance.

The peak to average power ratio (PAPR) of a continuous time signal is given by

$$PAPR = \frac{P_{Peak}}{P_{Average}} = \frac{max\ |x(t)\ |^2}{E\ |x(t)\ |^2}$$

Reduction Technique

Several techniques approaches have been proposed and implemented to reduce PAPR problem into different categories i.e. distortion and without distortion.

Distortion method includes clipping and companding whereas distortionless methods also include clipping and filtering, selective mapping, partial transmit sequence, tone injection etc.

In this section, we mainly discuss two typical techniques such as Selective Mapping and Amplitude clipping and filtering for PAPR reduction in OFDM systems.

A. Amplitude Clipping and Filtering

Amplitude clipping is one of the simplest reduction techniques for PAPR. Amplitude Clipping reduces the peak level of the input signal to a predetermined value. According to S. H. Han and J. H. Lee [1] the basic idea of this technique is to clip the parts of the signals that have high peak outside of the allowed region. The following equation below shows the amplitude clipping.

$$Y(t)=\begin{cases} -L & if\ x(t) < -L \\ x(t) & if\ -L \le x(t) \le L \\ L & if\ x(t) > L \end{cases}$$

B. Selective Mapping Technique (SLM):

The propose method for the reduction of peak to average transmit power of multicarrier modulation systems with selected mapping in 2013[7]. In selected mapping (SLM) the whole set of information symbol are loaded into the subcarrier and turn in serial and parallel after, the data block are form and then the most favorable signal with less PAPR is chosen and transmitted. The basic idea of this technique is based on the phase rotation sequence. The lowest PAPR signal shall be selected for transmission from a number of different data blocks independently.

3. PROPOSED METHOD

The common SLM method multiplies several phase rotation sequences in front of each IFFT block. This phase rotation process can be moved to back of IFFT block like as Fig. 2.Then clipping technique is carried out for further PAPR reduction.

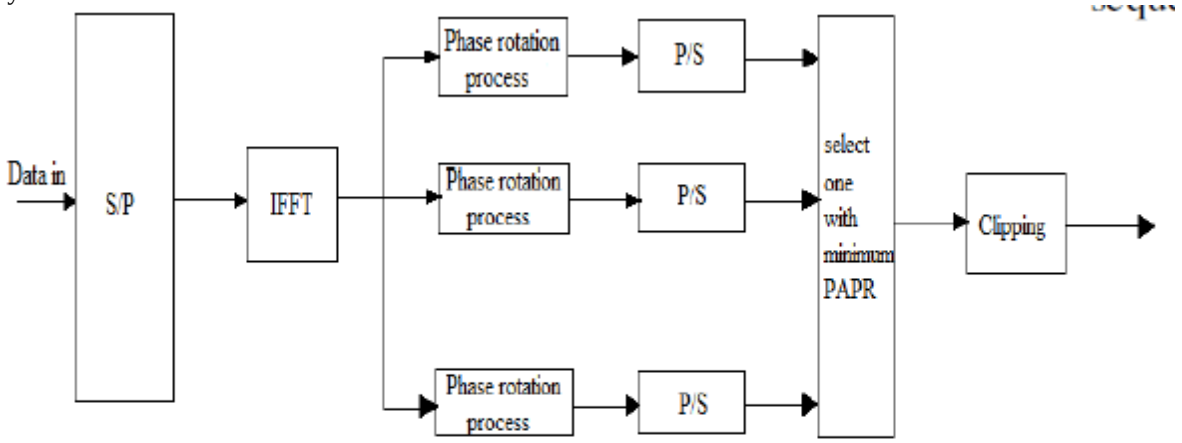

Figure 2. Proposed system.

MODIFIED SLM

The phase rotation process are different matrices generated from rows of complex hadamard matrix. They are multiplied as shown below. If we assume no over-sampling, N point DFT can be expressed like as follow matrix Q.

$$Q=\begin{bmatrix} 1 & 1 & \cdots & 1 \\ 1 & W^{1} & \cdots & W^{N-1} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & W^{N-1} & \cdots & W^{(N-1)(N-1)} \end{bmatrix}$$

The phase rotation process are different matrices generated from rows of complex hadamard matrix. They are multiplied using alternate rows of 8 point complex hadamard matrix generated using[18].Each element in a row becomes a non-zero element in the matrix B. The matrix generation is given in[14].Complex hadamard matrix are used to reduce the correlation between various OFDM symbols and thus reduce PAPR much better than using random phase sequences. This is shown in figure 3.

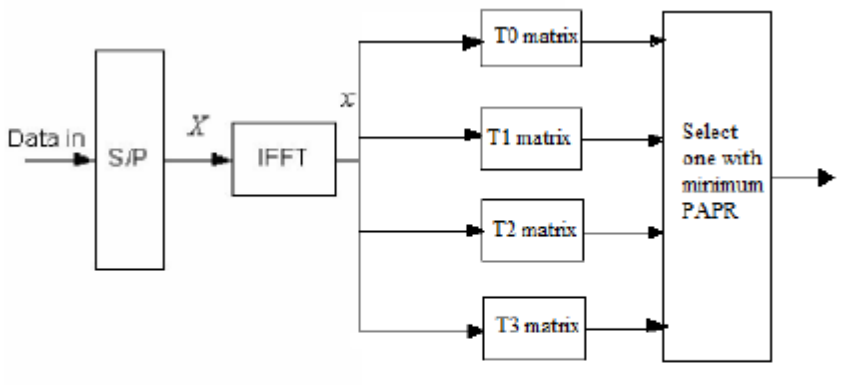

Figure 3. Modified SLM using 4 copy branches

4. PERFORMANCE ANALYSIS

In this paper, Matlab simulations are used to evaluate the peak to average power ratio reduction capability and bit error rate of the proposed method. The channel is corrupted by an additive white Gaussian noise(AWGN). In simulation an OFDM system is considered with N = 8, where N is the number of OFDM subcarriers and QPSK modulation is used for encoding the information. We have used a threshold value of 0.2 for clipping.

We can evaluate the performance of the proposed scheme using CCDF plots, which helps to measure the probability that PAPR of a certain block exceeds the given threshold. From fig. 4, it shows that PAPR of the OFDM has reduced considerably by the proposed method. We can see that with a probability of 10-2 , the PAPR of the original signal is more than 9dB, while that of conventional SLM is 7 dB, SLM technique combined with clipping is 6.8dB and the proposed

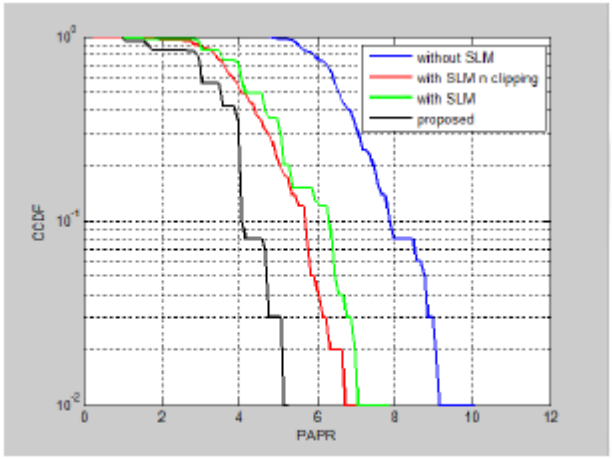

Figure 4. OFDM system using selective mapping method.

The BER curve of OFDM system and proposed scheme is also plotted. The proposed scheme maintains BER performance close to the conventional OFDM system. At the same time it serves an important role to reduce the PAPR considerably.

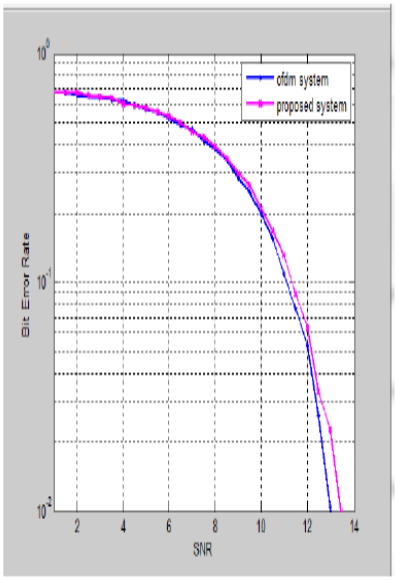

Figure 5. BER of the proposed technique for QPSK modulation ,N=8

CONCLUSION

In this paper, a new SLM method using complex Hadamard code is combined with clipping to reduce the PAPR in

OFDM. Because the SLM method can rotate the phase of input data after the IFFT process by transforming a Complex Hadamard code into several simple matrices, the computational complexity is highly reduced. The proposed method can reduce the PAPR more than the conventional SLM method combined with clipping technique and also got an affordable BER performance. scheme has a PAPR of 5.1dB.The CCDF curve has nearly 3.9 dB improvement for the proposed system.

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A Relative Analysis On Image Deblurring Techniques

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Abstract:**Blur can be defined as undesirable transitions that occur in the original image due to various factors like the motion of the patient, atmospheric turbulence,out-of-focus camera. To retrieve the original image, we adopt algorithms in deblurring which attempts to decrease blur and acquire crystal clear image. The point spread function typically determined by the imaging systems, the entire image can be described by knowing the optical properties of the system. The process is usually formulated by a convolution equation in this proposed method. Hence it is one of the vital factors that required to be calculated. In this research work an approximate study of different image deblurring techniques is carried out and performed several experiments to evaluate these techniques in terms of performance, blur type, Peak Signal to Noise Ratio, and structural similarity (SSIM).**

Keywords:**Intrusion Detection · Point Spread Function (PSF), Image deblurring techniques, image restoration, degradation, blur**

I. INTRODUCTION

Image restoration relates to the restoration of a long-established image from degraded observations [1]. The reason for image restoration is to undo the defects which degrade an image. In situations like motion blur, it is possible to come up with a very good estimation of the accurate blurring operation and undo the blur to get the vogue image [2]. In case if the image is corrupted by noise, the best way to do is to catch up on the degradation it effected with. The work-focused here is the Gaussian blur. The purpose is to deblur the resulted degraded images by different fast deblurring techniques, such as the optimized Richardson-Lucy, the enhanced Van Cittert, the optimized Landweber, the optimized Poisson Map, and Laplacian sharpening filters. The degradation process can be observed with the following system.

The degradation process can be modelled as a degradation function h(x.y) that,together with an additive white gaussian noise from η (x,y) operates in an input image f(x,y) to produce a degraded image g(x,y).

$$g(x,y) = h(x,y) * f(x,y) + \eta(x,y) \quad (1)$$

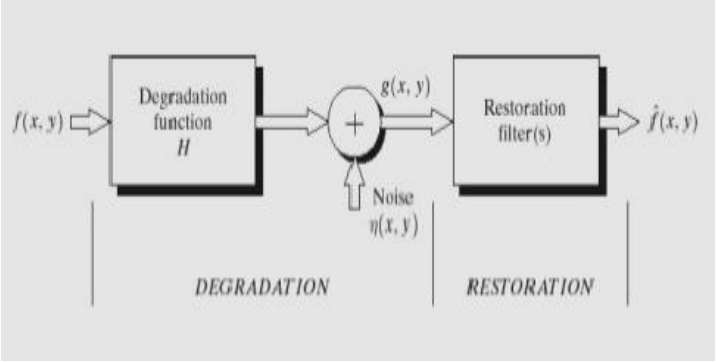

Figure 1: Degradation Model

II. BACKGROUND WORKS

Types of blur:

1). Average Blur: There are several tools used to remove noise and specks in an image. Average blur is used when noise is present over the entire image. This type of blurring can be distributed in the horizontal and vertical direction and can be circular averaging by radius R which is given below

$$R = \sqrt{g^2 + f^2} \quad (2)$$

Where '*R*' is the radius size of the circular average blurring,'*g*' is blurring in horizontal direction and '*f* ' is blurring in vertical direction.

2). Motion Blur: There are many types of motion blur. It is a device referred to between the device which is being recorded and the image. These variations can be carried over, circular movements, translations, conversions of scale, or sometimes it may be in the form of altogether. It is a filter that adds blur in a particular direction depending on the software used, [1] the movement can be controlled by angle or direction (0 to 360 degrees or (–90 to +90) and/or by spacing or intensity in pixels (0 to 999).

3).Gaussian Blur: In graphics software, this effect is mostly under-appreciation. It is used to reduce image noise. It is also appreciated in the preprocessing stage in computer-based algorithms to improve the image structure and fabricate the image at a different version of scales. The idea of Gaussian smoothing is to use this 2-D distribution as a point-spread function, and this is achieved by convolution.[5]

4). Out-of-focus Blur: When a camera images a 3-D scene onto a 2-D imaging plane, some regions of the scene are in focus and the remaining regions are out of focus. The perforation of the camera being circular the image at any point source is a small disk known as the circle of confusion whose diameter depends on the focal length, aperture, number of the lens, the distance between camera and object. Nowadays medical images are on high demand, but they are facing the problem of Gaussian and noisy blur. To overcome this, Meen Lee et al. [5] explained the research on deblurring of images based on the appraisal of PSF parameters and post-processing. The length and angle of the blur kernel are the two parameters of PSF. The deblurring interpretation is inclined by the accuracy of the estimation of the two parameters. The proposed method of PSF parameter estimation and reconstructing the image using the post-processing method.

Surveys on different image deblurring techniques were proposed by Vankawala, Ganatra, and Patel [6] about the reason for blurring on images. It may be motion blur, out-of-focus blur, camera shake, etc. Image enhancement is the other name of image deblurring which is used to decrease the amount of blur in an image. This technique is predominantly used to reduce the blur amount and convert the degraded performance of the image and it is very important to accelerate the effect of deblurring to get a good outcome. The study of image restoration techniques and research is concluded by Maheshwari [7]. But during transmission and acquisition, the Image restoration is generally used for improving the blurry image by removing the artifacts in it. The basic idea of the image restoration technique and various deblurring techniques were proposed by the author. In the field of image processing world and research, image restoration plays a vital role. It is widely used in various applications such as medical imaging. Daniel Fan and Nagy [8] explained the paper on Synthetic boundary conditions for image deblurring. the author concluded that while reconstructing a new observed image from the blurred and noisy image a boundary condition is used. Information from the new image that boundary conditions continue on edges and texture across the boundary is used in this approach. For implementing the new boundary condition an effective algorithm is used.Z. Reti [9] analyzed the topic which is based on deblurring ages blurred using discrete Gaussian. Gaussian blur is used for image degradation. The main motto is to deblur the image using discrete Gaussian. Hypergeometric series is used for this purpose a modified Gaussian blur is used. A recap of the research literature has given the parameter of various techniques. A derivative model to recover a sharp version of the image from a degraded image is presented.

Wiener filter: The Wiener filter reduces the amount of noise in an image. The inverse filtering is a restoration technique for deconvolution, i.e. when the image is blurred by a known low-pass filter, it is possible to recover the image by inverse filtering or generalized inverse filtering. However, the inverse filtering is very sensitive to additive noise. The approach of reducing one degradation at a time allows us to develop a restoration algorithm for each type of degradation and simply combine them. The Wiener filtering executes an optimal tradeoff between inverse filtering and noise smoothing. It removes the additive noise and inverts the blurring simultaneously. The Wiener filter is the Minimum Square Error optimal stationary linear filter for images degraded by additive noise and blurring. Some of the techniques where Let the case is the model described in equation (3).

$$b(x,y) = h(x,y) * s(x,y) + s(x,y) \quad (3)$$

b(x,y) is the observed blurred image, h(x,y) is the known impulse response of a linear scale-invariant system, s(x,y) is known sharp image and n(x,y) is some unknown additive noise independent of s(x, y).The Wiener deconvolution filter calculates g(x,y) and it is used to estimate s(x,y), as expressed in equation (4).

$$\hat{s}(x,y) = g(x,y) * b(x,y) \quad (4)$$

$\hat{s}(x,y)$ is an estimate of *s(x,y)* that minimizes themean square error. The weiner filter works in the frequency domain.The calculation of frequency domain version of *g(x,y)*, as expressed in equation.5.

$$G(u,v) = \frac{H(u,v)W(u,v)}{|H(u,v)|^2 W(u,v) + N(u,v)} \quad (5)$$

Where H(u,v) is the Fourier transform of h(x,y) , G(u, v) is the Fourier transform of g(x,y),W(u, v) is the mean power spectral density of s(x,y), N(u, v) is the mean power spectral densityof the noise n(x,y).

$$\hat{s}(u,v) = G(u,v) * B(u,v) \quad (6)$$

$\hat{s}$(u,v) is the Fourier transform of the estimated sharp image and B(u,v) is the Fourier transform of the observed blurred image.On an image If the three pixels in a line contain information from the same point, the digital image will seem to have been convolved with a three-point box car in the time domain. The requirements of wiener filter are as follows:

(i) The filter must be causal where this requirement is failed it resulting in a non-causal solution.

(ii) Periodic noise can be effectively removed by correcting the amplitude spectrum components altered by the noise.

However, a Wiener filter requires an accurate noise model, which may be difficult to obtain in various practical cases. In addition , a Wiener filter is also complicated in comutation.

Richardson-lucydeconvolution approach: The Richardson–Lucyde convolution or lucy-Richardson algorithm was developed by William Richardson and Leon Lucy. It is an iterative process used to recover the latent image that has been blurred by a known point spread function (PSF).In this strategy, pixels in the blurred image is represented in terms of the point spread function and sharp image. Some of the investigations based on the Lucy-Richardson algorithm can be found in [10-15]. Let X*j* is the pixel value at location *j* in the latent image, *Kij* is the point spread function (the portion of the light that comes from true location *j* that is observed at another location *i*), and bi is the observed value at pixel location *i*. The pixels in the observed image are represented in terms of the point spread function and the latent image as expressed in equation 7.

$$b_i = \sum_j K_{ij} x_j \quad (7)$$

The model assumes that x_j values are Poisson distributed.The model calculates the given x_j given the observed $b_i$andknown PSF K_{ij}. Also the model finds a recursive formula to estimate x9 as expressed in equation .8

$$x_j^{(t+1)} = x_j^{(t)} \sum_j \frac{b_i}{c_i} K_{ij} \quad (8)$$

$$c_i = \sum_j K_{ij} x(t)_j \quad (9)$$

Experimental outcome showed that the iteration converges tothe most liability solution of x_j.

III. METHOD AND MATERIALS

The image blur can be modelled by a sharp image convolving with a kernel K.

$$B = K \otimes I + n \quad (10)$$

Where *B*, *I* and *n* represent the input blurred image, noise and latent image respectively. The $\otimes$ denotes convolution operator and the deblurring problem in image are thus represented as deconvolution problem [13].Deblurring is a mixture of two sub-problems: Non-blind image deconvolution and Pointspread function (PSF)estimation. Sparse dictionary learning is a learning method of finding as parser presentation f input data in the form of a linear combination of basic elements. These elements compose a dictionary. Atoms in the dictionary need not be orthogonal[10]and the dictionary has to be inferred from the input data. By using the signal processing, the sparse dictionary learning method can be stimulated o represent the input data using as few possible components.

A. Dictionary Learning

The dictionary is usually used for Sparse representation or Approximation of signals. A dictionary is a collection of atoms, where the atoms are real column vectors of length N. A finite dictionary of K atoms can be represented as a matrix D of size NXK. Learning the dictionary adaptively from the adaptive image is the best way to choose. The algorithm below estimates the sparse coefficients of the given input blurred image.

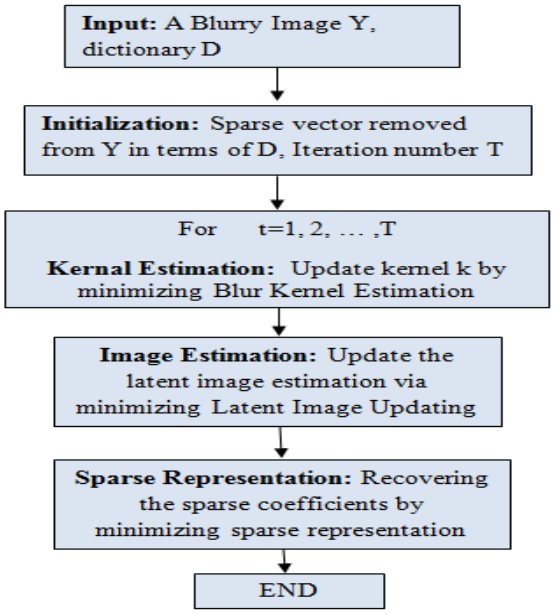

Figure 2: Methodology of Algorithm

Algorithm 1

• **Step1:** Get the blurred input image B

•**Step2:** Spilt the B into four patches asp1,p2,p3,p4.

•**Step3:** Consider first image patch p1 and find the sparse coefficient to fix K using Gaussian kernel and D as identity matrix.

$$\alpha(n+1) = argmin\|\alpha\|1 \quad (11)$$

$$s.t.\ b = (K(n) \otimes D(n))\alpha \quad (12)$$

• **Step4:** For each iteration the α value should be updated into D

• **Step5**: Take N iterations to estimating the α(n+1).

•**Step6:** Repeat the above 5 steps to all image patches and estimate the α(n+1).

B. Updating Dictionary

With the knowledge of previous algorithm using the sprase coefficient to update the dictionary of the image.

Algorithm 2

• **Step 1**: To update the dictionary, deconvolve blurred image with kernel up to last iteration using any deconvolution algorithm and get Ip.

• **Step 2**: Ip image is split into four patches.

• **Step 3**: Update the dictionary using α(n+1) and D.D(n+1) = min||Ip −D(n)α(n+1)||22. (4)

• **Step 4:** Repeat the steps 1 to 3 to all image patches and estimating the D(n+1).

C. Recovering Deblur Image

Consider antecedent algorithm to estimate the deblur kernel of the image and finally recover the deblur image.

Algorithm 3

• **Step 1:** Find the latent image patch using $Ip(n+1) = D(n+1)\ \alpha(n+1)$ (13)

• **Step 2:** Merge all the image patches of Ip.

• **Step 3**: The reconstructed image is subtracted from the blurred input image to obtain the deblur kernel.

•**Step 4**: Perform the deconvolution with the input blurred image and Deblur kernel using wiener deconvolution and Richardson-lucy deconvolution method.

•**Step 5:** Apply the regularization filter to the wiener deconvolution image and Richardson-lucy deconvolution to recover the original image.After that the RMSE, PSNR, SSIM and visual perception were analyzed for various images.

IV. RESULTS AND DISCUSSION

MATLAB R2013a (8.1.0.604)is used to simulate the deblur algorithm. The power to signal noise ratio, root mean square error, structural similarity index metric, and visual perception were analyzed for various images. It is noticed from the analysis that the deblurring was efficiently performed.experiments with blurred images by randomly generated kernel were carried out. The existing deblurring algorithms normally developed to deal with motion blur problems in which the kernels are oriented. As the camera shakes are complicated and cannot be designed well with simple blur kernels. This algorithm can recapture the latent image with more details and better contrast. The quality of the sharp image is measured to evaluate the effectiveness of different image deburring techniques. Subjective measures and objective measures are two types of measures that can be used to estimate quality. User's perception without calculating a numeric quantity through an explicit formula can be measured using subjective measures. This type of measurement is more precise because it is directly trying to accommodate different user requirements.The objective measure uses an explicit formula to calculate a numeric quantity. In the evaluation of image deblurring techniques two types of objective metrics are used, Peak Signal-to-Noise Ratio (PSNR) and Structural Similarity (SSIM). PSNR is used to measure the quality of

an image in dB (decibels). PSNR between the deblurred image and the original image measures how far the two images are equal.

$$MSE = \frac{1}{MN} \sum_{i=0}^{M-1} \sum_{j=0}^{N-1} [I_{ij} - X_{ij}]^2 \quad (14)$$

$$PSNR = 10log_{10}\left(\frac{MAX^2}{MSE}\right) \quad (15)$$

Where M is the number of rows,N is the number of columns I is the original image, X is the deblurred image, and MAX is the maximum possible intensity of the image.

Expt 1: Uniform motion blur with noise: After simulating motion blur with the blur parameters deblurring is carried out using the proposed *Sparse* method, Wiener filter, Richardson Lucy (RL) algorithm, and algorithm of Shan et. al [14]. PSNR and SSIM results reported in Table.1 for σn= 0.5 indicates how the Sparse method is superior over other methods.

Expt 2: Non-uniform blur with noise: In case of non-uniform blur removal with noise added, auspicious results are obtained, as the non-uniform kernels depict the camera shake effect, which is wearisome to remove from the single blurred image even after known the blur kernels. So this experiment is of particular interest. different non-uniform blur kernels are collected from the dataset of Levin et al. [10] which is created with the actual camera setup. In this work different deblurring techniques are compared. The following methods are tabulated after the comparison.

Table1. Comparison table of different techniques

Methods Used	Types ofBlur	Performance	PSNRValue
Wiener filter	Gaussian	Worst Result	17.06
Lucy Richardson	Gaussian	Efficient	21.02
Blind ImageDeconvolution	Motion	Efficient	26.76
Using MDF	Motion	Efficient	24.30
Using HandlingOutliers	Gaussian	Efficient	21.91
Using ASDSAR	Gaussian	VeryEfficient	31.20
Proposed	GaussianOut-offocus	VeryEfficient	38.56

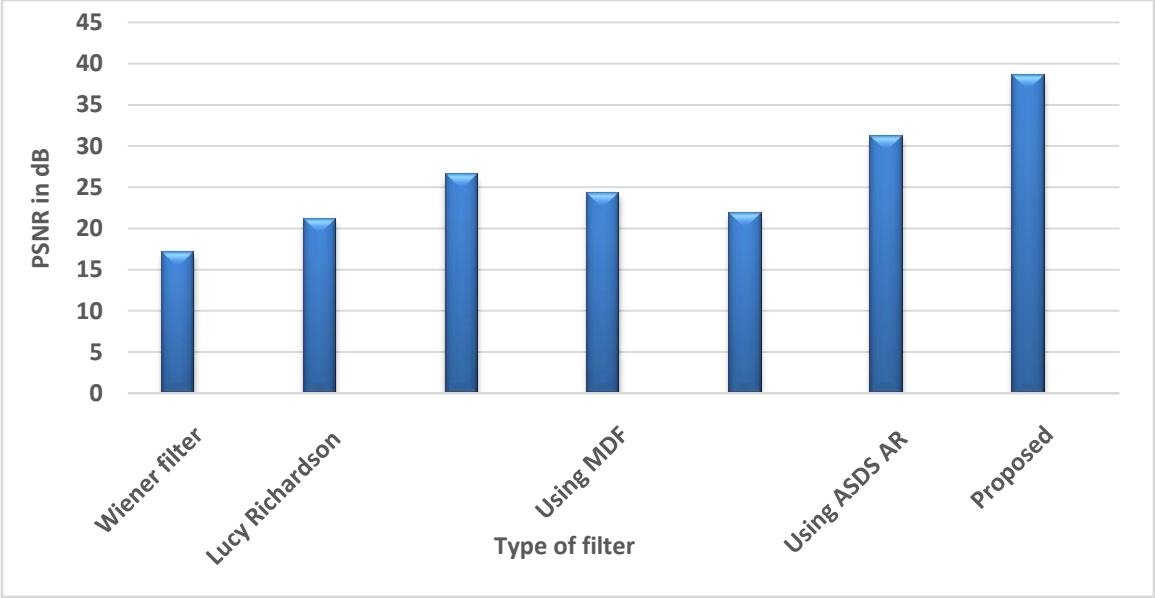

Figure 3:Comparisionof PSNR for different filtering techniques

V. CONCLUSION

The proposed method uses a simulation of an effective deblurring algorithm with dictionary learning using one single image. The technique proposed is capable to estimate blur kernels and thereby deblurred images by disintegrating the deconvolution problem into three portions deblurring and learning a sparse dictionary from the image. Experimental outcomes show that this algorithm achieves appreciative performance in terms of PSNR and SSIM results.

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A Novel Low Power Optimizing Chien Search Usage in the BCH Decoder

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Abstract:
In this a new power-saving chien search (CS) structure is proposed for parallel Bose-Chaudhuri-Hocquenghem (BCH) decoder .The CS plays an important role in identifying the areas of error in syndrome-based decoding, but incurs a huge waste of exhaustive computation power consumption. In this proposed architecture, the process of searching for the binary representation of the matrix is decomposed in two steps. The first step is accessed every cycle, but the second step is activated only when the first step is successful, this will result in remarkable power saving. Here an effective construction is presented in a two stage process to avoid an increase in the delay of the critical path. Experimental results of the proposed two-step structure for the BCH (8752, 8192, 40) code that saves 50% power consumption compared to a conventional building of the show.

Keywords:
Bose–Chaudhuri – Hocquenghem (BCH) codes, Chien search (CS), low power, two-step approach.

INTRODUCTION:

Communications and storage systems for various error correction codes are used to recover the corrupted code words, Bose-chaudhuri-Hocquenghem (BCH) code [1], [2] is the most widely used due to its powerful error correction performance and affordable hardware complexity is one of the algebraic signs. Binary BCH code is a solid-state storage such forward [3], [4] and optical fiber communication systems [5], most of the applications and the never-ending demand for high through put decoding has been running ever larger error- correction capability of different systems.Satisfying the huge computational capacity of high through put and strong error correction is inevitable, therefore, becomes more and more important power saving structure of the BCH decoding. In general, a BCH decoder to correct the bits T at the peak of the three main blocks, namely, the syndrome calculation (SC), the key-equation solving (KES) has, and Chien search (CS) [1], [2]. Receiving a code word for a given R (x) Compute syndromes SC 2T and KES (X) using the syndromes of the error locator polynomial Λ. Finally, the error is E (X) Λ sources (X) CS determined by the algorithm is based on the finding. In a parallel BCH decoder, CS main cause of power consumption and total electricity consumption [6] and can take up to a half. Numerous studies have demonstrated the ability to reduce the power consumption of CS proposed structures. Early termination of the methods presented in [6] and [7] After finding an error in the past to eliminate

redundant computations. An additional error counter is incremented when an error is found, and the counter KES down sides found in the CS is turned off matches. BCH decoder dealing with a small number of errors early in the implementation of the common and effective drug, though, when the power saving small insignificant error correction capability. [8], is a more effective method in order polynomial reduction (POR) when the error was found in the error locator polynomial of the proposed reform. Locator polynomial order one at a time, errors are detected by the decline and eventually becomes zero. POR [8] at a time, gradually power down circuitry associated with a polynomial factor makes it impossible for the CS. POR for serial BCH decoders are successful, however, because it is difficult to apply the technique of complex polynomial update parallel architecture. Further more, all of the previous power saving algorithms, including early termination, [6], [7] and the POR [8], depending on the position of the errors. For example, if faults at the end of the term of the code, as in the case of power savings is significant that in the beginning of errors. In this brief, we have a new approach, which is parallel to the CS proposed two stages of decomposition. In order to have access to each of the first step, but the first step to access the second stage will be activated only when a less successful result. The proposed two-step method [9] that is conceptually similar. The two-step approach, in general, lead to an increase in the critical path delay and delay, the losses can be solved simply by employing an efficient pipelined architecture. Unlike previous architectures [6] - [8], regardless of the error, the location of the proposed construction of the power consumption can be saved. Digital communication system for carrying the signal from the source to the destination user via a communication channel is used to transfer data. All the code words encoded, encoder, which generates a set of code word. When it becomes a code for the actual set of data encoded. Memories of errors and data corruption is a significant problem in the channels. Disorders that affect one or more of the memory cells of radiation-induced soft errors, for example, have been known to change their values. Other types of failures cause permanent damage, such as the device will no longer provide the correct data. In the event of failure to ensure that the data is not corrupted, error correction codes (ECCs) are widely used in memories [1]. To add some extra parity bits to check every memory ECCs word in such a way that errors are detected and corrected. The proposed system is basically sound channel .Parity describes the additional bits of memory for its ability to reduce data corruption. There are other costs introduced by the ECC encoding and decoding circuitry. More than one channel to transfer the data to be encoded and decoded as read from it also affects the circuit delay. In many cases, because many of the steps of the encoding, decoding speed is much more complex and ECC [1] .Traditionally single error, double error detection (SEC-DED) codes used to protect memories are limited [3]. But the data signal error was found and corrected in the proposed system for multi-byte. This point of view as well as the delay in the

performance of RS code symbols in the number of bits of memory modules and devices when the matches will be very attractive for the channel, a device that can be corrected failures. In fact, the main reason is usually used to protect the RS codes A code word for a certain polynomial coefficient of the polynomial, the generator polynomial g (x). Reed- Solomon error correcting codes (RS codes) to transmit a wide array of possible errors arising from error to restore data from a disk and data communication systems used for storage. There are two types of errors when the bits flowing from one point to another, they are subject to change because of the unpredictable interference. Change the shape of the interference signal. from 1 to 0 or 0 to more bits of data per unit of linear 1.Reed Solomon code means that the cycle has turned into a regular non-binary block code. Redundant encoder signals and message signs are included in the product using the generator polynomial. Decoder error location and intensity are calculated using the same generator polynomial. Then the correction is applied to the received code. Reed- Solomon coding, plus data storage and retrieval systems (noise channel harm) forward error correction of a type used for data transmission.

LITERATURE SURVEY:

A large number of errors, because they have the ability to correct the error correction described in this paper basically memory devices, the memory is used for the applications important to the majority logic decodable codes. However, the performance of the memory they need to have a big influence the decoding time. Technical standards, in memory devices become larger and more powerful error correction codes are needed. Euclidean geometry to overcome the problems in this paper as they use more modern codes. These codes can correct a number of errors, but usually requires complex decoders. Serially with the majority logic decoding circuitry can be implemented in a very simple, but it requires long periods of decoding. Memory, this is an important parameter for the access to the system can increase the time. Increase the size of the code, so the majority of the increase in the time of decoding the decoding logic (implemented serially), N iterations required. EG-LDPC code, the code word is used in this method (Euclidean geometry -Low Density Parity Check), there is a majority One Step Logic Decodable code. It uses the algorithm to check the code. There is nothing to check the algorithm, but code word is associated with a numerical value to be transmitted. The receiver then receives the code word at the end of the numerical values associated with the error identification is a comparison of some numerical value.There. The method is easy to implement using existing hardware. This method is more time for decoding. As well as the power consumption and the need for the region are high. One step is to identify the shortcomings of the majority of serially MLDD serial technique uses Logic decoder. [2] In this article, the author of the noisy channel (Additive White Gaussian Noise) in the presence of PSK and FSK modulation techniques Reed Solomon code (RSC) of the bit error rate (BER) on performance analysis explains. In this paper, 32- FSK (frequency shift keying), PSK (phase shift keying) modulation coded communication system is used for the simulation. In addition to the use of Monte Carlo simulation and calculation of the rate of BER MATLAB / SIMULINK is done using the tool. The results are shown using BERTOOL. In order to compare the

performance of the block length is fixed, we have taken a different code rates. After getting familiarized with the classification and characteristics of forward error correction codes, error detection and correction codes described in this section are compared to some. Hamming code - a Hamming encoder bits of parity bits are inserted into the message. The parity bits and parity bits of data to determine the different combinations to impose a fixed parity. The combinations are fixed parity check decoder. The parity bits are set according to the decoder. The combination of the binary equivalent of the error location is determined. OK, that particular bit of data that is being flipped. Hamming code in the same error code. If any of the attempted correction of double errors can be detected.

• Berger code - Unidirectional Berger code error detection code. It can only detect an error in either '1' flipped '0' or '0' flipped '1', but it means the same code. '1' are designed to detect errors with a "0", the binary equivalent of the message, then the message is sent by the number of 0s and flipped over. The invention of the '0' design '1', an error message, the binary equivalent of the number of 1s and sent along with the message, as well as when it flipped. According to the decoder to receive the binary 0s or 1s compares the number of the same design. Imbalance between the two indicates an error. It is expected to be used where the error is unidirectional.

• a valid code word in the code has always been a constant weight, constant weight code. It means that a valid code word of a fixed number of 1s. Therefore, any variation indicates an error. Multiple errors can cancel each other out as a simple but effective way of encoding it.

• Code of Ann M - An encoder message out in an M-M number of 1s in an n bit code is mapped to a word. An M-1s in the code message bits which are used to adjust the number of bits added to the number of additional M. It consists of all the M bits of the message in any 1s '1' will. It is also effective in terms of the code of coding rate.

• Erase Code - to erase the error means that you know in advance from the previous experience of its location. Erasure code is to be able to correct such errors. It is already known that this type of code is not required in the decoder circuit fault locator. Only to correct an error in the decoder is calculated by measuring the eraser.

• low-density parity check code - the low density parity check code is a linear block code. The message block is transformed into a code block by multiplying the transformation matrix. The name refers to the low density and low density transform matrix. This means that the number of 1s in the transformation matrix less. It's a lot of coding gain, but the encoder and decoder design is concerned, the best code is complicated. Mainly used for Digital Video Broadcasting.

• Turbo code - it is a convolutional code. Convolutional encoding, encoding normal. It is defined by the (n, k, l) n the number of bits input to the Turbo code, k and l is the number of output bits is the memory of the encoder. Decoding takes place in two stages. The first stage will be a hard and soft decoding step decoding. This is a very good error correcting capability, which means that there is no coding gain. The main drawback is that it has a low coding rate and high latency. Hence it is not suitable for many applications. Satellite communication latency due to distance, but also the lowest in the extra latency is too high. Hence it is mainly used in satellite communication.

• Reed Solomon code - Reed Solomon code of a nonbinary block linear cyclic code sequence. Redundant encoder signals and message signs are included in the product using the generator polynomial. Decoder error location and intensity are calculated

using the same generator polynomial. Then the correction is applied to the received code. Reed Solomon code and turbo codes, LDPC coding gain is relatively low. But it is a very high rate and low complexity of coding. Hence it is suitable for many applications, including storage and transmission.

REED-SOLOMON CODES:

A Reed-Solomon (RS) code described in a paper in 1960, Reed Solomon error-correcting code is a rst [9]. Since that time they are CD-ROM, wireless communications, space communications, DSL, DVD, digital TV application. RS encoding of the data is relatively straightforward, but the decoding of the 1960s and other major e ciency improved by Berlekamp, time consuming [2, 5, 6, 8]. RS only in the last few years, it has become possible by using the high-bandwidth data to count. Groups of bits instead of one bit at a time, that it is a gesture from the Hamming code of RS ERS. We are the groups of digits \ Call "(the \ icons" or \ Co cients ") is. If a digit is error-free in all of its bits are error-free only. For example, if an 8-bit character in a number, and the same error in three bits of impersonation we are number one is damaged. the following example is damaged two digits (but not more than two corrupted bits) that count

Original : 10110001 11011111 01001011
0101110
0
Received
: 10110101 11011111 01110001
0101110
0
Corrupted
? yes no yes no

If we want to send a k digit plaintext message, RS will send n = k + 2s digits, and guarantee that the correct message can be reconstructed at the other end if there are fewer than s corrupted digits. An example of commonly used parameters: k = 223, s = 16, n = k+2s = 255, giving the ability to correct 16 corrupted digits out of every 255 digit packet. In general, the number of bits in a digit and the parameters n and s are tuned to optimize for your application. A CD-ROM can correct a burst of up to 4000 consecutive errors.

PROPOSED TWO-STEP CS ARCHITECTURE:

In the proposed architecture paraell CS is decomposed int two steps.The p-parallel CS examines p error positions at the same time, each of which generates a binary matrix of 1 x m representing a Galois field (GF) element by computing

$$Y(\alpha^{wp+i}) = \sum_{j=1}^{t} \mathrm{FFM}_{ij} = \sum_{j=1}^{t} \Omega_j A_{ij} = [\Omega_1\ \Omega_2 \cdots \Omega_t] \begin{bmatrix} A_{i1} \\ A_{i2} \\ \vdots \\ A_{it} \end{bmatrix} \quad (5)$$

Where i ranging from 1 to p. The CS will examines and determines the presence of an error when Y (αwp+i) is 1, where αwp+i is a root of the error locator polynomial.The main idea comes from the fact that the absence of errors is guaranteed if some bits ofY (αwp+i) are not equal to those of 0(m−1:1)1(0).In the GF of dimension m, the multiplicative identity element, α0 or α2m−1, is defined as 1, i.e., 0(m−1:1)1(0), more precisely In the case of GF(24), for example, no presence of errors is guaranteed if Y (αwp+i)(3:2) _= 0. Like this two-step approach is employed for early detection.This wil results in remarkable power saving.

SIMULATION RESULTS:

CS low power, depending on the size of the field of construction of the proposed two step different configurations, and error-correction capability of the horizontal factor compared to traditional construction. At the operating frequency of 200 MHz for all the

CS blocks with a 130-nm CMOS technology is, and equally probable error model [7], [8] adopted simulations power consumption. More precisely, V errors BCH (n, k, t) signals, the average bit of a distance between two adjacent errors n / V model, every bit of the code word received is from the same error occurs when the reference is corrupted.

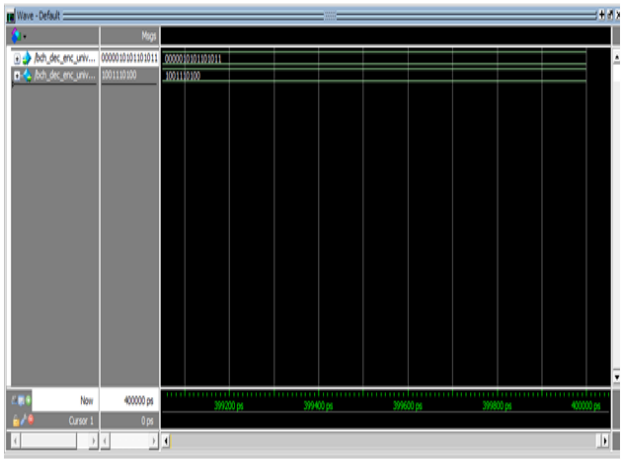

Fig: Chien search based BCH codes

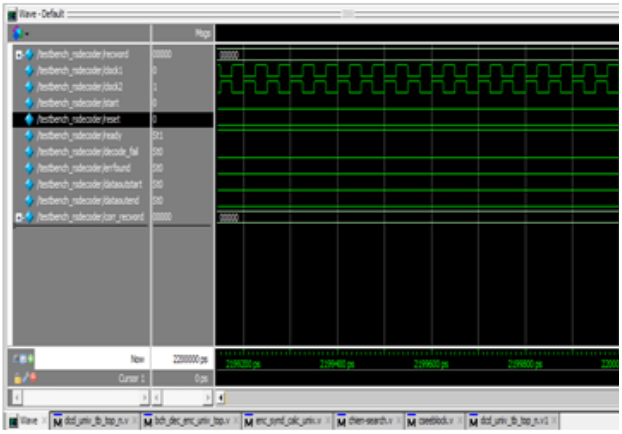

Fig: Chien search for RS decoder

SEC-RS code testbench waveforms shown in below two figures

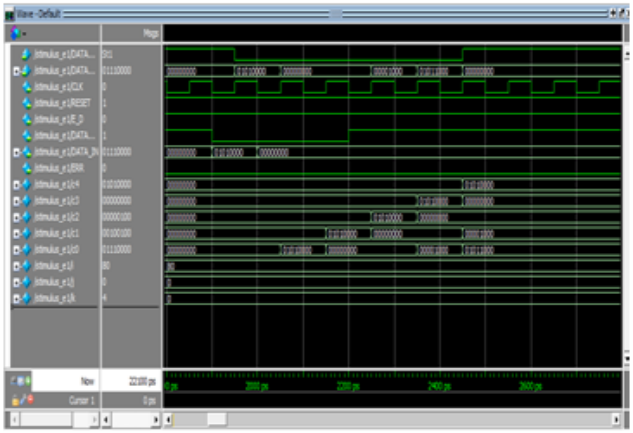

Fig. The size of the field in the first step of the bit width of 4 and shows the effect of energy saving ratio.

For fair comparison, all of the BCH codes to model the rate of 0.93 is designed and shown in Fig 8. Set the horizontal element. 4, the proposed increase in the size of the field of development becomes even more important as a result of the construction, and a small number of bits are sufficient in electricity savings increase. For example, BCH for the proposed two-step structure (8752, 8192, 40) GF (214) 49.3% power, savings over the code FFM partial opening of the first four MSBs will be processed. Moreover, Figs. 5 and 6 horizontal error correction factor and illustrate how it affects the efficiency of power saving. The horizontal element increases, the energy savings and the horizontal aspect ratio closer to 50% than the energy saving ratio of 8. It is error correction capability is almost independently shown to be saturated when. In figs. 3-6, we estimate an offset between energy savings and in spite of the simulation, a simplified energy model (9) can be used as a good

estimate. Due to the additional buffers are addressed in Section III, the proposed construction of an approximately 10% increase in hardware complexity.

CONCLUSION:

By reducing access to the second stage of the conventional CS to achieve significant

power savings is decomposed in two steps. Error operate under the same ownership, the less energy the size of the CS in the construction sector in different configurations, and error-correction capability of the horizontal factor compared to traditional construction. From the experimental results, the proposed construction of a 50% reduction in power consumption compared to the conventional horizontal CS show. Power saving horizontal factor or increase the size of the field will become more and more important. Reed- Solomon codes, such as the proposed two-step CS also applies to other linear block codes.

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Implementation of Multifunction Residue Architectures on FPGA for Cryptography Applications

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Abstract: Data confidentiality and encryption are essential features of modern computing. Due to its high limited size and therefore its reliability equal to that of other traditional public-key algorithms, elliptical curve cryptography (ECC) is the ultimate cryptographic method. Furthermore, the hardware acceleration of cryptographic algorithms is necessary to satisfy the raising speed demand for contemporary implementations. The core component of the residue number method is the forward converters, modulo decimal units and the reverse converters. The reverse converter is based using standard and compact adders in the current network of residue numbers. It displays substantial power usage and low speed. In-depth, it suggested a residue Montgomery algorithm for multiplying data paths among converters and between the two residue representations by evaluating the input/output conversion to/from residue representation. The design is acquired thus, we use the dual field modulator for the GF(p) and GF(2)n Montgomery multiplication, input/output conversions, mixed-radius conversions (MRC) for inputs and polynomials and exponentiation and inversion in the same hardware.

Keywords: Research in finite fields, computer arithmetic, Montgomery multiplication, parallel mechanism in arithmetic and logic structure.

I. INTRODUCTION

Throughout this era, wireless and digital interactions have rising astronomically. Hundreds of purchases exist on both the worldwide network daily. Almost all of these activities include important, sensitive details, verified transactions and authenticated users. Such specifications include a comprehensive protection system.With the rapid development of secure network communications, cryptography criteria for authentication have recently raised exponentially. Modular multiplication is a basic practice in many common architectures including RSA [1] and ECC [2, 3] for public-key encryption (PKC). Since the division process in modular reduction takes time, Montgomery [4] suggested a new methodology to prevent division. ECC is a very popular and powerful public-key encryption method for cryptographic purposes and is now very prominent in both primary and binary fields due to the smaller field size. The focus of this research will become an elliptical curve over a binary field because it is quite effective for hardware deployment due to the use of modulo 2 arithmetic.

An elliptical curve over a finite field gives a group structure used to enforce the cryptographic scheme. The activities of the company are PD and PA. Such two community operations have been merged into a lightweight hardware architecture and named PDPA. For elliptical group curve procedures, two well-known coordinate systems are often used: Affine coordinate structures and projective coordinate structures. Furthermore, the most sophisticated modular multiplication methods in Montgomery were designed for the set accuracy of operands which cannot be used for variable accuracy. Different strategies for improving the performance of point multiplication are implemented using either FPGA or ASIC implementation, including algorithm optimization and enhanced arithmetic field architectures. However, most point multiplication systems have been introduced with independent group operations, which could improve the frequency of group activities and thus decrease the

multiplication pace. Although several high-speed point multiplication strategies were described in the literature for an ECC processor, most are field-efficient. Our suggested design has a speed-area trade-off which is ideal for quicker, new, cryptography implementations. Practices including such multi-module and multi-function models have been proposed to eliminate redundancies in the hardware and therefore to mitigate power dissipation through multi-threshold voltage and multi-source stress architectures. These optimization techniques are designed for the exploration of space at the algorithm level and are specific to common numerical modules. To simplify the design level of such modulo arithmetic processes like the multiplication of units, techniques that investigate particular theoretical characteristics of the different modules of types $2n$ and $2n \pm 1$ have received comprehensive attention, amongst many others.

The VLSI design recommended in this article for the usage of RNS is the macro selection criterion for the chip memory use, which contributes to the complex implementation of main techniques. The literature survey indicates that various working conditions were suggested for the multiplication of cryptography by companies focused on polynomials to address the shortcomings of RNS schemes. The algorithm of Montgomery is one of the master areas of dual-field applications. Under key RSA word lengths, the Montgomery architecture fits well with the processing of word-size details, considering that key RSA sizes (512, 1024, 2048, etc.) often have a multiple word scale. Furthermore, the main sizes in error correction techniques are not integer multiples, therefore it indicates because, if such designs have been used in the error correction application techniques, more clock cycles would be needed to enforce them, which would result in higher power usage. This issue may be solved by implying that the system is designed at a bit level. This method is designed and applied with a view to the environment and power consumption; the next portion of the process summarizes so much about the framework suggested.

The main contributions and organization of this paper are summarized as follows: In section 2 we describe background details of Montgomery operations. Section 3 discusses the proposed work. Section 4 deliberates Results and Discussions. Finally, in section 5, we concluded the paper.

II. BACKGROUND WORKS

Encryption is performed through a public key, so then the matching private key will decrypt the encrypted document. The reliability of these algorithms depends on the hardness of the public key to extract the private key. While gradual and highly technical, asymmetric key encryption provides tremendous benefits. The main benefit seems to be that the simple primitives used will be based on well-known issues like integer factoring and discrete problems with the logarithm. Such difficulties were extensively studied and, despite years of research, their consistency was not contradicted. This may be distinct from symmetric key encryption, in which the power of the code relies on combinatory strategies. The protection of such algorithms has not been demonstrated and therefore does not rely on well-researched literary problems.

Within real-world environments, crypto-system installations must be effective, scalable and reusable. Implementations such as smart cards and mobile phones need deployment where resource consumption and power consumption are important. Such architectures should always be lightweight and low-powered. A secondary criterion is computing capacity. The degree of system reconfigurability may also be held to a minimum. This seems to be since these machines are short-lived and are typically only installed once. High-efficiency devices such as network servers, storage networks, etc. on the other side of the continuum need high-speed deployment of ECC. The crypto algorithm will never be the output bottleneck of the program. These architectures do need to be rather scalable. Running conditions can be reconfigurable, such as algorithm variables, etc. The software can be quickly reconfigured; furthermore, program implementations do not often scale the application's output. These systems need specialized equipment for speed calculations. The required clock cycles, operating frequency, and region are critical design parameters while utilizing these hardware accelerators. The clock cycles will be short and the frequency high, so that the average device latency is smaller. The region is essential since smaller areas imply that parallelism on the same equipment may be introduced, thus the device's performance.

The Correctness of RSA). Let *X*, *Z*, *Y*, *l*, *m* be plaintext, cipher text, encryption exponent, decryption exponent and modulus, respectively. Then

$$(X^{l})^{m} \equiv X \left(mod\, Y\right) \tag{1}$$

Proof. Notice first that

$$Z^{m} = (X^{l})^{m} X \left(mod\, Y\right) \tag{2}$$

$$Z \equiv X^{l} \left(mod\, Y\right)$$

$$\equiv X^{1+k\phi(Y)} \left(modY\right) (lm \equiv 1\left(mod\phi\left(Y\right)\right) \tag{3}$$

$$\equiv X.X^{k\phi(Y)} \left(modY\right) a^{\phi(y)} \equiv 1\left(modY\right)) \equiv X \tag{4}$$

The result thus follows.

Remark 1. In order to complete, this process of decryption, the approved users having the *m*, *r* and *s*, with the data available from $X \equiv Z^{m} \left(mod\, Y\right)$, makes the computation to operate at speed by taking into account two axioms

$$X_{r} \equiv Z^{d} \equiv Z^{m \bmod r-1} \left(mod\, r\right) \tag{5}$$

$$X_{s} \equiv Z^{d} \equiv Z^{m \bmod s-1} \left(mod\, s\right) \tag{6}$$

$$X \equiv X_{r}.s.s-1 mod r + M_{s}.r.r-1 mod\, s \left(mod\, Y\right) \tag{7}$$

Recently the residue number system $\{2^{y}\text{-}1, 2^{y}, 2^{y}\text{+}1, 2^{2ys+1}\text{-}1\}$ supposed to introduce both high dynamic terms with the logic of parallelism. The block diagram of RNS system based on these moduli set is shown in Figure1.

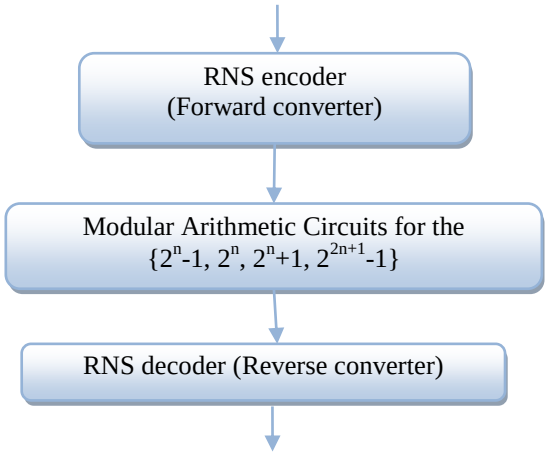

Figure 1: Block Diagram of residue number system

The first phase in constructing a converter is the collection of the module package. The collection of modules will play an important role in the dynamic range, pace, and hardware creation of the RNS. The second phase for constructing a reverse converter is to replace the variables of the module provided by modern CRT conversion algorithms.

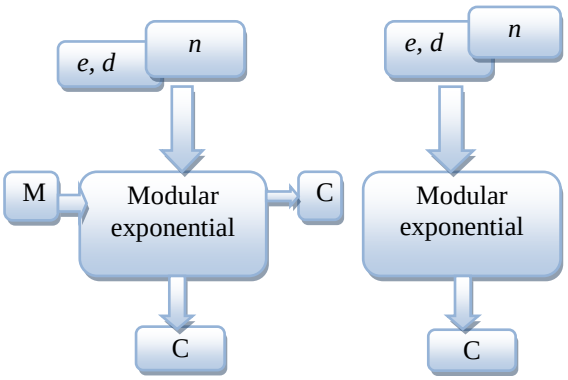

Figure 2 : The RSA encryption/decryption structure

The corresponding calculations are condensed in the third stage by utilizing mathematical characteristics and proposals. Eventually, adder elements including CSA-EAC, CPA-EAC, and Revised adders are created for final equations. Figure 2 shows the RSA encryption/decryption structure in hardware implementation. The essential of the RSA implementation is how better the modular arithmetic operations that can incorporates the modular addition, subtraction, multiplication and exponential.

III. METHODS AND METHODOLOGY

Dual-Field Modular Reduction: A final modular reduction by each modified RNS/PRNS modulus is required, for each multiplication outcome, within each MAC unit.

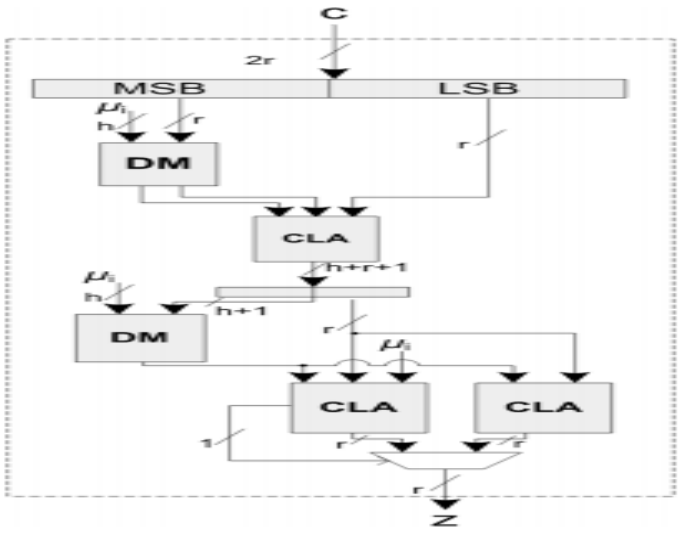

Figure 3: Connections of Dual-field modular and CLA units

Let us denote the 2*p*-bit product where its primary requirement is to modulo reduction p_i. By taking into consideration r_i and treating the term $2p-\mu_i$, in order to denote *h*-bit μ_i 2^p, the major calculation can be done which can be further be simplified as

$$z_{r_i} = \sum_{i=0}^{p-1} z_i 2^i + 2^p \sum_{i=0}^{p-1} z_{r+i} 2^i_{r_i} = G + 2^p H_{r_i} \quad (8)$$

$$= \sum_{i=0}^{r-1} m_i 2^i + \mu_i \sum_{i=0}^{h} m_{r+i} 2^i{}_{r_i} \quad (9)$$

A certain mathematical calculation extended for differential equations where a compact dual-field reduction (DMR), as seen in the figure, can be mechanized and adders, multipliers depends on modular operation are used. Nonetheless, CSKA, which would be an effective adder in terms of energy use and region usage, was implemented by CLA. The CSKA's vital latency is much lower than that of the RCA, whereas its region and electricity consumption are comparable to RCA. However, the CSKA power delay product (PDP) is smaller than the CSLA device.

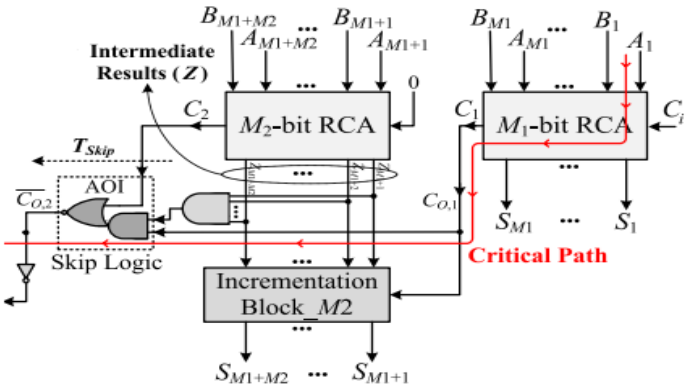

Figure 4: Modified CI-CSKA structures

In Figure 4, the modified CI-CSKA structure which can be substituted in Figure 3 by a CLA block allows us to use easier carrying skip logic. The AOI/OAI compound gates are quicker and more efficient. Remember that it is augmented in this form when the carry propagates through the skip logic. Furthermore, the completion of the carry is obtained at the output of the skip logic of even phases. The structure has a significantly lower propagation time with a slightly smaller area compared to existing areas on its own. Likewise, while the AOI gate's electric energy consumption is slightly smaller than that of the multiplexer, the proposed CI-CSKA's energy consumption is slightly higher than traditional power consumption.

IV. RESULTS AND DISCUSSION

The Montgomery architecture and modular RSA encryption was written in VHDL/Verilog and synthesized in the FF1153 speeds of XILINX ISE 14.4i (Kintex7) and XILINX ISE 12.4 products. The findings of the synthesis of the original Montgomery specification for various operand size bits are shown in Table 1-3. In the synthesis report region and frequency (minimum period) are produced. The output is measured as bit length multiplied by frequency and divided by clock cycle number.

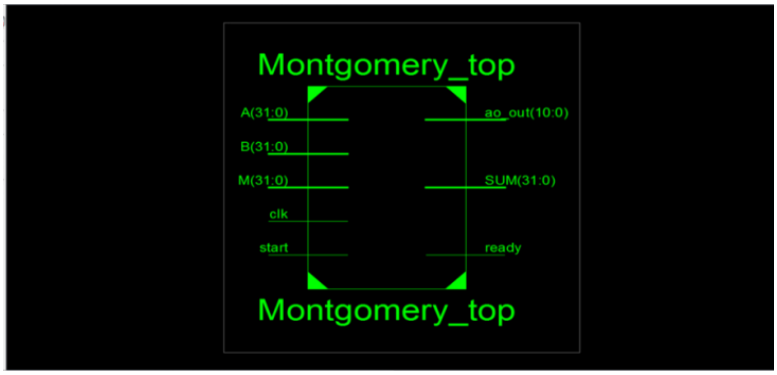

Figure 5: RTL schematic of proposed design

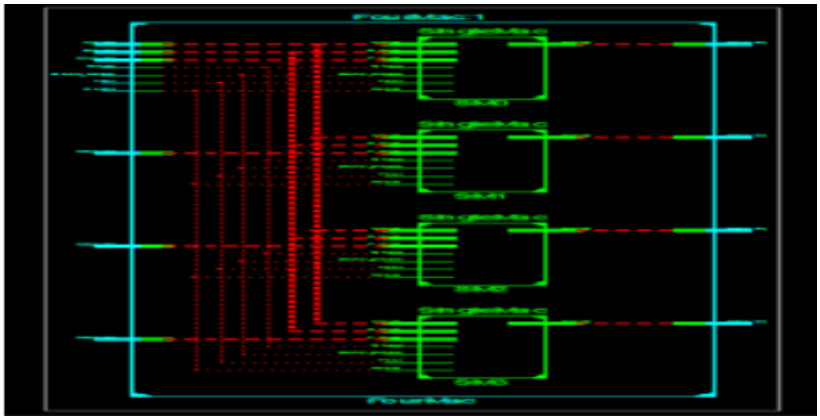

Figure 6: Technology schematic of proposed design

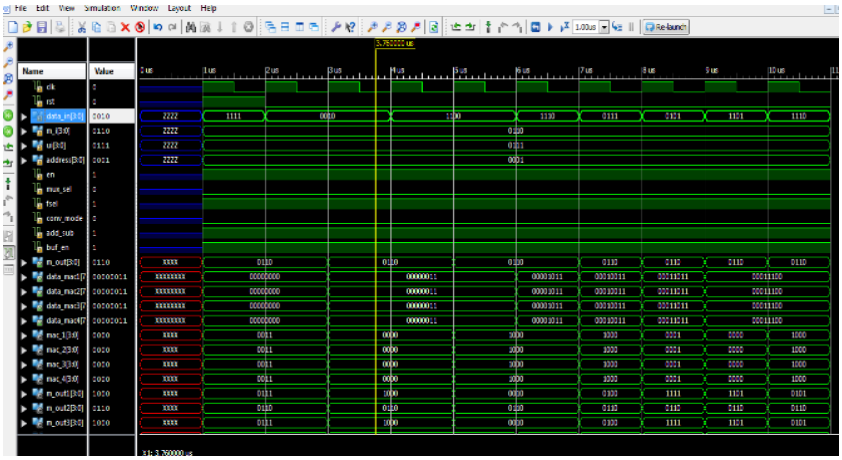

Figure 7: Simulation results of the proposed design

Table 1: Overview of logic blocks usage CSK adder for 4-bit length

Device Utilization Summary (estimated values) [-]			
Logic Utilization	Used	Available	Utilization
Number of Slices	5	960	0%
Number of 4 input LUTs	10	1920	0%
Number of bonded IOBs	14	66	21%

Delay in the path for CSK adder for 4-bit length is 9.23ns

Table 2: Overview of logic blocks usage CSK adder for 8-bit length

Device Utilization Summary (estimated values) [-]			
Logic Utilization	Used	Available	Utilization
Number of Slices	9	960	0%
Number of 4 input LUTs	15	1920	0%
Number of bonded IOBs	26	66	39%

Delay in the path for CSK adder for 8-bit length is: 9.23ns: 12.45ns

Table 3: Overview of logic blocks usage CSK adder for 16-bit length

Device Utilization Summary (estimated values)			
Logic Utilization	**Used**	**Available**	**Utilization**
Number of Slices	14	960	1%
Number of 4 input LUTs	25	1920	1%
Number of bonded IOBs	50	66	75%

Delay in the path for CSK adder for 16-bit length is: 15.23ns

Table 4: Overview of logic blocks usage CSK adder for 32-bit length s

Device Utilization Summary (estimated values)			
Logic Utilization	**Used**	**Available**	**Utilization**
Number of Slices	26	960	2%
Number of 4 input LUTs	45	1920	2%
Number of bonded IOBs	98	66	148%

Delay in the path for CSK adder for 4-bit length is: 31.23 ns

Table 5: Device Utilization Summary of 4, 8, 16, 32-Bit Carry's Skip Adder

Logic Utilization	**4 – Bit CSkA**	**8 - Bit CSkA**	**16 – Bit CSkA**	**32– Bit CSkA**
Number of Slices	5	9	14	26
Number of 4 input LUTs	10	15	25	45
Number of Bonded IOBs	14	26	50	98
Delay	8.7ns	11.3ns	14.1ns	29.8ns

V. CONCLUSION

This paper presents the design of an efficient RSA cryptosystem that uses the Montgomery algorithm for modular multiplication. With the help of dual field residue arithmetic unit, the Montgomery multiplication is done for all cases of word lengths are achieved. However, the associated DRAMM unit makes possible operations of multiplication in GF(p) and GF(2n), with the residual model. For improving the overall performance of the architecture of Montgomery and adder, the response time and critical path are decreased. The advantage of the proposed CI-CSKA achieved better results as related to other techniques.

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NETWORK THEORY

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Network Theory

Course Objectives

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
- To impart knowledge on applying appropriate theorem for electrical circuit analysis
- To explain transient behavior of circuits in time and frequency domains
- To teach concepts of resonance
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

UNIT-1: Introduction to Electrical Circuits

Passive components and their V-I relations, Energy sources - Ideal, Non-ideal, Independent and dependent sources, Source transformation Kirchoff's laws, Star–to-Delta or Delta-to-Star Transformations, Mesh analysis and Nodal analysis problem solving, Super node and Super mesh for DC Excitations.

Unit Outcomes

- Gain knowledge on basic network elements, voltage and current laws (L1)
- Apply Kirchoff's laws, network reduction techniques on simple electrical circuits with dependent & independent sources (L3)
- Solve complex circuits using mesh and nodal analysis techniques (L3)

UNIT-2: Network Theorems

Superposition theorem, Thevenin & Norton theorems, Maximum power transfer theorem, Reciprocity theorem, Millman theorem, Miller Theorem, Tellegan's Theorem, Compensation theorem - problem solving using dependent sources also, Duality and dual networks.

Unit Outcomes

- Understand significance of duality and dual networks (L2)
- Select appropriate theorem for network simplification (L5)
- Determine maximum power transfer to the load (L5)

UNIT-3: Transients

First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and

AC (sinusoidal) excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method.

Unit Outcomes

- Understand behavior of circuit elements under switching conditions (L1)
- Analyze response of RL, RC & RLC circuits in time & frequency domains (L4)
- Evaluate initial conditions in RL, RC & RLC circuits (L5)

UNIT-4: Resonance and Coupled Circuits

Self inductance, Mutual inductance, dot rule, coefficient of coupling, Analysis of multi-winding coupled circuits, series & parallel connection of coupled inductors.

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case resistance present in both branches, anti resonance at all frequencies.

Unit Outcomes

- Understand magnetically coupled circuits (L1)
- Determine resonant frequency and bandwidth of a simple series or parallel RLC circuit (L5)
- Determine voltages and currents in a resonant circuit (L5)

UNIT-5: Two Port Networks & Network Functions

Two Port Networks, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters, hybrid and inverse hybrid parameters, relationship between parameters, interconnection of two port networks. Concept of complex frequency, driving point and transfer functions for one port and two port network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function

Unit Outcomes

- Determine network parameters for given two port network (L5)
- Relate different two port network parameters (L4)
- Represent transfer function for the given network (L4)

Network Theory
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Cluster Based Routing Algorithm for Large Scale Cooperative Mobile Ad hoc Networks

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ABSTRACT

In wireless networks, the performance of the network is inversely proportional to the distance between source and destination. Cooperative Communication (CC) technique can be used to improve the performance in such cases, wherein the intermediate nodes can be used as relay nodes. In this approach, selection of relay nodes and the path from source to destination plays a key role in the performance of the system. In this paper, we proposed a hierarchical routing algorithm for large scale cooperative mobile ad hoc networks based on mobility and link Signal to Noise Ratio (SNR). To improve the performance further we implemented cooperative communication in each hop. Simulation results show that our proposed algorithm gives better performance (average BER) than conventional routing (AODV) algorithm.

Keywords: Large scale mobile ad hoc network, routing algorithm, relay selection, mobility.

I. INTRODUCTION

Performance of wireless networks is degraded by fading, and it can be mitigated by providing diversity. Cooperative Communication is a technique which provides spatial diversity without having multiple antennas at the transmitter and receiver by forming Virtual Multiple Input – Multiple Output (VMIMO).

Cooperative Communication (CC) is implemented in large scale mobile Ad hoc networks to leverage the benefits of CC technique. Mobile Ad hoc Networks (MANET) can be a better choice than the conventional cellular system in some applications like, military and emergency search and rescue (natural disaster); where there is a need of establishing temporary communication network. Routing is the key issue in MANETs, since every node in the network having mobility so it can move freely in any direction [1].

In recent years, several routing algorithms have been proposed based on the way of establishing the path. They are based on: protocol operation, network structure, initiation of communication, path establishment or next hop selection [2, 3].

Path established based routing algorithms are categorized into three types: Proactive routing algorithms, reactive routing algorithms and hybrid routing algorithms. In proactive routing algorithms, route for every node is calculated and maintained by routing table well before it is needed. This route table is updated periodically by route update process. Proactive routing algorithms are: [4,5,6]

- Destination – Sequenced Distance – Vector (DSDV)
- Optimized Link State Routing Algorithm (OLSR)

In reactive routing algorithms, route is established only when it is needed. Therefore these routing algorithms do not need to maintain any routing information (route table) globally. Reactive routing algorithms are [4,7,8]:

- Ad hoc On Demand Distance Vector (AODV)
- Dynamic Source Routing (DSR)

Hybrid routing algorithms are a combination of proactive and reactive routing algorithms. Generally these algorithms are cluster based routing algorithms. It uses proactive routing strategy within the cluster and reactive routing strategy for cluster to cluster communication [4].

Next hop selection based routing algorithms are categorized into five groups: content based routing, probabilistic routing, Location based routing, Hierarchical based routing and broadcast based routing. In content based routing, next hop selection is merely based on query content. These types of routing algorithms (Directed Diffusion) are most suitable for sensor network architectures [9].

In probabilistic routing, a sensor node is selected randomly for the next hop by assuming, all the nodes are homogeneous and distributed randomly. In location based routing protocols, next hop relay node is selected based on the location of neighbor nodes and destination. In hierarchical routing, a set of nodes form a cluster, which helps to forward the message to the destination. Each node aggregates the message by which they reduce the overload, and hence the network lifetime is increased. In broadcast routing, every node broadcast the message if it wants to transmit (every node take decision individually) [9].

In this paper, we propose a hierarchical routing algorithm to improve the network perform. For this, we form a cluster based on the link signal to noise ratio (SNR), formation of cluster and identification of cluster head explained in algorithm 1. In this, cooperative

communication is implemented in each hop to improve the performance further.

The rest of the paper is organized as follows: description of the network given in section II, routing algorithm presented in section III. In section IV, we present the simulation results and finally we conclude the paper in section V.

II. SYSTEM MODEL

In this paper, we consider a large scale cooperative wireless Mobile Ad hoc Network (LSC-MANET) with N Nodes as shown in figure 1. Each node having 'M' radio terminals and employs Amplify and Forward (AF) relay protocol. The mobility of the ith node is assumed as v^i. Every node knows its neighbor node positions by sending beacon signal periodically.

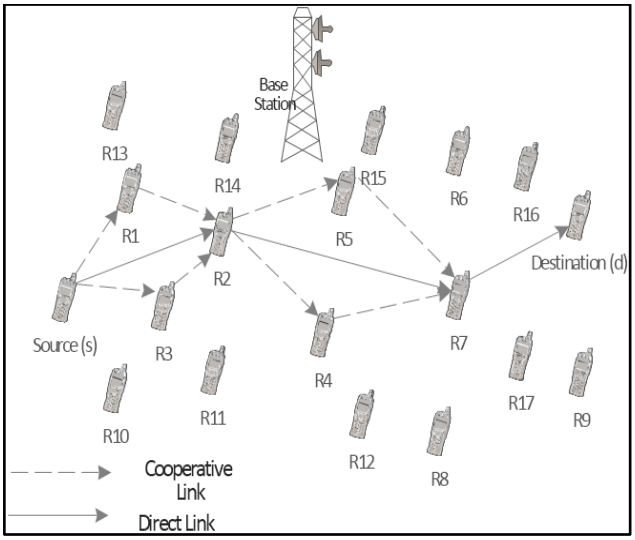

Fig. 1. Large Scale Cooperative wireless Mobile ad hoc Network.

Since every node is equipped with more than one radio terminal, each node sends the control (beacon) signal along with its node ID through setup channel, periodically for every β sec. Other nodes which are in its transmission coverage region receive the beacon signal and measure the link SNR based on Received Signal Strength (RSS) of the control signal. Node ID is useful to the received node to identify the broadcast node. Let the nodes R1, R2, R3 and R10 are in the transmission coverage area of source (s), node R1 measure the link SNR:$\gamma_{s,R1}$, node R2 measure the link SNR: $\gamma_{s,R2}$, similarly node R3 and R10 measures the link SNRs $\gamma_{s,R3}$ and $\gamma_{s,R10}$respectively for every beacon signal.

In a hop, the relay node *'j'* (destination in a hop) receives the information *'x'* from the source *'s'* through two different ways: i.e., through direct link (s → j) and through cooperative links (s → r → j). The information at the node 'j' through these two paths can be given as [10]:

$$y_{s,j} = \sqrt{P}h_{s,j}x + \eta_{s,j}$$
$$y_{s,r} = \sqrt{P}h_{s,r}x + \eta_{s,r} \quad (1)$$
$$y_{r,j} = \sqrt{P}h_{r,j}Ay_{s,r} + \bar{\eta}_{r,j}$$

and $\bar{\eta}_{r,j} = \eta_{r,j} + A\eta_{s,r}$

where P is the transmitting power, $h_{s,r}$ is the coefficient of the link from node 's' to node 'r' ($s \rightarrow r$) and $\eta_{s,j}$ is the additive white Gaussian noise of the link $s \rightarrow j$.

We assumed that, every cell site contains a global table (shown in Table I) at the base station which contains link SNRs & mobility of each node and it is accessed by every mobile node in its region. After calculating the link SNR every node updates the measured SNR in global table which is useful in the relay selection described in algorithm 1. The nodes which are not in the transmission coverage area of node 'i' its link SNR is represented by NA.

TABLE 1: GLOBAL TABLE

Node	**R1**	**R2**	**R3**	**…..**	**RN**
R1	v^1	$\gamma_{R1,R2}$	$\gamma_{R1,R3}$	…….	NA
R2	$\gamma_{R2,R1}$	v^2	$\gamma_{R2,R3}$	…..	NA
R3	$\gamma_{R3,R1}$	$\gamma_{R3,R2}$	v^3	……	NA
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
RN	NA	NA	NA	……	v^N

III. ROUTING ALGORITHM

Routing algorithm for the Large Scale Cooperative Mobile Ad hoc Network (LSC-MANET) is presented in this section.

Algorithm 1: Optimal Routing Algorithm

Input: Flow request from source to destination.

Output: Routing path from source to destination with each hop's relay node.

1: **while** source ≠ destination **do**
2: **if** d ϵ T(s)
3: relay node = destination
4: **else**
5: Find set of nodes which having low velocity in its transmission coverage area T(s).

$$M(s) = \{i | v^i - \min(v^j) < \theta; i, j \, \epsilon T(s)\}$$

6: Source finds the SNR of links from source node to each node in M(s) using global table.
7: The node which having the higher SNR will act as relay node for the next hop.

$$n = \arg\max_{i \epsilon M(s)} \{\gamma_{s,i}\}$$

8: forms a set of nodes which having almost equal SNR

$$SR(s) = \{z | \arg[(\gamma_{s,n} - \gamma_{s,z}) < \alpha]; z \epsilon M(s), n \neq z\}$$

9: Source use the SR(s) set as cooperative relay nodes to further improve the performance of the network.
10: **end if**
11: source node = relay node
12: **end while**

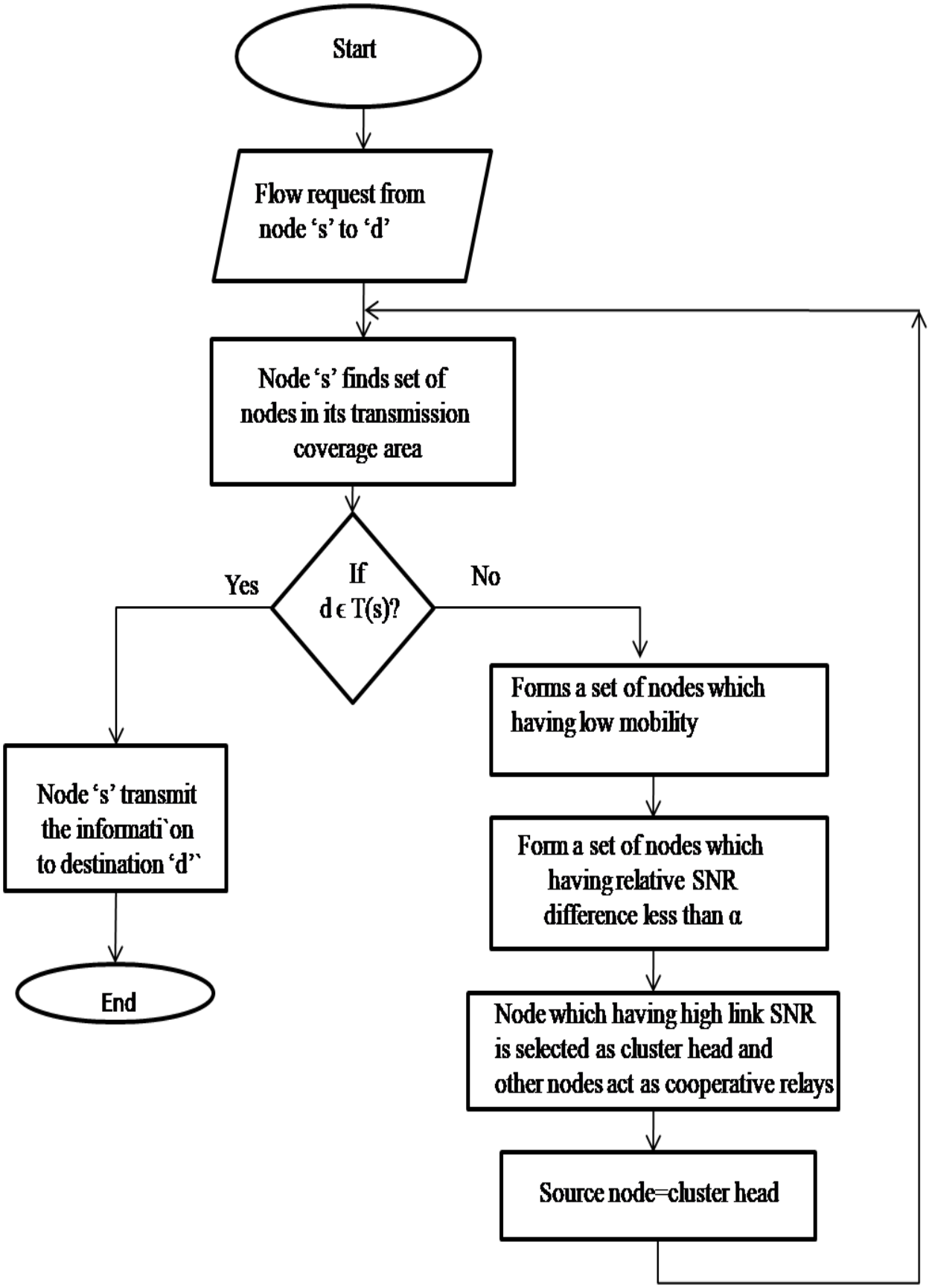

Fig 2: Flow chart for the proposed algorithm

The summary of the algorithm is given as

1) Source finds the set of nodes in its transmission coverage area T(s). It obtains every node velocity and link SNR from global table.
2) Forms a subset of step 1 which having almost low velocity.
3) Forms a subset (cluster) of step 2 which having almost high SNR.
4) In step 3, the node which having maximum SNR will be the cluster head and it will act as a source node for the next hop and other nodes in the cluster helps to transfer the information to cluster head.
5) If the destination node is not in T(s) go to step 1.

The above said algorithm is repeated periodically, so that the routing path and cooperative relay nodes are updated based on their mobility and link SNR.

IV. SIMULATION RESULTS

The simulation results of the proposed routing algorithm are presented in this section. The parameters used for the simulation listed in TABLE-II.

TABLE-II: SIMULATION PARAMETERS

Parameter	Value
Number of Nodes	50
Transmitted Power	1mW
Mobility threshold (θ)	5m/s
SNR Threshold (α)	3dB
Noise Variance	10^{-10}
Modulation	M-QAM
Path loss exponent (n)	4
Combining Strategy	MRC

Figure 3 shows the average Bit Error Rate (BER) of the network for varying node mobility. From the simulation result, we can observe that the proposed algorithm gives better performance than the AODV algorithm. The average BER of the network is increased as the mobility increases and it is improved with the number of nodes.

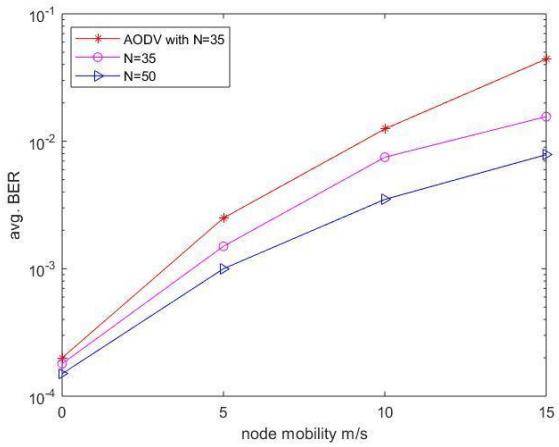

Fig 3: Average BER for varying node mobility

The average BER of the network decreases as the number of nodes of the network increases as shown in Figure 4. As mentioned in the system model, every node updates the link SNR for every β sec. The dynamic changes in the network can be captured if the nodes update for smaller intervals of time. So as β decreases, the performance of the proposed algorithm also increases.

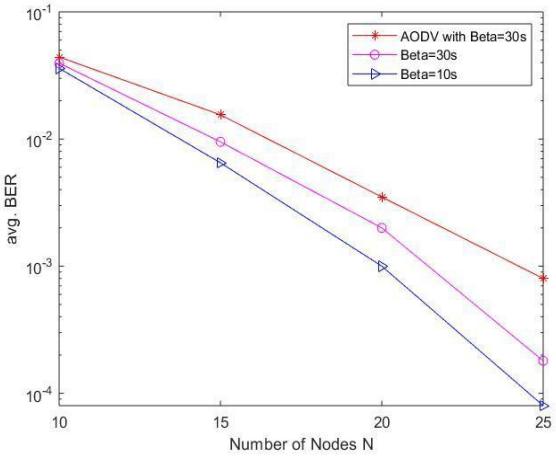

Fig 4: Average BER over Number of Nodes

V. CONCLUSION

In this paper, we proposed and analyzed a dynamic routing algorithm for large scale cooperative mobile ad hoc networks (LSC-MANET). This algorithm considers two parameters for relay selection, namely mobility parameter and Signal to Noise Ratio (SNR). It selects a set of nodes which are moving slowly, and select a node as relay from that set which having high link SNR. Therefore relay node is having relative mobility is low and SNR is high. We implemented cooperative communication in each hop to further improve the performance. From the simulation results we conclude that our algorithm gives better performance than AODV algorithm.

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Effect of physical parameters on the drain characteristics of Double gate MOSFET incorporating Quantum Mechanical Effects

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Abstract. Scaling of bulk MOSFETs in nanometre regime has several disadvantages. The electrical behaviour of the devices doesn't show the anticipated characteristics if scaling is done beyond certain point. But in order to have smaller devices with higher density on chips, it is necessary to avoid short channel effects (SCE) which lead to unexpected electrical features. One of the methods to avoid SCE is to have multi-gate architecture of MOSFET. This paper investigates the behaviour of double-gate MOSFETs with respect to the variation of their physical dimensions. The analyses have been done taking into notice the quantum mechanical effects due to dimensions in nanometre scale. The results obtained highlight how subthreshold and above threshold regions are impacted due to the various physical quantities that have been varied.

1. Introduction

By reducing the dimensions of MOSFETs, more number of components can be incorporated on a VLSI [1, 2] chip to have diversified applications. Adjusting short-channel effects (SCE) is the major issue during scaling down of conventional MOSFETs. There are several ways through which SCE can be lessened while reducing the dimensions of a device. There are many prominent techniques to overcome these shortcomings. Use of strain as reported in [3-5] alleviates SCE and boosts electrical integrity. Similar advantages have been found through the use of junctionless transistors [6-8].Use of multiple gates has been reported in [9-12]. The core theme of all these methods is to enable gate electric field to be more dominant in the channel region. Proper lithographic techniques are used to enable these methods.

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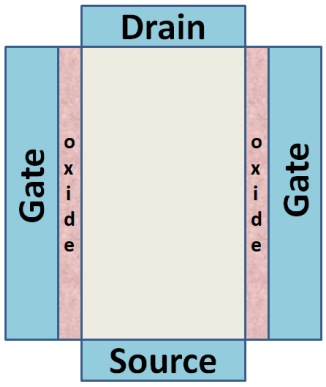

Figure 1. Double-Gate n-channel MOSFET

In multi-gate MOSFETs, there is more than one gate and all gates are maintained at the same potential through the application of gate voltage. The role of gate is to govern the electrons in the channel. Due to multi-gate, the channel electrons are better controlled [13] and exhibit superior properties than single gate transistors.

In this work the electrical behaviour of Double-Gate (DG) MOSFET as shown in figure 1 has been examined by varying the physical parameters of the device. The subthreshold characteristics denote the region of MOSFET operation when gate voltage is smaller than the required turn-on voltage. Subthreshold region determines the power consumption of the device when it is supposedly in off state. In the nanometre range, the energy levels redistribute and it impacts the threshold voltage of the given device. In our calculations we have taken into this consideration which is known as quantum mechanical effect (QM) [14].

2. Theoretical details

The potential in the channel and its charges are related through the Poisson expression written as $d^2\phi/dx^2 = (q/\varepsilon_{si})n_i e^{(\phi-V)q/kT}$ where ϕ is the potential in the channel, q is charge, ε_{si} is the silicon permittivity, n_i is the doping concentration, V is the quasi-Fermi potential, and kT/q is the thermal potential. The solution of this equation can be found using boundary conditions [15]

$$\frac{q\left(V_g-\Delta\phi-V\right)}{2kT}-ln\left[\frac{2}{t_{Si}}\sqrt{\frac{2\varepsilon_{Si}kT}{q^2n_i}}\right]=ln\beta\ \ -\ln[\cos\beta]+\frac{2\varepsilon_{Si}t_{ox}}{\varepsilon_{ox}t_{Si}}\beta\tan\beta \tag{1}$$

The drain current expression is given as [16]

$$I_{ds}=\mu\frac{W}{L}\int_0^{V_{ds}}Q_i(V)dV \tag{2}$$

The current in the linear, saturation and subthreshold regions are given as [15]

$$I_{ds,Lin}=2\mu C_{ox}\frac{W}{L}\left(V_g-V_t-\frac{V_{ds}}{2}\right)V_{ds} \tag{3}$$

$$I_{ds,Sat}=\mu C_{ox}\frac{W}{L}\left((V_g-V_t)^2-\frac{8rk^2T^2}{q^2}e^{\frac{q\left(V_g-V_0-V_{ds}\right)}{kT}}\right) \tag{4}$$

$$I_{ds,Sub} = \mu \frac{W}{L} kTn_i t_{si} e^{\frac{q(V_g - \triangle\phi)}{kT}} \left(1 - e^{\frac{-q(V_{ds})}{kT}}\right) \quad (5)$$

where μ is the mobility, C_{ox} gate oxide capacitance, W is channel width, L is channel length, V_g is applied gate voltage, V_{ds} is drain to source applied voltage and threshold voltage V_t is expressed as [15]

$$V_t = \Delta\phi + \frac{2kT}{q} ln\left[\frac{2}{t_{Si}}\sqrt{\frac{2\varepsilon_{Si}kT}{q^2 n_i}}\right] + \frac{2kT}{q} ln\left[q\frac{(V_g - V_0)}{4rkT}\right] \quad (6)$$

where $\Delta\phi$ is $\phi_m - \phi_s$, the difference of metal and semiconductor work function, t_{si} is channel thickness, and $r = \varepsilon_{si}t_{ox}/\varepsilon_{ox}t_{si}$. Due to QM effect, the increase in threshold voltage is given as [17] $\Delta V_{thQM} = (h^2 / 4qm^* t_{Si}^2)(\Delta t_{Si} / t_{Si})$ where h denotes Planks constant and additional symbols have traditional implications.

3. Results and Discussion

The calculation results are presented in Fig. 2–7. The channel length used is 1μm and oxide thickness as 1.5 nm for all calculations otherwise it has been stated.

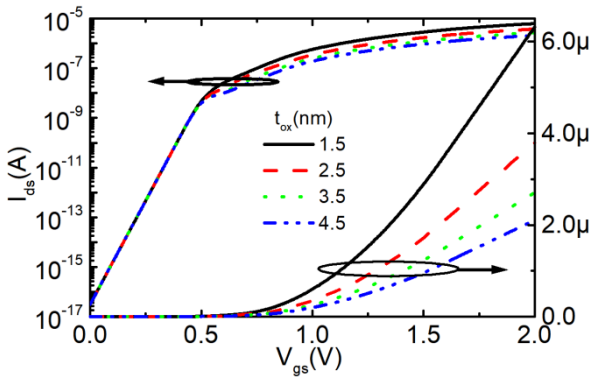

Figure 2. Drain current versus gate to source voltage for different oxide thickness.

Fig. 2 shows the variations of current with respect to applied gate voltage for different gate oxide thickness. The oxide thickness has been varied from 1.5 nm to 4.5 nm. The effect of oxide thickness variation is negligible in subthreshold region while it considerably affects the above threshold region.
In Fig. 3, silicon channel thickness has been changed to get the current variation. Here t_{si} affects subthreshold characteristics more than above threshold and it is as per the observations in [15]. The channel thickness near 5 nm contributes more to the elevation in threshold voltage arising due to QM effect.

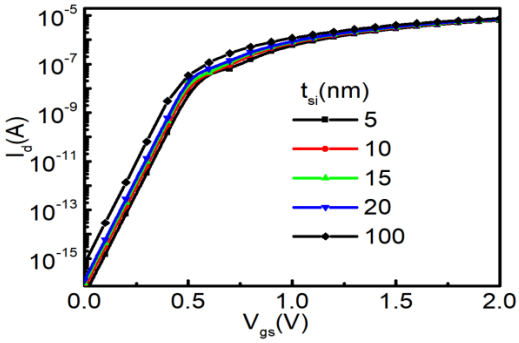

Figure 3. Drain current versus gate to source voltage for different silicon thickness..

The effect of change of channel width on the drain current is shown in Fig. 4. Current increases with width *W*. In this case, *W* has relatively more effect on above threshold area. Drain current can be increased by increasing *W*, but then it increases the size of the device.

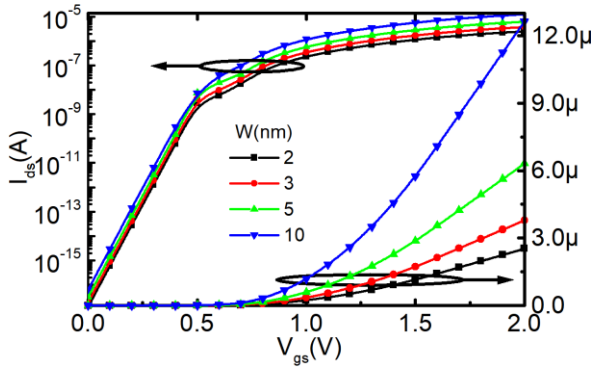

Figure 4. Drain current versus gate to source voltage for different channel width.

The outcome of altering the doping concentration can be seen from Fig. 5. Increase in doping raises the work function of silicon and in subthreshold region current increases.

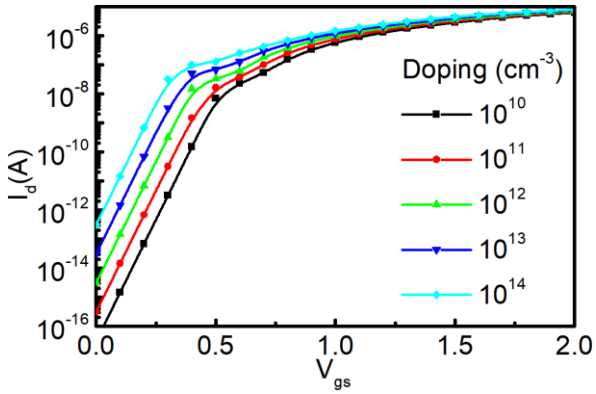

Figure 5. Drain current versus gate to source voltage for different channel doping concentration.

By changing the metal work function, desired threshold voltage can be obtained and accordingly the drain current is also affected. It can be observed from figure 6 that metal work function affects both

the regions of MOSFET operation. Threshold voltage decreases if metal work function is decreased. But one of the disadvantages is that smaller metal work function increases subthreshold current and hence the leakage current. Leakage current must be kept at minimum level. From this graph the optimum value of metal work function can be inferred.

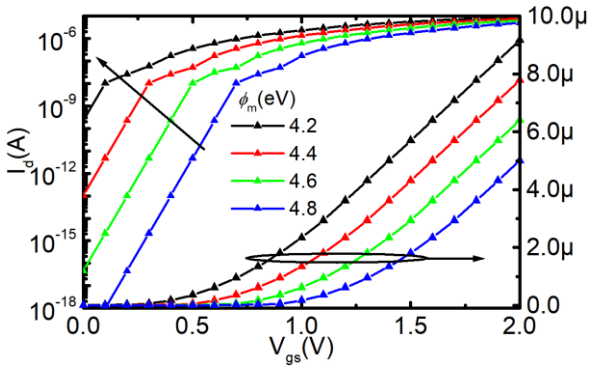

Figure 6. Drain current versus gate to source voltage for different metal work function.

The effect of mobility on current can be visualized from Fig. 7. Mobility shows more impact in the above threshold area. Therefore techniques that increase mobility may be incorporated in DG MOSFETs to increase drain current.

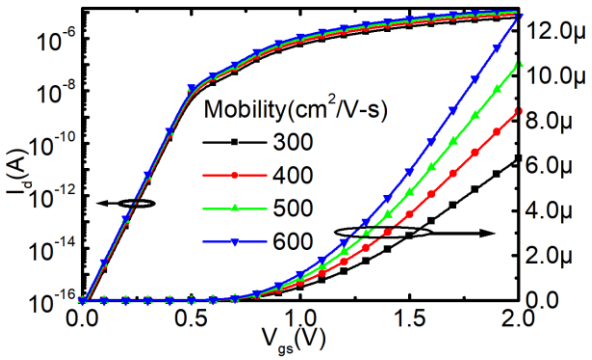

Figure 7. Drain current versus gate to source voltage for different mobility.

4. Conclusion

In this work the sensitivity of drain current of DG MOSFET for device dimension changes have been explored. It may be concluded that constraints exist for the selection of proper parameter so as to get maximum current and minimum dimension. Subthreshold current determines the off-state of the device and therefore it should be as low as possible. In the on-state, i.e., when the gate voltage is greater than the threshold voltage, larger current is expected. Selection of metal gate work function also plays very important role in the optimum performance of the device. As a future work, the effect of variation of channel length would be explored.

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Cost Minimization Through Load Balancing and Effective Resource Utilization in Cloud-Based Web Services

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ABSTRACT

With the growth of internet-based applications and the explosion of consumers, cloud-based web service applications have become more common and the importance of minimizing the cost, increasing the interactivity, and management and efficient use of resources has become high. Existing methods like fixed cost per month no longer satisfy the application maintenance costs of the modern app developers. In this article, the authors propose an enhanced model for improving efficiency; maximize availability and minimizing the cost of cloud-based web applications. The authors have conducted experiments on grid dataset and analyzed the results using several algorithms on the load balancer with the multilevel optimized shortest remaining time scheduling method. The analysis clearly proves that applying a "pay as you" go mechanism will substantially reduce the cost and will improve the efficiency which resources are utilized. The results clearly suggest improvements in cost minimization and effective utilization of resources leading to effective utilization of services.

KEYWORDS

Cloud Computing, Cost Optimization, QoS, Resource Utilization

1. INTRODUCTION

In 1961, utility computing was used, and in 1969, ARPANET was used to connect the systems for information exchange. In 1979 USENET was used for information exchange, and in 1983 TCP/IP model and protocol suite were used for network communication. In 1991, the World Wide Web was invented by Tim Berners-Lee, a Scientist, and Engineer, with web information to connect the systems. The technological advancements have benefited internet applications. In 1999 Grid computing was used on geographically distributed systems in 2000 ubiquitous access configuration of resources networks storage and services on demand inception of cloud computing. In 2012 big data was used for data processing and applications, the technological advancements now the Internet of Things (IoT) using sensors to get data and process, analyze and operation of various application like Home appliances, smart cities etc. Web services are functional services over the internet. Cloud computing is an internet-based computing that provides information processing, computation services, and

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resources to the user as pay as you go manner (For example, computer systems, servers, storage and applications).

The growth of internet-based applications which are used by billions of devices in the world and the demand for cloud-based web applications are high. The service provider adds the technical infrastructural services based on the demand of users with affordable cost, minimum maintenance, shared resources, improved performance, increase the data operations parallel processing, scalability, reliability elasticity, and secured applications. In the 21stcentury cloud-based web application services pay as you manner, to meet the performance of applications by resource, network, load balancing, and Management applications. Considering web traffic at peak hours to access the services, managing the Cloud resources by performance and cost factors. In the development of Cloud-based web applications models service providers, users, designers in a service organization, the most important non-functional parameter is the development cost, maintenance cost to be minimized and optimize and provide the services to the end users.

The rest of the article is organized as follows: Section 2 deals with related work and Section 3 with the proposed method. The Sections 4 and 5 deal with experimental results and discussions, respectively. Finally, section 6 draws the conclusion.

2. RELATED WORK

2.1. Problem Definition

The objective is to provide cloud-based web applications with a minimum cost to run the services or applications without compromising on the functionality, latency, throughput, reliability, scale and other aspects. This enforces the effective use of services by the applications as well as pushes optimizations on the data center in such a way that it effectively allocates the use of resources. There are various needs and Service Level Agreement (SLA) required for the services backing the web applications during different phases of the product lifecycle i.e. development, deployment, maintenance etc. The problem focuses on delivering a mechanism to minimize the project cost during the various phases. The motivation of the cost minimization for Cloud-based web services comes from the service providers capability to control the feature set of the services provided based on the desired SLA as opted by the end user. This will enable the end user to provide the service with the desired feature set and minimum cost. The tasks, cost, load, and availability are described in Equation 1-4.

Let there will N number of DCs/Servers to process the cloud-based web applications, tasks t_1, t_2,…, t_n for allocating process:

$$tij = \begin{cases} 1 & if\ succussful \\ 0 & for\ unsucessful \end{cases} Tasks \tag{1}$$

For minimization of:

$$Total\,cost = \sum_{i=1}^{n} \left(\mathrm{C1} + \mathrm{C2} + , .. , \mathrm{Ci} , + \mathrm{Cn} \right) \tag{2}$$

subject to a load of the server where:

$$load = \frac{\text{Number of applications running on server}}{\text{Total number of applications}} \tag{3}$$

and effective utilization of services by the availability of the system:

$$availability\,of\,server = \frac{\text{No of requests over number of applications}}{\text{Total number of applica ations}} \tag{4}$$

2.2. Literature Survey

The Total Cost of Ownership (TCO) proposed by Panagiota Nikolaou in 2015, key optimization data center design, the model framework is used for availability, hardware and software resources. The performance by power single and dual channel in Web service by TCO model failure rate and cost estimated (Nikolaou, Sazeides, Ndreu & Kleanthous, 2015).

(M. Zivkovic,2011) proposed a model sequential decision for composite service request used for decisions optimal dynamic programming by backward decision structure and forward decision structure which use of cost, and response time of application. Pengcheng Xiong in 2011, proposed decision application level (adaptive feedback controller) has a robust workload based on resources on demand. Cloud computing is the Service Level Agreement (SLA) of the service provider to ensure that the quality of services by PaaS components. The web application uses multiple tiers (N-tiers), the controller, application decision maker with different levels of resources and minimizes total resource cost by managing the workload.

(Mathias, 2011) studied two replication strategy is arrival rate and response time policy, by optimizing service replication in Cloud, load replica operating cost depends on arrival rate, response time and policy. The service oriented architecture (SOA) system use service level agreement (SLA) at cost-effective, cost-saving, and balancing load multiple replicas. The service replicas have a low response time, low utilization of active replicas, control service replica utilization, the minimum number of active replicas. C. Tian in 2011, proposed optimal load balancing technique for web applications, allocation servers to maximize throughput and cost minimization. David Breitgand in 2015, proposed an Elastic Service virtual resources workload conditions, SLA virtual data centers, to manage solution quality and computation time. Service (IaaS) cloud computing, the Virtual Machine (VM) instances-based workload the user need to pay the cost, with minimum responsibility, the service is elastic, the behavior of the service is based on workload rules, optimization techniques to maximize profit.

Cloud computing has virtual scalable computing resources, Peng Zhang in 2012, proposed cost optimization to provide data services, parallel scheduling and minimize cost applications with the execution of computations cloud services. The Greedy algorithm minimizing the cost and random task. Tao in 2012, proposed a cost-effective algorithm model which optimize multiple resources based on system preference.

Farhana Kabir 2012, proposed autonomous, self-scaling, cost-effective cache for data-intensive applications, the user cost and performance considerations. Sheng Liu in 2012 proposed optimal service composition execution cost based on Quality state matrix, and execution service and the service requestor need to pay for every successful execution. Adnan Ashraf in 2013, proposed cost-effective VM multi-tier application for video applications to find an optimal solution by meta-heuristic approaches for web application. Jing Jiang in 2013, proposed an auto-scaling Cloud resource, VM for Web application providers optimized latency and SLA. Suhradam Patel in 2013, proposed a cost-minimizing by workload monitoring by grouping Virtual Machines (Wang, Shen, Di, Li & Zhou, 2013). Lijuan Wang in 2013, proposed service computing, a compositional model for data-intensive applications.

Y. M. Xia in 2013, proposed Quality optimization and redundancy removal algorithm which reduces the memory cost and improves performance (Wu & Nie, 2013). Web service is available on the Internet with the best quality of web service satisfying all functionalities. Min Yao in 2014,

used Cloud brokerage service which helps the Cloud computing by approximation and trace-based evolutions which minimize cost. Song Li in 2014, proposed Hybrid cloud computing optimization model by dynamic provision algorithm. Lu in 2014, proposed Server virtualization and game-changing technology which will maintain and high utilization of resources and reduce cost data center. Rui Zhu in 2014, proposed comprehensive cost model used for video webcast operators with many CDN networks use of ISP and CDN cloud server providers. Satish Narayana in 2014, Cloud Computing elasticity policy has optimum setup for Cloud workload. Amazon load trace control flow components for enterprise application with use of XOR and AND operators, and auto-scaling of Web services. Z. Ren in 2014, studied workload analysis of E-commerce application, and used job scheduling algorithm and proposed Fair4S, Hadoop scheduler handling for small jobs.

Waheed Iqbal (2018) proposed a pro-active auto-scaling approach used to manage the applications based on dynamic workload and probabilistic workload patterns, predictions. fog-based interval identifies application workload using URI, distributions and predicting workload by arrival rate, average response time and auto-scaling. Maria, 2018 proposed scientific instrument workflow as service (WaaS), for deployment of applications using infrastructural facilities with use of many workflows minimize the overall cost for infrastructure resource each individual workflow. The performance is analyzed Dyna, Elastic resource Provisioning and Scheduling - Multiple workflows (EPSM) approach.

Syed Aon Ali (2018) proposed a cloud, a fog-based method with use of Energy Management System to maintain electricity for a huge number of complex smart grid applications and load balancing methods. Satapathy et al. (2016) use a contiguous link scheduling, Bhateja et al. (2018) use a FOO DBMS method to optimize the query, and Satapathy et al. (2018) use load balancing to minimize the cost of cloud-based web applications.

2.3. Proposed Model and Architecture

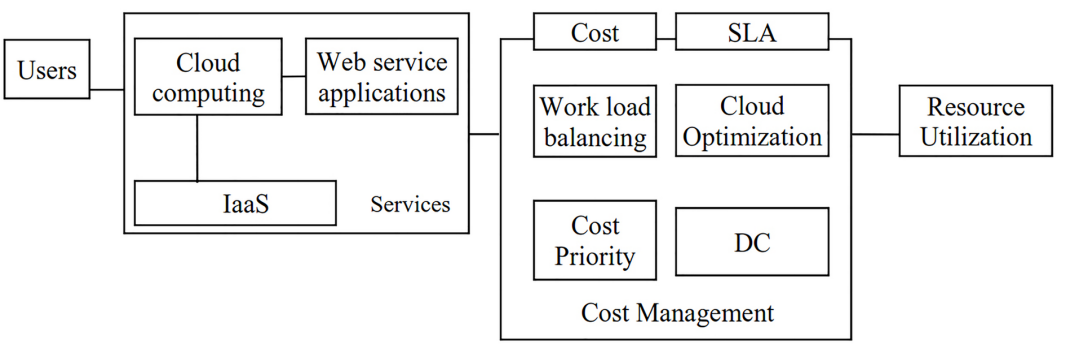
The proposed enhanced automated cloud services consist of users, services, Management and resource utilization shown in Figure 1.

The users are the end users who can access the services pay as you manner, cloud services, and cost management with effective utilization of infrastructural resources.

2.3.1. Cloud Services

Cloud computing is an IT solution that enables end users to use resources from the cloud that are managed by the service providers and the layers underneath. Organizations are moving to cloud computing as it frees them from the management and maintenance aspects of the hardware and software and allows them to focus on their core scenarios without having to worry about other aspects. This flexibility comes at the cost of paying the service providers for the services consumed. More and

Figure 1. Web service and Cloud cost optimization model



more services are moving away from a fixed cost per month model to a "pay as you go" model which allows the end users to provision the resources on demand and deflate them once they are done with using the resources. Cloud computing model users SOA principles and operates over a faster wide area network providing high virtualization of the underlying hardware, software, and infrastructure.

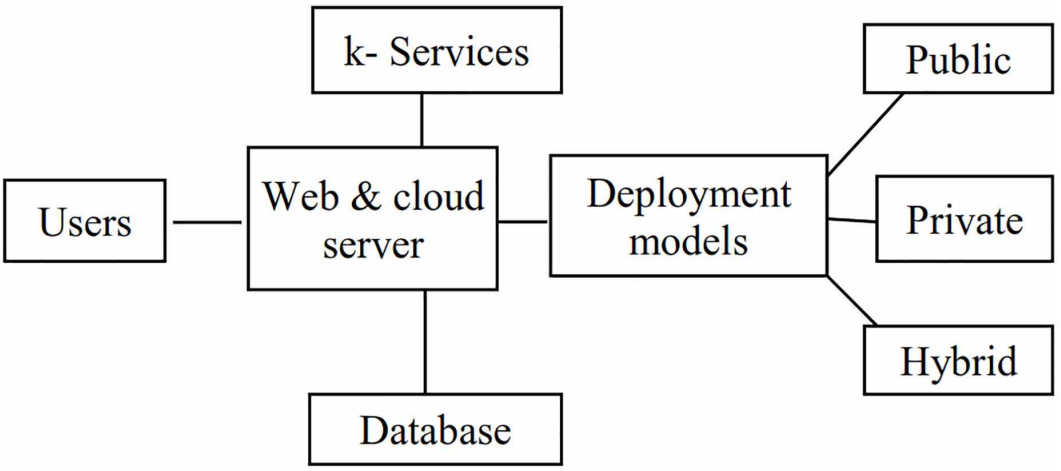
IaaS service related to infrastructural services cost maximum Cloud providers, multi-unit solution resource pools. The virtual machine service used by operational cost and elastic service. Figure 2. Shows Web services and cloud deployment model has users, web cloud servers, and deployment models. The user is the clients who can access service as "pay as you go" manner. The web and cloud server which has functional services and resources in which developer deploy the applications into public, private and hybrid cloud centers.

The Cloud computing models are divided into three types SaaS, PaaS, and IaaS. There are potentially two types of pricing models:

1. **Pay as you model:** In this model, the users are charged free for specific duration hardware, software, for example up to 15 GB free for Google cloud users. And after the specified free trial period is over, the users are charged based on the consumption of the resources. If the user does not consume the resource, they can save the cost;
2. **Fixed price model:** In this model, the users subscribe to the resources and pay a flat per month price for the resources that they bought from the service provider. The price does not vary based on the consumption, but the user is charged a flat fee irrespective of the extent of the resources consumed.

The goal of the pricing models is to empower the user by providing the user with different options such as a fixed flat rate vs a variable cost based on usage. This will enable the user to select the model based on their usage patterns. If the user has a usage pattern where the usage is constant, and the SLA requirements are harder, then the user will preferably go for the fixed price model. If the user has different workload patterns during different periods of the year, then "pay as you go" pricing model might suit better which would enable the user to scale down the services provided during the "off-peak" season and scaling the same up during the high-demand and critical seasons.

Figure 2. Web services and Cloud deployment



2.3.2. Infrastructure as Service (IaaS)

The lower layer basic computing capability of system use of operating system, storage, and services in the network, including hardware servers, memory and computing power etc. Cloud provider example, Amazon EC2, VMware, Web service Elastic Compute Cloud (EC2) and Simple Storage Service(S3). And other services described in Table 1.

Cloud computing by scalability application by variant load and elasticity of cloud servers based on load. The types of cloud services are public, private and hybrid cloud services.

2.3.3. Public Cloud Services

Are designed which are not for single or group enterprise applications, these are used by the parties, pay you manner servers with storage and services. In a public cloud, the cloud service provider, the customer chooses the best service provider with affordable cost. The request of service to process the service with the use of best proposals and needs.

2.3.4. Private Cloud

Is configured and available to only authorized users not for their party and public. Services in organizations network, bandwidth, and availability. In private Cloud services infrastructure located outside, the operating system provides the services to authorized users. For example, trusted customers in organization financial services.

2.3.5. Hybrid Cloud

The organizations use Cloud model both public and private modules in financial services, cost-effective infrastructure to the user. This is the combination of public cloud for internal use and used for consolidated, virtualized and potential resources. This is financial and business solutions (Papazoglou, 2012). The services can be functional and non-functional services, for example, functional services are APIs, Menus and application services to the user whereas Non-functional like infrastructural facilities, cost of application by Quality state matrix, execution services. The quality of services described by Equation 5:

$$Qualityofservice\left(QoS\right) = F\left(cost, availability, Responsetime\right) \tag{5}$$

The Internet Service Provider (ISP) will achieve maximum profit by the quality of services, for example, network bandwidth, delay, and bit, error rate, Wireless network systems are used based on customer satisfaction. In Cloud Computing automatic control cloud system used to optimize resources using on-demand computing model. Cost effective placement algorithm is a model cloud-based environment that uses the multi-resource model by adding the resources based on demand.

Table 1. Cloud services and examples

Service	Amazon	Microsoft	Google
SaaS	Operating system, memory, services	Microsoft Azure, Office 365	Google Docs, Gmail, Google Apps
PaaS	Elastic Compute Cloud	Micro soft Azure cloud	Data center, Google App engine
IaaS	Amazon EC2, servers, storage, networking	Microsoft Azure, servers, storage, networking	Google Cloud Platform (GCP) service, servers, storage, networking

The Cloud Service Provider (CSP)s such as Amazon, EC2, and Rockspace. The demand for resources based on the cost of applications. The software as service performs running applications, monitoring communication finance the model is formulated and analyzed by aiming to study the advantages of the data access to save the cost and space. The model is used to eliminate data duplication form memory (Indrawati, Puspita, Erlita, Nadeak, & Arisha, 2018).

Cloud-based web applications require Quality of Service, the demand of customer and optimized services. SOA components, cloud services. Load balancer use of dynamic resource allocation using hierarchical balanced tree topology, if load increases, management of cloud data centers by auto scaling and the load management is shown in Figure 3.

Software service (SaaS), running applications, and monitoring communication finance. Advantages are data can be accessed, save the cost and space, elimination of duplication. To analyze and formulate the model and balance them across the instances of available multiple zones.

In cloud computing, the workload depends on the number of systems logging interactive sessions, the computing capacity, variable workload, network management. The workload can be of two types 1) predictive workload 2) dynamic workload.

2.3.6. Predictive Workload

The workload of systems can be predicted based on the current load and past load characteristics like applications, memory, network usage, and others.

2.3.7. Dynamic Workload

Can be measured by considering the current load of the cloud-based web applications by considering the characteristics application in use, number of users, network bandwidth, scheduling, memory, DCs, and others. The submission of Machines into the systems in a cloud system which connected to proxy and virtual Node/system.

The intelligent workload management systems consist of the following components shown in Figure 4). Software applications can be identified with Data Center 2) Policy-based (Service Level Agreement): the provider promises the services based on cost and application at the time of Project assignment. 3) The client can access and identify the services 4) Performance, configuration, and Analysis and 5) secured physical and Virtual services. The above two workloads by considering the provisioning, scheduling, and Monitoring the cloud load applications.

The architecture of cloud load balancing is described here, it consists of Software applications, SLA and Middleware, operating system, servers, storage and analysis of performance and configuration, Management of services and Secured applications.

Figure 3. Load management

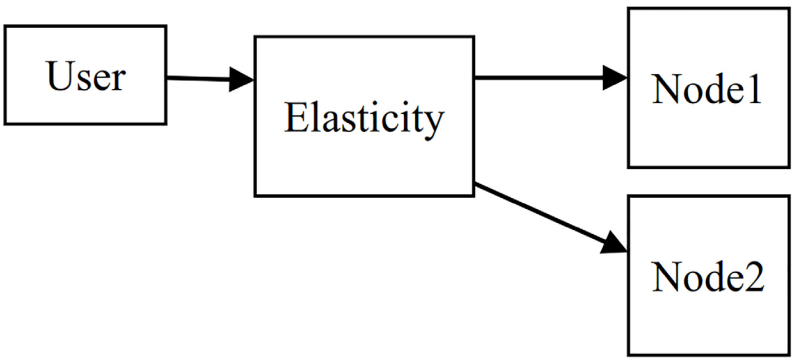
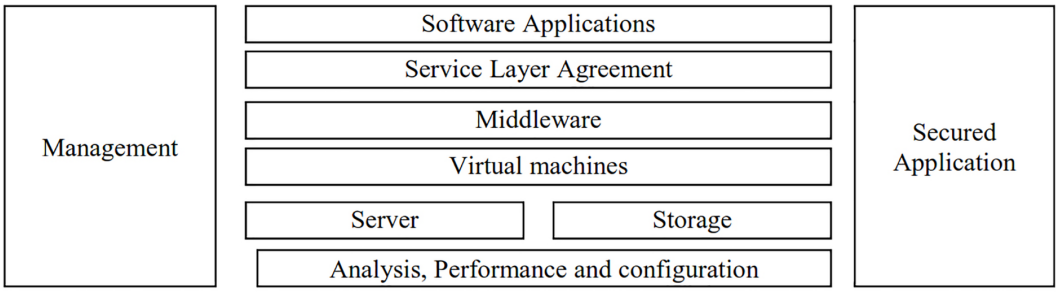


Figure 4. Cloud-based web application architecture



The development of applications with reduced cost by error-free quality documentation, reuse the code, and minimum maintenance of applications. In the service level agreement, the provider services to the user with SLA the quality of services Virtual systems, services provided for 24X7 time with the use of secured applications, storage systems. The Datacenters and application services, which will minimize the cost with use of Servers/ storage/Network facilities to the users based on the demand of users and workload monitoring add data centers by considering the peak hours, number of clients used, number of applications, capacity, network facilities, the response of the system. The applications are increasing the response time also increased minimize the response time by load balancing and scheduling algorithms. The load characteristics, network speed, network distance, response time, scheduling, cloud type services, hardware, the demand for services, peak load, DC, and workload management. The cloud-based web applications offer services such as cloud management, service request, applications workload management, infrastructure (virtual and physical).

2.3.8. Web Services

The growth of internet technologies, web service applications development companies has to implement right, and quality software based on user expectations. The Internet is growing the demand of use of web service applications across the worldwide. Web services are the functional services over the internet, in which a client can access the services, researchers are focused on functional services in UDDI – WSDL descriptions. The building of web-based applications uses of SOAP, REST-based models.

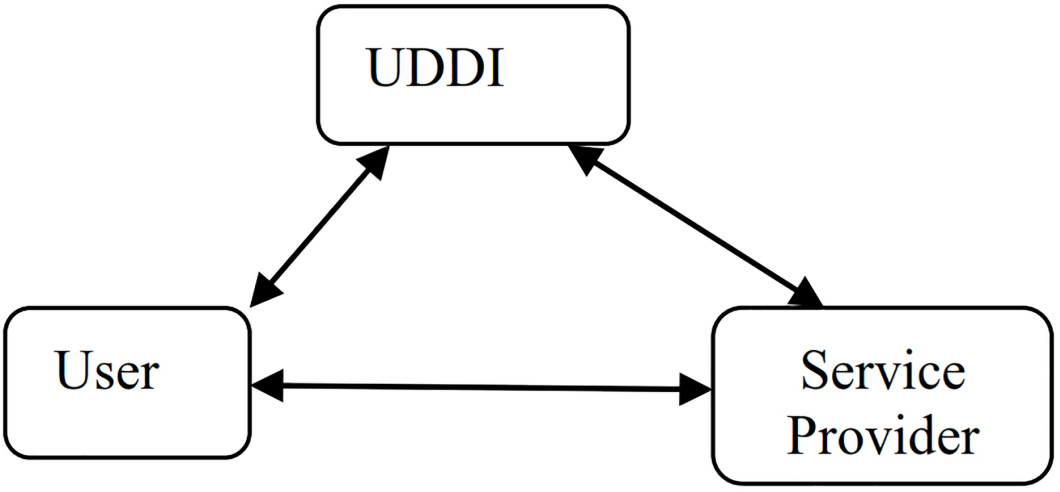
2.3.9. Simple Object Access Protocol (SOAP)

Use of SOA model/architecture shown in Figure 5, it has requester, provider, and UDDI registry. The service user is the client and end user who can use the functional services provided services by the provider, the service provider is the developer who can design and develop web applications and publish in registries. The heart of web service is registry, users and service providers, to improve the discovery of functions across multiple heterogeneous sources. UDDI is a registry with a pool of services.

2.3.10. Restful Services

The document REST based principles used in web services, clients, and intermediates. The REST has: 1) Resource identification; 2) Resource representation; 3) Represent descriptive messages; 4) Hypermedia applications, these are linked with URI in a client-server model with message communications. RESTful services three levels: 1) architectural procedures; 2) decisions related to concepts; 3) decisions related to technology. The architecture of Restful services, in the domain the method for creates, updating, reading, deleting the resource on services (GET, POST, PUT, etc.) and involving various operations by HTTP methods. Decision-related procedures to identify the source

Figure 5. SOA model



by URI, HTTP methods used (get, put) used the same it is used in Google search engine to search the relevant queries and UDDI. The Framework and building RESTful services (Adamczyk, Smith, Johnson & Hafiz, 2011) use of technologies such as programming languages Java, PHP, Python, Ruby, Rails, HTML and others.

Web services are software components, providers ensure agreed quality of services (QoS), quality factors software engineering. ISO/IEC 25010 quality standard, models used for quality evaluations, in software and quality are functional suitability, performance, efficiency, compatibility, usability, reliability and portability (Oriol, Marco & Frranch, 2014). The service provider will assure to the client with an agreement of services by SLA.

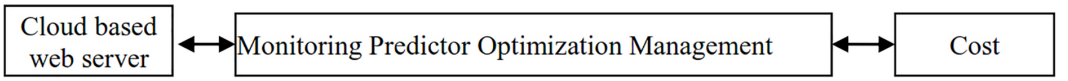
2.3.11. Service Level Agreement

Minimum total resource cost by considering workload to optimize the service by replication of cloud data servers, the load balancing by use of replicate servers by minimum operating cost based on arrival rate, response time and policies. The SLA of Service provider, the designer must design a solution which is cost effective, cost-saving, load balancing of data centers. Service replicas, the low response time, low utilization of active replicas, control service replica utilization minimum number of active replicas. Arrival policy, response time-based policy. Balancing algorithms, replica saving arranges utilization active replica to achieve average response time, SLA, complaint. Elastic resources by adding the resources minimum subject to the minimizing the cost of web applications. The cloud-based web application service provider manages the resources based on the demand.

2.3.12. Resource Management

Web service management shows in Figure 6. The Utilization of entire system, resource, dependency matrices, and cost. The demand of cloud services, the service provider application and scaling the servers as per load and demand allocation resources, with SLA, to predict the resource management, Queuing theory, Optimal auto-scaling by collecting the data, analyze the data, utilization, management allocation, load, and DC etc. The pseudo code 1, describes the load balancing of services. The objective is to optimum load for DC and maximum availability of resources. The Load balancing equations resource utilization, expected completion, load balancing under hierarchical tree topology are described in Equations 6 to11.

Figure 6. Web service management



Load balancing let there will the N number of tasks are in the queue to access the resources in Datacenters:

$$ResourceUtlization\left(Ru\right)=\frac{Number\,of\,applicaitons\;\;running}{Total\,number\,of\,applicaiotns} \tag{6}$$

R_u: Resource utilization
A_r: Applications currently running
A_t: Total number of applications

$$Resource\,utlization\left(Ru\right)=\begin{cases}0 & if\,task\,Tij\,no\,task\,are\,running\;\;where\,Ti<0\\ 1 & The\,tasks\,running\,on\,the\,system\,where\,Ti\geq n\end{cases} \tag{7}$$

n: The number of applications

$$Expected\,completion\,time=Execution\,time+Arrival\,time \tag{8}$$

Load balancing standard deviation, the load for a DC based on Equation (6) and find the load balancing mean standard deviation is used to predict the load balancing threshold of a DC:

$$\text{load balancing MSD}=\sqrt{\frac{(\text{Average resouce utlization}-\text{resource utlizationr})^2}{\text{Total jobs}}} \tag{9}$$

$$loadbalancinglevel\left(lb\right)=1-\left\{\frac{\text{load balancing MSD}}{\text{resource utlization}}\right\}*100 \tag{10}$$

By using lead balancing level (lb) values lying between 0 and 1, if the value is zero means no load. If lb value 1 means fully loaded. Load balancing level is also called threshold.

Pseudo code 1. Load Balancing

```
Input:
Web service parameters: VMs, nodes, time allocation, availability,
demand, balance load
```

```
Output:  Balance Load
Begin
1. Web service requests time t1, t2, …, tn where web systems Ws1,
Ws2, …, Wsn
2. Web Requestprediction model, to identify key features described
in Figure 4.
3. Calculate the co-relation of elements
4. Identify the key elements cost, VMs, nodes, time allocation and
availability of Multiple servers
5. Read the load
6. Find the load balancing Mean Square SD from Equation.9
7. If (load ≤ threshold)// threshold is load balancing level use
of Equation.10
Then allocate the resources on tasks on DC
Else if (load = threshold) // the DC is fully loaded
Then balance the load by adding DC to multiple servers and Network
distribution
End if
end
```

2.3.13. Workload Management

The designer and service provider must identify the key factors, protocols, network, bandwidth, routing, and design a model based on the characteristics. Select the data workload, to analyze the jobs of types small, medium and large jobs, the priority of jobs, scheduling, and considering all the workload monitoring, to optimize scheduler policies, and optimize cost-based algorithms and predict the workload and suggest the resource utilization.

Table 2 gives the cloud application usage VMs and memory and cost. To handle the workload, EC2, grow or shrink to handle the current workload, use of data structure B+ tree fast search, memory limited, most recently used cache memory, and least recently used (limited memory). The cheap storage with the use of EC2 resident, cache $0.125 per GB month per month. A load of systems based on clients (number of users), jobs running (application usage), number of processors, queues, scheduling algorithms, and other parameters. Here we consider the dynamic workload distribution.

2.3.14. Dynamic Workload Management

Workload improves the performance, resource management, allocation of resources with the dynamic workload. The changes of workload are analyzed by Workload analysis with use of Map-reduce work. The Optimize job scheduling methods with the use of map-reduce in Hadoop. Examples are Google, Facebook, Twitter, and Yahoo.

Web services can process the requests simultaneously to a maximum number of concurrent users. Video streaming application, video encoding, compression, bit rate, frequency. The cluster video encoding, virtual machines (EC2), quality of service utilization 95 to 99%. In a multi-tier web

Table 2. Cost of Cloud applications

Price per Hour in ($)	Virtual Machine (EC2)	Memory
0.08	1	2GB
0.32	4	7.5 GB
0.64	8	15 GB

application, the delay, load, capacity, admission control, prevent server overload, load prediction, predictive functional load, and reduces the machines. Grid dataset used for experimental analysis using R language which sample Grid dataset 10580 records and 12 parameters from (Grid Datatset, n.d.), summarized in Table 3., and Figure 7. Gives the number of users waiting on the queue of processes and number of applications are executing on processors the waiting time, as applications are increasing the waiting time is also increasing. Figure 8 describes the number of users requesting applications waiting time of the process is also increasing and it reaches the maximum value.

Delay, performance and cost share VM resource to improve performance, share the application to multi-web applications. For example, in video transcoding, the number of frames, bit rate, and bits used per second. Sharing of multiple concurrent streams data to improve VM utilization. And automatic adjustment and adaptability of cost, load distribution, adjust load conditions. The CPU utilization to load the jobs in memory utilization of networks and provides an approach to reduce the physical nodes.

Web applications quality by maximum throughput, server utilization, load balancing, network cost, minimize resource utilization worst case optimize to integrate new optimization which overall cost by minimizing the individual costs by load balancing, scheduling, and effective utilization of resources. The final balance to minimize the cost, balance server load. The pseudo code 2. Describes load distribution will improve the performance. The maximum utilization of services, if the load is accepted then proceed, otherwise update the system with DC, all the systems are updated based on demand and usage.

Pseudo code 2. For Load distribution

```
Input:  Request of services in a server system (DC) load
Output:  load distribution
Begin
Step 1:  Initialize the variable
```

Table 3. Grid dataset

Parameter	Description	Measured in
JobID	Counter, t_1, t_2,..t_{ij}	Sequence number
SubmitTime	In seconds	Milliseconds
WaitTime	In seconds	Milliseconds
RunTime	Runtime measured in wallclock seconds.	Time
NProcs	number of allocated processors- DCs	Number
ReqNProcs	requested number of processors	Number
ReqTime	requested time measured in wallclock seconds	Milliseconds
Status	job completed = 1, job failed = 0, job cancelled = 5	Integer
UserID	string identifier for the user	String
GroupID	string identifier for group user belongs to	String
ExecutableID	name of the executable	Filenameid
QueueID	string identifier for queue	String

```
Step 2:  Read the requestsTasks(T_ij)
Step 3:  Read the load resource utilization using Equation.6
Step 4: While (Maximum utilization) do
If (Load balance is with utilization)// Pseudocode 1. Load
balancing
Then load accepted yes.
else
Update the parameters and add DC based on load level threshold
using Equation.10.
end if
Step 5: All the system update and systems load distribute
dynamically   based on demand and distribute load to multiple
servers using   network balancing.
end while
end
```

The pseudo code 3. Describe the demand of web services (DC), if demand if high allocate the resource, based on demand allocate the resources, number of machines, number of applications, capacity and finally based on demand to allocate the DC for load distribution.

Pseudo Code 3. Find the demand cost of the web server (DC)

```
Input: Demand, load
Output: Based on demand add DC and load balancing
begin
Step 1: Initialization of parameters
Step 2: For each utilization
Step 3: Being calculate the demand
if (demand high)
then
Allocate the resource add DC
else  if (demand == average)
then the allocation is based on average demand
else
Allocate the resource based on demand.
end if
Step 4: The number of Machines, and the number of applications,
Memory   machines (MB), Capacity, CPU demand.
Step 5. If (new DC is added based on load)
Function load distribution()// Pseudo code.2 Load distribution
Optimize the cost of DC by load balancing and scheduling
algorithms
described in Table.4
Step 6. Find the load distribution
end
```

3. EXPERIMENTAL RESULTS

Load Balancing Performance Parameters with various algorithms like Random allocation, round-robin allocation, and weighted round robin. The application grid dataset which consists of sample 10580 and 12 parameters are shown in Table 3. Experiments are conducted using R Language, jobs are

running, submission time, waiting time of runtime of applications, a number of allocated processors, requested processors etc. the experiments conducted using R language and found that the users are increasing and applications are increasing the waiting time is also increasing shown in the Figure.7, the number of tasks (t_{ij})are executing waiting time reach to maximum when applications are reached to maximum load in the Figure.8, the Maximum utilization of processes according to demand and load adding the DC to distribute the load. In Table 4. Describes the load balancing algorithms for selecting parameters.

The models can be used for workload predictions, Static, Round robin, Minimum-maximum, Dynamic Loader, Honeybee, Ant colony optimization and Optimized Multi-level Shortest Remaining Time First and others. Workload predictions and management of DC and load balance will improve the cost of servers.

The users or the customers who can use the web and cloud applications. The specific applications like e-commerce, finance, insurance, transport etc. The infrastructural use facilities such as the hardware, storage, networking and server configurations. The optimum utilization of resources, high availability of resources, management of service with optimized cost. Figure 9. represents load balancing applications. Network load balancing is shown in Equations 6 to 11:

$$Network = Number\,of\,Active Transactions * \frac{total\,transactions}{weights} \tag{11}$$

The systems which handle the load as per user requests and available services, based on load adding the servers (DC) number of servers used for experiments are 12 and optimum utilization of servers by using the following. Load balancing where the list connections servers with a smaller

Table 4. Load balancing algorithms comparisons

Load Balancing/ Parameter	Random Allocation	Round-Robin Allocation
Nature of systems (DC)	Static	Dynamic
Overhead of processors	More overhead	Less overhead for round robin
Resource utilization	Less utilization of resources because randomly allocate the resources	The resource utilization is more because resources are allocated dynamically
Processor	Little trashing	No thrashing
Preemptiveness	Nonpreemptive	Preemptive by Shortest job First / Non-Preemptive priority can be decided
Predictability	Less for the static approach	weighted round robin designed for dynamic load balancing based on demand
Adaptability	Less because of deterministic allocation space	More because of flexibility to add the space based on demand
Reliability	Less because memory is fixed	More because memory is based on runtime requirement
Response time	More	Less
Availability	Less	More
Central/ distributed systems	Central	Distributed

Figure 7. Grid dataset the jobs are in queue number of users and applications are increasing the waiting time also increases

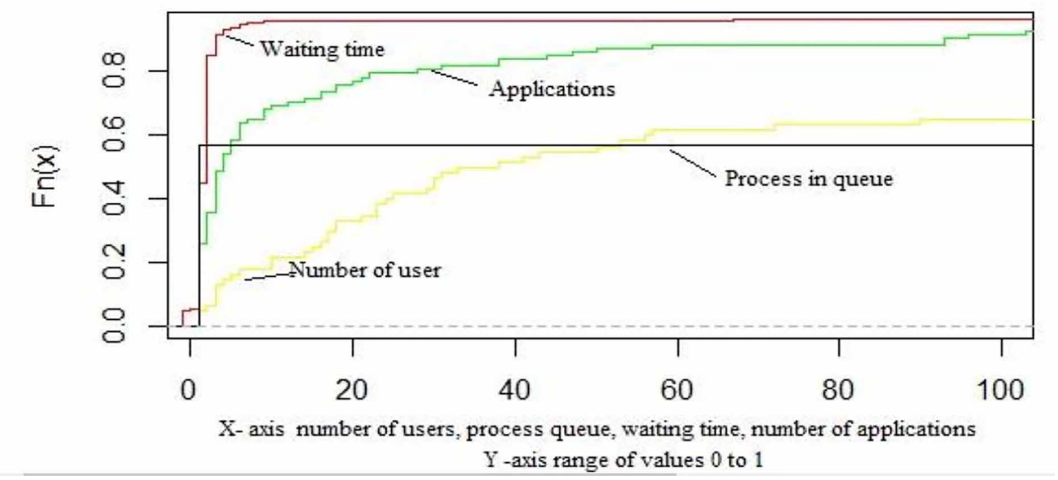
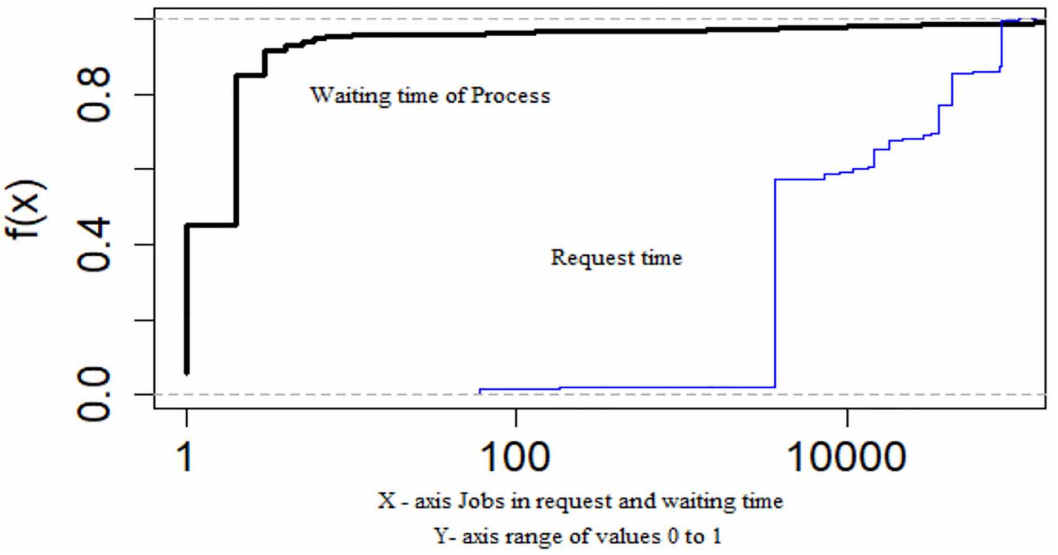


Figure 8. Grid data request time of the job (Task T) and waiting for jobs the number of process waiting time as request time waiting time reaches to the maximum

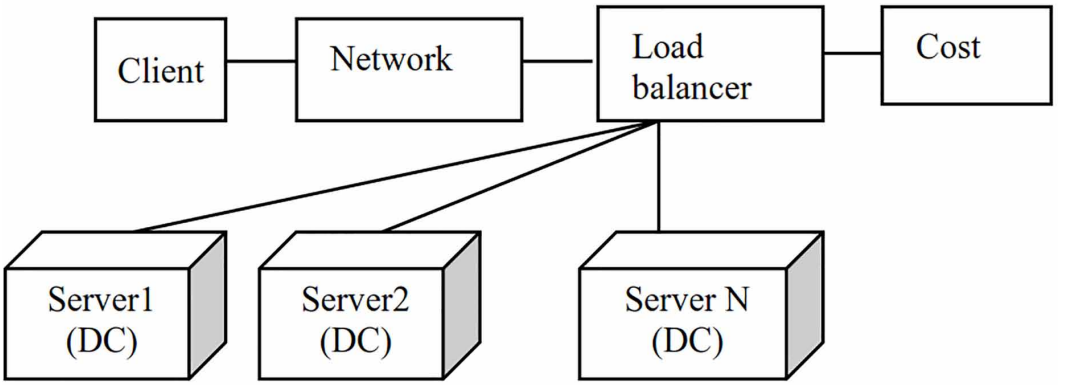


number of outflow routes. Weighted least connections each server to load the weights each server load across weights, Use round robin, and weighted round robin, equally time (Grid Dataset, n.d.).

3.1. Cost Management

The goal is automatically to adjust the load balancing with the DC-based on demand and Demand cloud resources, data-intensive applications. Read the input parameters nodes, resources, demand and applications etc., find the load of the current server (DC), if the server is balancing workload proceed with the load, not means assign resources applications to the system, find the load of the servers, if more load means and add the DC and distribute the load and update the system information.

Figure 9. Load balancing of systems



Use of job scheduling algorithms minimize the waiting time and maximize the available, and load balancing helps to minimize the cost of web-based application. The pseudo code. 4 describes cost minimization of systems here we have used 10 data centers as infrastructure as service. For example, Elastic Compute Cloud (EC2), Simple Storage Service (S3).

Pseudocode 4. Cost minimization algorithm

```
Input:  nodes, resources, demand, resource demand, current
database
Output:  Nodes (n) new database-1(if not available)
Cost plan - migration table Migration = false
Begin
Step 1:  Initialize the variables
Step 2:  Read the data,
Step 3:  For each node
Compute Load of the server using Equation 10.
Step 4:  if(load is more based on demand)
then
add the DC
migration = true;
else
execute the load on the same server
endif
Step 5:  if(migration is true)
then
current new demand
update demand
if(n>0)
then
// resource is free
return the resource
Step 6: Find the total cost using Equation 14.
end if
```

```
end if
end
```

The total cost of applications including the development cost, infrastructural cost, manpower, maintenance cost of systems and applications. Cost = ∑(cost of all things), a cost that includes development cost, development cost, service cost, and maintenance cost. The cost can be minimum, average and maximum depends on the requirements and infrastructural facilities and demand applications. The total cost is described Equation 14 and performance is by query request and delay (latency) by Equation 12. The response time to be minimized by using multi-level queue shortest remaining time algorithm:

$$Performance = querytime - latency \tag{12}$$

Time of request within latency(delay), an independent, self-scaling, cost-effective cloud cache, runtime user cost, auto configuration, resource management, scaling, workload.

The query time is by Equation 13. Which use of optimal nodes, optimal storage, predicted workload and data access based on the parameters the query response time is calculated. This will improve the performance latency miss, latency fast and the query execution time:

$$\text{Query Time} = \frac{OptimalnodeXnodes}{dataaccessfast} + \frac{optimalstroage}{slowaccess} + \frac{Predictedload}{\text{Data miss}} \tag{13}$$

The predicted load is computed by using Equation 14. Which predicted query by multiplying the data size:

$$PredictedLoad = predictedquery * Datasize \tag{14}$$

The availability is system is by invocations requests over total invocations. Estimate service errors, whole system all servers Mean time to Failure (MTTF), Mean time to Recovery (MTTR), throughput, availability input, and server will process.

Cost estimation of Web and cloud services including the data centers, estimation of maintenance, availability of services by FTS (Fault Tolerance System), MTTF model, faulty components, replacements, disk, CPU etc. predicted cost by Equation 15:

$$TotalCost = \sum \left(development\,cost + infrastrucure\,cost + services\,cost + maintanance\,cost \right) \tag{15}$$

Utilization of server by Equation 16:

$$\text{Utilization of server} = \text{Number of servers} * \frac{\text{No. of server components predictedload}}{\left(\text{MTTF} + \text{MTTR}\right)} \tag{16}$$

Estimate the server errors whole system all servers, with MTTF, MTTR, and utilization.

In the Web service applications, the user requests the application server and a request processed by the application server by executing functionality and further operations to communicate to the database server. The virtual systems use of IaaS service with scalable, web application at operational

cost, the proposed cost-effective solutions are shown in Table 8 which improve the results of cost optimization, load balancing helps to effective utilization of resources, optimized Multi-level Shortest Remaining time first will reduce the average waiting time. Figure 10 shows the cost optimization of various load balancing and scheduling methods.

4. DISCUSSIONS

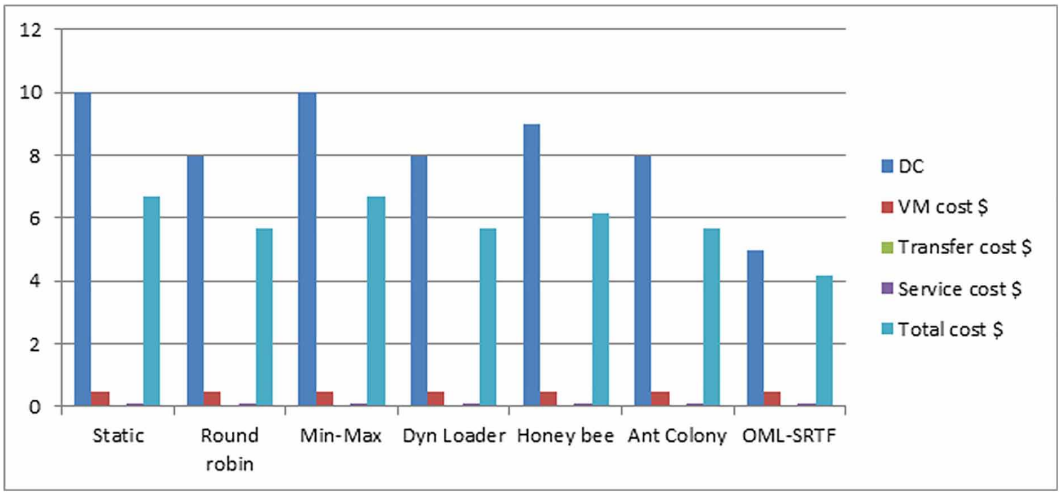
The goal is improve the quality of web services and reduce the cost of applications, by minimizing failures with use of best practices (Swami Das, Govardhan & Vijaya Lakshmi, 2016; Ebert, Dumke, Bundschuh & Schmieterndorf, 2005) in development of web applications, reduce the cost and improve the utilization of services, the quality improvement by internal process view as skilled employees as a result minimize the fault rate, and external view optimization of cost of applications, with accuracy product and services.

The customer satisfaction to services the develop use of best practices deployment, and maintenance of cloud-based web applications, this by planning, monitoring and management and improving the efficiency of components with best techniques are discussed below. These methods are also used to minimize the overall cost of the Cloud-based web application:

1. Minimize the defects in code;
2. Functional correctness improvement;
3. Cost management and optimization by minimizing the maintenance cost(rework) including detection and repair of faults and error in a web application;
4. Optimum strategies at all levels including high-speed networks;
5. Inspections, preventive measures and risk management in software development;
6. Portability and adaptability of applications, and systems;
7. Several jobs with available resources, servers and workload and software and hardware, analyze the application using benchmark dataset and tools.

Cost optimization in internet applications, the proposed method is a model using load balancing, effective utilization of resources (i.e. infrastructural) and scheduling algorithms. The user internet

Figure 10. Comparative study of cost optimization using load balancing and scheduling methods. X-axis scheduling method and Y-axis cost of Cloud services



uses functional services like banking, etc. Internet applications play an important role in economics and services (Weintraub & Cohrn, 2015; Van de Bossche, Vanmechelen & Broeckhove, 2015).

The advantages and disadvantages of Load balancing are listed in Table 5.

5. CONCLUSION

The use of cloud-based web applications increasing rapidly, the cloud service IaaS and deployment models public, private and hybrid. Providing infrastructural, platform and software services. The demand to use the services, based user requirement of services, that adds the Infrastructural, platform and software services. There are various factors influence the cost. whereas design, development, and maintenance of software, the software services, where data centers(nodes) are heavily loaded with many tasks, as considering the load constraints, and resource importance, high availability (I/O operations), and maximum utilization of resources, subjected to minimizing the overall application. The proposed enhanced model architecture which is well suited for cloud-based web applications design deployment and minimizing cost and effective utilization of resources by considering the demand, cost, resource utilization, applications, quality of services, management applications, analysis of workload management, load balancing(like static, dynamic workload) with example random allocation and round-robin dynamic allocation, and use of cost minimization algorithm (Pseudo code 4), with grid dataset consists of 12 parameters with sample of 10580 records. The experimental results conducted R language and result in the number of users increases, the applications are increasing, the processes in the queue, the waiting time is also increasing. The designer will use load balancing, and scheduling (Multi-level shortest remaining) algorithms will improve the performance shown in Figure 7, and Figure 8. Table 4 describes the load balancing comparisons, Table 5 describes various scheduling methods advantages and disadvantages are discussed. Table 6 describes the scheduling models and finally optimized multi-level CPU scheduling – load balancing will be best solution., Table 7 shows a sample of 1559 records of Grid dataset, number of processors, average waiting time, an average of maximum execution time, minimum execution time, maximum execution time computations. Table 8 shows the cost optimization of load balancing, effective utilization of resources and scheduling algorithms. Figure 10 shows the comparative study of load balancing- scheduling algorithms among these Optimized Multi- queue shortest Remaining time method got improved results. The suggestion to improve the cost minimization and effective utilization of resource with a user of best practices such as application load balancer with use of scheduling methods. The network load balancers used

Table 5. Load balancing details

Scheduling	Pros	Cons
Static	Load at complete time	Not handle throughput
Round robin	Fixed quantum CPU burst	Longest task time
Minimum-maximum	Small task better completion	Starvation
Dynamic Loader	Work distortion at runtime use FTS	Check the node
Honeybee	Increase throughput minimum Response time	High priority
Ant colony optimization	Faster information, minimum span, independent task, and intensive computation	Network overhead for a long time and no clarity in ants
Optimized Multi-level shortest remaining time First	Faster information and minimization of response time for many tasks, Better performance	Needs to sort the jobs based on the shortest remaining time - priority

Table 6. The cost of applications using various scheduling methods

Scheduling	Service Utilization Cost	DC Cost	Maintenance Cost	Load Balancing	Effective Utilization
Static	Fixed cost	more	Increased	Manually	Manually
Round robin	Variable cost	Less	Decreased	Dynamically	Dynamically
Minimum-maximum	Fixed	More	increased	static	static
Dynamic Loader	Variable	Less	Increased	Dynamic	Dynamically
Honeybee	Fixed/ variable	More	Increased	Static/dynamic	Manually/ Dynamically
Ant colony optimization	Fixed	More	Increased	Manually	Manually
Optimized Multi-levelShortest Remaining Time First	Variable	Less	Decreased	Dynamically	Dynamically

Table 7. A sample of 1559 records of grid dataset, number of processors, average waiting time, an average of maximum execution time, minimum execution time, maximum execution time

Processors	Record Job Count	Average Waiting Time (ms)	Average Execution Time (ms)	Maximum Execution Time (ms)	Minimum Run Time of One Record (ms)	Maximum Run Time of One Record (ms)
1	368	3.73	2.3	65161	1	60
2	841	46.94	8.3	1058	2	305
4	220	2.29	1.45	559	3	313
8	110	2.89	2.69	4	2	10
12	2	3	114.5	210	23	212
16	16	3.06	5.06	7	2	9
24	2	3.5	31	35	31	38

to minimize defects, functional correctness, and the maintenance cost to be minimized. In the future, IoT controlled the Hybrid load balancing algorithms will be used for mixed attributes.

Table 8. Cost optimization by load balancing, scheduling, and effective utilization

Scheduling	Load Balancing and Effective Utilization	Virtual Machine	Communication	Per Hour Cloud Service Cost	Total Cost in $
		VM Cost in $	Data Transfer Cost $	Fixed Cost	Total Cost $
Static	10	0.5	0.06	0.08	6.68
Round robin	8	0.5	0.06	0.08	5.68
Minimum-maximum	10	0.5	0.06	0.08	6.68
Dynamic Loader	8	0.5	0.06	0.08	5.68
Honey bee	9	0.5	0.06	0.08	6.18
Ant colony optimization	8	0.5	0.06	0.08	5.68
Optimized Multi-level Shortest Remaining Time First	5	0.5	0.06	0.08	4.18

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Locality—Aware Scheduling for Containers in Cloud Computing



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Abstract The cutting edge scheduler of containerized cloud administrations considers load balance as the main rule, numerous other imperative properties, including application execution, are ignored. In the period of Big Data, applications advance to be progressively more information escalated and subsequently performed inadequately when conveyed on containerized cloud administrations. With that in mind, this paper means to enhance the present cloud administration by considering application execution for the cutting edge compartments. The more explicitly, in this work we fabricate and break down another model that regards both burden equalization and application execution. Dissimilar to earlier examinations, our model edited compositions the predicament between burden equalization and application execution into brought together steaming issue and after that utilizes a factual technique to effectively settle it. The most difficult part is that some sub-issues are amazingly unpredictable (for instance, NP-hard) and heuristic calculations must be formulated. To wrap things up, we actualize a framework model of the proposed planning procedure for containerized cloud administrations. Exploratory outcomes demonstrate that our framework can fundamentally support application execution white safeguarding generally high burden balance.

Keywords Cloud computing · Load balance · Containerized cloud administration · Safeguarding · NP-hard

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1 Introduction

The previous couple of years have seen a developing number of versatile and sensor applications that depend on Cloud support. The job of the Cloud is to enable these asset constrained gadgets to offload and execute a portion of their register serious undertakings in the Cloud for vitality sparing and additionally quicker preparing. Notwithstanding, such offloading to the Cloud may result in high system overhead which isn't reasonable for some portable/sensor applications that require low idleness. In this paper, we propose a territory mindful burden-sharing method that permits edge assets to share their remaining task at hand so as to keep up the low inertness necessity of Mobile-Cloud applications. In particular, we examine how to figure out which edge hubs ought to be utilized to impart the remaining task at hand to and the amount of the outstanding burden ought to be shared to every hub. Our trials demonstrate that our region mindful burden-sharing procedure can keep up low normal start to finish idleness of portable applications with low inertness variety while accomplishing great use of assets within the sight of a dynamic remaining task at hand.

Objectives

- To examination prescient investigation of territory mindful storage tier information obstructs over Hadoop;
- To plan area mindful burden part taking in versatile distributed computing;
- To structure toward territory mindful planning for containerized cloud administrations;
- To examination territory mindful booking for holders in distributed computing.

2 Literature Review

2.1 Structuring Your Paper

LaValle et al. [1] the term "Enormous Data investigation's alludes to an extensive scale answer for overseeing mammoth datasets in a parallel domain. Hadoop is a biological community that forms vast datasets in appropriated processing situation. The biological community is additionally classified into four sub-ventures, for example, HDFS, MapReduce, YARN, and Hadoop Commons. The Hadoop Distributed File System (HDFS) is a spine of biological system, which helps putting away and handling substantial datasets. As of late, HDFS is moved up to heterogeneous capacity level condition that adapts to information square handling over various capacity gadgets for example Plate, SSD, and RAM. The square position strategy dispatches information squares to the gadgets without figuring I/O exchange parameters and territory points of view. In addition, HDFS chooses arbitrary Datanodes that could

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be situated into the following rack having longer way than neighborhood rack. This expands the information square handling dormancy and results in a colossal postponement for reproduction the board in heterogeneous capacity level. To determine this issue, we propose a prescient examination that fabricate a territory mindful capacity level hub outline and anticipate the most adjacent accessible capacity level for square occupation preparing. The test assessment delineates that the proposed methodology diminishes information square exchange time overhead, copy exchange time overhead and diminishes hub ways to an ideal availability over the bunch.

Cloudera [2] in this paper, we propose a system for security safeguarding redistributed medication revelation in the cloud, which we allude to as POD. In particular, POD is intended to enable the cloud to safely utilize different medication recipe suppliers" medication equations to prepare Support Vector Machine (SVM) given by the logical model supplier. In our methodology, we configuration secure calculation conventions to enable the cloud server to perform generally utilized number and division calculations. To safely prepare the SVM, we plan a safe SVM parameter choice convention to choose two SVM parameters and develop a safe consecutive negligible enhancement convention to secretly invigorate both chose SVM parameters. The prepared SVM classifier can be utilized to decide if a medication substance compound is dynamic or not in a security safeguarding way. In conclusion, we demonstrate that the proposed POD accomplishes the objective of SVM preparing and concoction compound order without protection spillage to unapproved parties, just as exhibiting its utility and productivity utilizing three certifiable medication datasets.

Kala Karun and Chitharanjan [3] cloud-helped Internet of Things (IoT) gives a promising answer for information blasting issues for the capacity imperatives of individual items. Nonetheless, with the influence of cloud, IoT faces new security challenges for information commonality between two gatherings, which is presented without precedent for this paper and not as of now tended to by customary methodologies. We research a protected cloud-helped IoT information overseeing technique to keep information classification when gathering, putting away, and getting to IoT information with the help of a cloud with the thought of clients increase. The proposed framework novelly applies an intermediary re-encryption plot, which was proposed in \cite{XJW15}. Henceforth, a protected IoT under our proposed strategy could oppose most assaults from the two insiders and untouchables of IoT to break information classification, and in the interim with consistent correspondence cost for re-encryption against gradual size of IoT. We further demonstrate the technique is handy by numerical outcomes.

Abbas et al. [4] Information spillage is the coincidental revelation of delicate data through relationship of records from a few databases/accumulations of a cloud information distribution center. Vindictive insiders represent a genuine danger to cloud information security and this legitimizes the emphasis on data spillage because of maverick representatives or to pariahs utilizing the qualifications of authentic workers. The exchange in this paper is confined to NoSQL databases with an adaptable construction. Information encryption can lessen data spillage, however, it is illogical to scramble huge databases and additionally all fields of database records. Encryption restricts the tasks that can be carried on the information in a database. It is along these

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lines, basic to recognize touchy reports in an information stockroom and focus on endeavors to secure them. The limit of a spillage divert presented in this work evaluates the instinctively evident intends to trigger cautions when an insider aggressor utilizes unreasonable PC assets to correspond data in various databases. The Sensitivity Analysis dependent on Data Sampling (SADS) presented in this paper adjusts the exchange offs between higher effectiveness in recognizing the dangers presented by data spillage and the exactness of the outcomes gotten by testing vast accumulations of reports. The paper gives an account of trials surveying the viability of SADS and the utilization of specific disinformation to confine data spillage. Cloud administrations distinguishing touchy records and decreasing the danger of data spillage are additionally talked about.

Tsuruoka [5] with the appearance of distributed computing, an ever-increasing number of individuals will in general re-appropriate their information to the cloud. As a basic information use, secure watchword look over scrambled cloud information has pulled in light of a legitimate concern for some specialists as of late. Be that as it may, the majority of existing looks into depend on a perfect suspicion that the cloud server is "interested however genuine", where the list items are not checked. In this paper, we think about an all the more difficult model, where the cloud server would most likely carry on unscrupulously. In view of this model, we investigate the issue of result confirmation for the protected positioned catchphrase seek. Not the same as past information confirmation plans, we propose a novel obstacle based plan. With our cautiously formulated check information, the cloud server can't know which information proprietors, or what number of information proprietors trade stay information which will be utilized for confirming the cloud server's rowdiness. With our methodically structured confirmation development, the cloud server can't know which information proprietors' information are installed in the check information support, or what number of information proprietors' confirmation information are really utilized for confirmation. All the cloud server knows is that when he carries on untrustworthily, he would be found with a high likelihood, and rebuffed truly once found. Besides, we propose to enhance the estimation of parameters utilized in the development of the mystery confirmation information cradle.

3 Methodology

The predictive analysis consists of two phases, i.e., (i) Storage-tier summary container and (ii) Predict the most nearby Datanode.

The storage-tier summary container collects all the Datanode and storage media information, i.e., computing capacity and storage-tier devices with volume statistics. Moreover, the media predictor performs training sessions over the dataset and predicts the most nearby Datanode with available storage-tier media as seen from Fig. 1.

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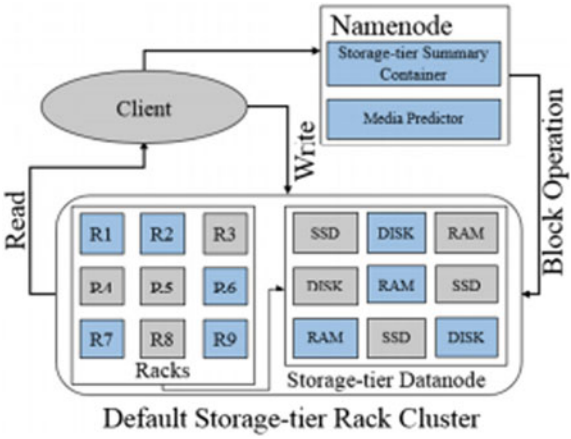

Fig. 1 Storage tier predictive analysis over HDFS cluster

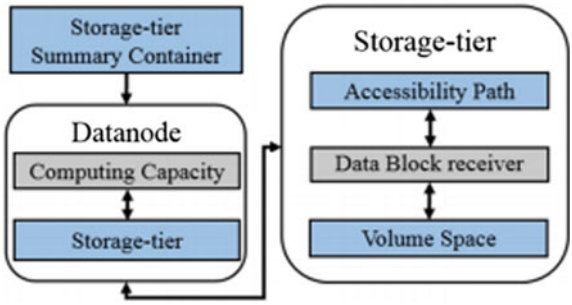

Fig. 2 Storage-tier summary architecture

Storage-tier Summary Container

The summary container consists of Datanode information, i.e., CPU, storage media, accessibility time, 1 MB data block receiving time and volume sizes of each storage (Fig. 2).

4 Results

Environment

The biological community comprises of Intel Xeon processor with 8 CPUs, 32 GB memory, and capacity gadgets, for example, 1 TB Hard plate drive and 128 GB Samsung SSD. Notwithstanding that, we use Intel center i5 with 4 Core, 16 GB memory and capacity gadgets for example 1 TB Hard circle drive and 128 GB Samsung SSD. We introduce 5 virtual machines having virtual box 5.0.16 as observed from Table.

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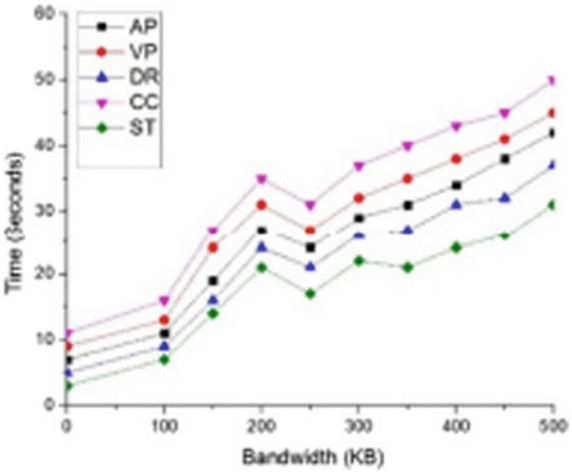

Fig. 3 Storage-tier summary container message collector

The exploratory dataset comprises of:

(i) 250 arbitrary SSD word check information squares of 64 MB (40 GB size),
(ii) 250 irregular DISK word tally information squares (40 GB size) and
(iii) 250 arbitrary RAM word check information squares (40 GB size).

Storage-tier Summary Collector

The collector fetches event traces of computing capacity, storage-tier I/O, Accessibility Path timestamp, Datablock receiver timestamp and Volume Space statistics over container. The message length varies between $0.5 \leq \text{size} \geq 5$ KB and consumes a resource between $0.2 \leq \text{Bandwidth} \geq 500$ KB/s. The summary container stores 2.7 GB of log information over 120 GB data blocks as observed from Fig. 3.

After generating container messages, we perform prediction simulations over three "250" random data blocks. In the first hour of simulation, we observe that predictor detects pattern of "109" SSD data blocks, "78" DISK data blocks and "63" RAM data blocks. In the second hour of simulation, we use "500" random data blocks and analyze that predictor observes pattern of "211" SSD data blocks, "192" DISK data blocks and "97" RAM data blocks. In the third hour of simulation, we evaluate "750" random data blocks and evaluate that predictor observes pattern of "322" SSD data block, "219" DISK data blocks and "109" RAM data blocks as observed from Fig. 4.

The media predictor depicts locality-aware nearby Datanode statistics with available functional media. The predictor lists processing timestamp, accessibility timestamp, and completion timestamp of data blocks over respective storage media. As a result, we calculate locality-aware path and observes that proposed processing, node, and storage-tier approaches are 39.1, 54.7, and 22.9% efficient than default data block processing. This reduces storage-tier latency, node latency, and overall processing latency as observed from Fig. 5.

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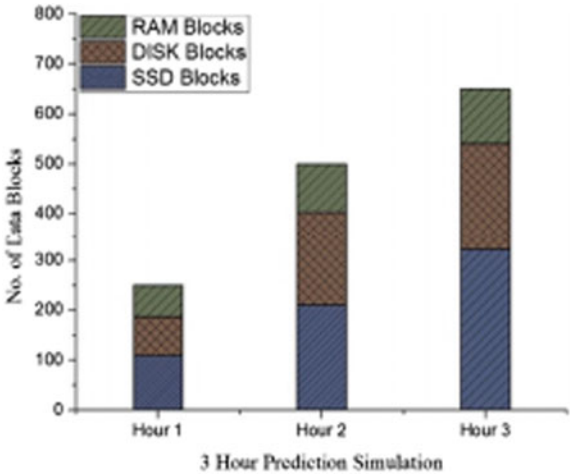

Fig. 4 Storage-tier media block job prediction

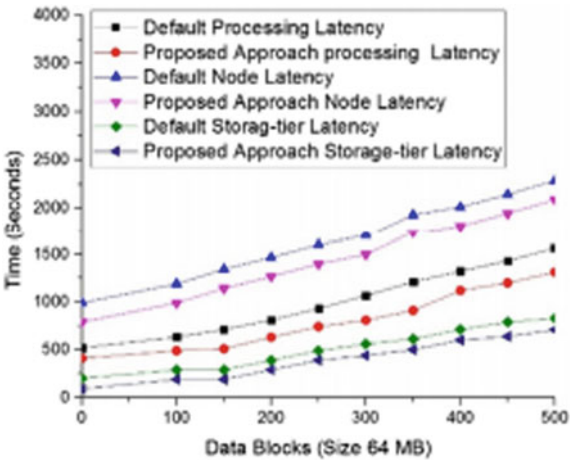

Fig. 5 Latency optimization over HDFS cluster

5 Conclusion

In this paper, we think about the issue of burden-sharing to deal with runtime elements in a Mobile-Edge Computing (MEC) condition. Our inspiration depends on the dynamic property of the outstanding burden in MEC alongside the low idleness prerequisite for a considerable lot of the present portable/IoT applications. The Edge Cloud stage that has been proposed to give computational loading backing to versatile applications faces extra difficulties in taking care of outstanding burden elements since the hubs in Edge Clouds are ordinarily associated by WAN with high system inertness and constrained transmission capacity. We propose a region mindful burden-sharing method that permits edge hubs to share their outstanding task at hand

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to different hubs to meet the low dormancy prerequisite of the versatile applications on account of remaining task at hand increments. Our heap sharing system enables hubs to

(1) Intelligently decides if to share their outstanding burden to different hubs,
(2) Selectively picks which hubs the outstanding burden ought to be imparted to, and
(3) Determines the amount of the remaining burden ought to be shared. Our trial results dependent on a genuine Twitter's follow demonstrate that our territory mindful burden-sharing strategy can keep the general dormancy of versatile applications near the applications' ideal objectives just as better use assets even on account of dynamic outstanding task at hand.

Headings should be capitalized (i.e., nouns, verbs, and all other words except articles, prepositions, and conjunctions should be set with an initial capital) and should, with the exception of the title, be aligned to the left. Only the first two levels of section headings should be numbered. Kindly refrain from using "0" when numbering your section headings.

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A Comparative Analysis of Parallel and Distributed FSM approaches on Large-scale Graph Data

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Abstract— Graph Mining has an explosive growth or increasing use of graphs in generating graph databases of real-world applications. It contains either a single large-scale graph or set of small size graphs. A Graph is used for complex dynamic modeling objects and they are often changing in nature i.e. it may increase or decrease in their size. Frequent subgraph mining plays a vital role in data mining, with an objective of extracting useful knowledge is presented in terms of repeated structures. Graph mining is used for the chemo-informatics, Bio-informatics, sentiment analysis, social human behavior analysis, financial network analysis, web analysis, wired and wireless networks. In this paper, we describe in detail survey on frequent subgraph mining algorithms, which are helpful for retrieving knowledge from complex dynamic objects. There are different types of large-scale parallel and distributed frameworks used for performing graph partitioning, FSM based on Apriori and pattern growth strategies, and large-scale graph processing techniques to achieve load balancing memory scalability, partitioning, load balancing, granularity and technical enhancement for future generations.

Keywords: Graph partitioning, frequent subgraph mining, Apriori, pattern growth, parallel framework.

1. INTRODUCTION

Nowadays, one of the most challenging issue to be faced by government, business, scientific, and social network communities is to mine valuable information [1]. Most of the domains, there have been a success for the data that takes in terms of entities and along with their attributes, because the relationship between the entities can be helpful. A Data Mining is an analysis step in the way of Knowledge Discovery in Databases (KDD) and it should be in different forms, i.e. recurring patterns of transactions to complex patterns of transactions which are interrelated. It aims to extract the attractive patterns and knowledge from the huge amount of homogenous or heterogeneous data which is being collected within the business and the experimental world.

Basics of Graphs: A Graph is an efficient and suitable method to model the data in complex databases. It serves as an imperative data structure in various areas including social network, bioinformatics and web applications etc. In this model, a relationship should be in terms of nodes and edges, where a node acts as an object and an edge will is to make the relationships between the nodes. Graph modeling which helps us to deal with the problems that were not solved before and find the similarity between graphs is essential.

As communication networks are graphs, in which each node is a protein and each edge describes the way of an interaction, there are two possible methods to measure the similarity between the graphs. First make a pair-wise comparison among the vertices and/or links in two networks and compute an overall similarity score for the given two networks from the similarity of among the components, it requires time quadratic in terms of its edges and vertices, and it is computationally possible even for large-scale graphs and it totally neglects and defects the network shape, considered them as the collection of nodes and edges instead of graphs. In this, if they share most of the common substructures or subgraphs then we can consider two networks are similar and to solve subgraph isomorphism problem is an NP-complete, in this, the time taken for execution is expensive because this problem increases exponentially with problem size. To speed up the subgraph isomorphism with the help of novel graph canonical labelling and different types of heuristics approaches were developed.

Modern graph datasets follow two magic words i.e. “Large and Evolving”, here term large means that vertices and edges available in that graph are in terms of millions and billions. Evolving in these graphs is not static frequently, changing with addition and/or deletion of nodes and/or edges [2]. In dynamic graphs, if an insertion of subgraph that leads to more number of subgraphs and it may not be the desired subgraph, becoming the targeted subgraph pattern, removal of a single node may result in the changes of most recently required subgraph available in the current graph into non-targeted subgraph or subgraph of the targeted subgraph. Next challenge is if a graph dataset is combined into a single entity or split into more units, i.e. it may be a single connected component or disconnected. These kinds of graphs will offer different performance with different algorithms before

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selecting the proper algorithm and choosing data set type is also very essential. FSM is a critical and crucial problem in data retrieval or mining domain. The aim of the FSM is to identify possible subgraphs will occur in the input graphs more frequently than a given user-defined threshold [3]. It is also called frequent pattern mining or frequent subgraph discovery. It has significance in intra disciplinary areas, such as protein structure analysis, transportation systems, sentiment analysis, defense and security, wireless networks, financial network analysis, and sentiment analysis. The structures relevant information is gathered from the above applications are simple trees.

Apart from the graph analysis, FSM is essential in intra-disciplinary areas, such as privacy-preservation, protein function prediction, image processing, classification, clustering, and graph indexing. FSM in a social network is required to identify the way of social media communications. In spite of getting useful information, finding the FSM will probably provide, it may be sensitive data such as web-click graphs, trajectory graphs, mobile phone call graphs, and, release directly the FSM will cause substantial concerns on the users' privacy those who are participating in the data.

The remaining paper is described in the following strategy. In the next section, gives a review of different graph partitioning approaches. Section 3, deals with the various frequent subgraph mining techniques using Apriori-based and patterns growth methods those will be helpful for solving the FSM in small-scale graphs to large-scale graphs they depend on the candidate generation approaches and the frequency counting. Section 4, we present the parallel and distributed frameworks for finding the FSM on large-scale graphs. Section 5, discuss the conclusions and future scope.

2. GRAPH PARTITIONING APPROACHES:

Unstructured meshes are illustrated as undirected graphs and they follow the sparse matrix data structures. Various algorithms are operating on these graphs usually involve the iterative application of the same basic processing at each and every node of the graph, and each node will do a small amount of work. Unstructured mesh types of problems may be implemented on a parallel and distributed-memory computer, the graph must be divided into multiple subgraphs and each subgraph is associated with one processor. Then after, all of these subgraphs should be of very nearly equal size subgraphs or equal numbers of vertices for achieving an efficient load balancing, and the edges to be connected to the subgraphs is minimized for avoiding unnecessary communication or connection among the processors.

Let G is an undirected graph from G_1 to G_n. In this, $G_i=(V_i, E_i)$ is a tuple where V is a collection of non-empty vertices $V=\{v_1,v_2,\ldots,v_n\}$ and E is a collection of non-empty edges $E \subseteq V \times V$, such that each and every edge $e \in E$ belongs to the pair of vertices (v_1, v_2). Suppose, Graph $Gs = (V_s, E_s)$ is acts as a subgraph of $G =(V,E)$, indicated as $G_s \subseteq G$, iff $V_s \subseteq V$ and $E_s \subseteq E$. In this, bunch of graphs in G and user-mentioned support threshold is S_{min}, then G_s is said to be frequent only if it is a subgraph of at least S_{min} graphs. The support$(G, G_s) = \{G_i | G_s \subseteq G_i \cap G_i \in G\}$ denotes the supporting graphs of G_s. A subgraph G_s is frequent if $|support(G, G_s)| \geq Smin$. Suppose F denotes the collection of all FSMs and frequent subgraph $X \in F$ is said to be maximal only if it is not having the frequent supersets where M is a group of possible maximal FSMs and which is helpful to identify the maximal FSMs as connectivity is a valuable information which is collected from the connection between the nodes and permits for removing the mining disconnected combinations. The graph partitioning (GP) problem follows the NP-complete, it is also called the min-cut problem and defined as splitting the given graph into smaller chunks or blocks. Graph Partitioning can be implemented in two ways i.e. vertex based partitioning and edge-based partitioning.

For graph mining, good partitioning on large graphs is crucial because of several reasons. One of the best GP is the vital pre-processing step is to follow the divide-and-conquer algorithms, in this graph is divided into roughly same sized dense subgraphs, the same algorithm is applied on it and combines the intermediate results in the final phase. Another type of partition is to reduce the size of cross-partition edges that decreases the length of communication among the different machines at a large scale.

Large-scale graph partitioning challenges are multi-level paradigm, quality graph partitioning, and load balancing. There are various graph partitioning algorithms [4] that will use different techniques to overcome the above challenges.

There are two types of Graph partitioning techniques: 1) Static Partitioning 2) Dynamic Partitioning. Static Partitioning is further classified as serial partitioning and parallel partitioning whereas dynamic partitioning is further classified as distributed and clustered Approach. Figure1 shows the classification of algorithms depends on the implementation of graph partitioning strategies.

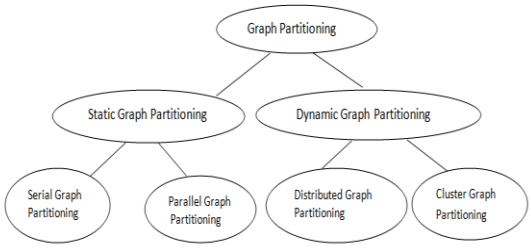

Figure1. Classification of Graph partitioning strategies

2.1. Non-Adaptive or Static Graph Partitioning:

Static partitioning is an essential way of multi level computations. Here, split a node into various m-disjoint subsets using the first stage of multi-phase calculations, in which they are active and the subgraph contains only those nodes in the first subset and its connected edges are partitioned. The subgraphs are calculated nodes are locked, it will not be changed further and accordingly, the next nodes which are available in the second subset will be appended to the subgraph. In this phase, the nodes which are from the second subset are easy to vary the subdomains and these free vertices which are allotted to the identical subdomains as their

locked neighbors. Though the next iteration of partitioning is over, the subdomains which are calculated from the second subset nodes are blocked, the third subset nodes and edges are added to the subgraph, it is further partitioned for the third iteration and the similar process is to be continued for m iterations, which gives a multi level partitioning result.

Serial Graph Partitioning: METIS is an irregular graph and which is consists of sequential programs for graph partitioning, divides the large meshes, and computes the fill-reducing orderings of sparse matrices will results in quickly produce good quality graph partitioning. METIS related algorithms are depended on the multilevel k-way, multilevel recursive-bisection, and multi-constraint partitioning approaches developed in the University of Minnesota Digital Technology Center (DTC) labs and is freely distributed.

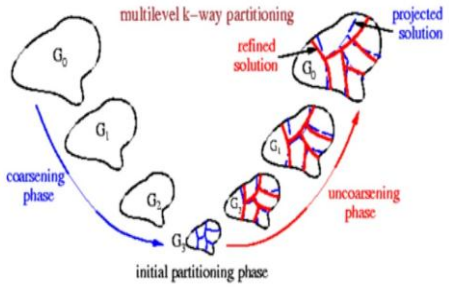

Figure2. Phases of Multilevel graph partitioning

Multilevel graph partitioning has three levels or phases that they are graph coarsening, initial partitioning, and uncoarsening. In the first phase i.e. Graph coarsening, a consecutive in sequence tiny graphs is computed from the input graph, every consecutive graph is to be built from the earlier graph by combining for a maximal size set of neighboring pairs of nodes and it should be continued until the size of the graph will have been reduced to less number of nodes. In the second phase, a partitioning of the coarsest, the smallest graph is to be identified, it is very small and which executes quickly. In the third phase, the partitioning of the smallest graph produces a useful larger graph by allocating the bunch of vertices which are combined to get the same partition as that of their relevant collapsed node. After completion of the projection step, it should be modified with the help of different heuristic methods to repetitively move the nodes between partitions till the that types moves will enhance the performance of the GP solution. Therefore, the uncoarsening phase is completed only if the partitioning solution given graph is obtained on has been projected all the way to the given graph.

METIS use modern strategies to consecutively decrease the size of the graph and refine the graph partitioning during the uncoarsening phase. At the time of coarsening, METIS applies the algorithms is simple to identify a good quality partition at the coarsest graph.

Parallel Graph Partitioning: There are various issues when the graph partitioning is performed in parallel implementation [5]. The large-scale graph data could not be computed in a consecutive manner because the memory is not enough to allow the partitioning that can be resolved on enormously concurrent implementation and a group of workstation clusters. To partitioning the very large-scale graph data in parallel graph partitioning algorithms for parallel implementation large size memory is needed.

Parallel graph partitioning is focused on geometric, spectral, and multilevel partitioning approaches. Geometric graph partitioning algorithms are easy to parallelize whereas multilevel partitions and spectral partitions are very complicated to make parallelize. The parallel asymptotic runtime is identical to which it performs a parallel matrix-vector multiplication on a randomly partitioned matrix, because of that the given graph is not properly scattered among the processors. Initially, the input graph is partitioned and distributed among the processors and the parallel asymptotic run times of multilevel partitions and spectral partitioning diminish the performance of a parallel matrix-vector multiplication on a good partitioned matrix and these partitioning approaches need to parallel well partitioning of the input graph.

2.2. Dynamic Graph Partitioning

Most of the static graph partitioning strategies is not give good quality of input graphs. But the dynamic graph partitioning will give the quality of input graph partitioning, including low edge cut that's the way the parallel adaptive graph partitions will run considerably faster than static partitions and it can be applicable to the scalable graphs and real-world applications.

Dynamic graph partitioning is not possible to do in a single memory because it has the aspect of radically increasing graph nodes and it may be billions of nodes, for this reason, it uses the distributed memory system concept which helps to place graphs in various machines and processing. For dynamic partitioning of a given large-scale graph, it requires load balancing, clustering and few heuristic techniques which obtain good results. Some of the other dynamic partitioning approaches are the parallel graph partitioning or streaming graph partitioning for the complex networks and spinner technique for scalable graph partitioning for cloud networks.

Most of the parallel geometric partitioning approaches will not affect the execution at the initial distribution of the graph, which will be helpful for the partitioning algorithm i.e. a rough partitioning is a faster geometric approach. Rough partitioning is useful for the reallocation of the graph before performing the spectral partitioning or parallel multilevel. This approach considerably enhances the concurrent efficts of the additional correct partitioning task.

Parallel graph partitioning [6] is decisive for achieving preeminent results in the circumstance of dynamic GP, in this, the input graph is shared earlier among the processors and it is the necessity of repartitioned as a consequence of adaptive nature of underlying computation. In a dynamic GP approach, if one processor is used for repartitioning of the given large-scale graph will generate a severe bottleneck problem that should be negative impact measurability. The widespread approach is to perform on the large graph that uses the

simultaneous computational systems to compute the algorithms and graph dataset is shared among the machines and different concurrent computation techniques will be useful to handle these types of graphs. There are various computationally efficient and good quality algorithms are used for graph partition problem, but the results are may or may not be optimal, such as spectral bisection method, Kernighan-Lin algorithm, and multilevel graph partitioning, however, these techniques are not scalable to the graph data with large sets. One of the eminent techniques is the graph stream partitioning for large scale distributed graphs is to accept the graph datasets sequentially from the disk onto a cluster heuristics techniques. In most situations, it is identified as impracticable for the distributed system, in which graph data is performed in a parallel way.

In distributed graphs, a distributed memory system was helpful for online query processing over large-scale graph which may be a billion nodes. For organizing the large-scale graph on distributed systems, segregate into more partitions and each and every partition is stored in one processor without any conflicts or overlapping. Dynamic multi-phase graph partitioning will cause major effects on load balancing and inter-process communication in distributed graphs. To maintain the consistency in this environment, fulfill the load balance constraints and minimize the inter-process communication.

3. FREQUENT SUBGRAPH MINING

FSM is used to calculate all the possible subgraphs which occur in the input graphs most frequently than a given user-defined threshold. It is generating the candidates and the task of candidate generation is done either in a depth-first or breadth-first strategy. From the generated candidate subgraphs, the frequently occurring subgraphs are found i.e. support counting. There are two issues of given FSM, first it is to generate the candidate subgraphs without including the duplicates and second is to calculate the eminent processing approaches that produce the necessary and desired frequent subgraphs or candidate subgraphs. FSM is used to check the isomorphism checking strategy. The best candidate subgraph generation technique will produce the candidates and it avoids the duplicate candidates.

Every FSM should follow the three characteristics that they are:

Graph Representations: A graph is described as an adjacency matrix or adjacency list and difficult to find the isomorphism testing using adjacency matrix and adjacency list. Canonical labelling describes a unique code for a given graph and it makes possible to check isomorphism because it makes sure that given pair of graphs is isomorphic, then their corresponding canonical labelling is same.

Subgraph Enumeration: Enumeration is a task of calculating or counting subgraphs one by one. Graph enumeration to be done by using either join operation or extension operation. With single join operation, multiple candidates are identified and with many join operations single candidate which can be duplicated. With extension operation, it can restrict nodes which include to the newly introduced edge.

Frequency Counting: Frequency counting for graphs can be done using either embedding lists or recomputed embedding.

3.1. Categorization of Frequent Subgraph Mining Algorithms: There are three major challenges of subgraph generation process that they are infrequent subgraphs, isomorphic subgraphs, and the subgraphs that do not available in the graph database. FSM algorithms use various strategies to reduce and eliminate these issues or challenges. Grouping the similar approaches depends on their nature of the given input graph data which may be small-scale graphs to large-scale graphs.

There are possible ways to find out the frequent subgraph mining search strategy i.e. either using Breadth First Search (BFS) or Depth First Search (DFS) approach. The algorithms basically depend on the input correctness then one is to accept the exact graph for a certain group of graphs as input and another is an uncertain set of graphs as input. In this, an input may be a bunch of small graphs or a single large graph as input. After multiple FSGs are identified then it will produce a complete set of FSGs or a partial set of FSGs.

Apriori-based Approach: The basic scheme of this frequent substructure mining algorithms [15] is to combine two size-k frequent sub structures and to produce (k+1) size candidate graphs, searching for frequent graphs and starts with the small size and continues in a bottom-up approach. In this, isomorphism testing is an expensive i.e. NP-Complete problem, test the false candidates or false search efficiency is minimized.

Apriori-based FSM approaches are further classified as follows: Suppose given graph is a large single graph then GREW and HSIGRAM algorithms are used. If the type of the graph input is a graph database then it uses the AGM algorithm. Suppose input is a set of graphs then FARMER, FSG, FFSG, ISG, and SPIN algorithms are used. If the input is a dynamic graph then it uses Dynamic GREW. Finally, the given input graph is an uncertain set of graphs then we use MUSE, MUSE-P, WMUSE, and UGRAP algorithms.

GREW [7]: It is a sparse matrix representation of a static graph and uses repetitive merging for subgraph candidate generation. It follows a greedy search strategy. The aim of the GREW is to calculate maximal independent set of a graph, which is collected from the FSM so as to calculate the frequency which missed many interesting patterns. GREW is efficient for large-scale graphs and for finding non-trivial patterns which allow the maximum portion of the input graph.

HSIGRAM : It is an adjacency matrix representation of a static graph and uses the iterative merging for subgraph candidate generation which follows a breadth-first search strategy. The aim of the HSIGRAM is to calculate the maximal independent group of a graph, which is built from the FSM embeddings to evaluate its frequency.

AGM [8]: It uses adjacency matrix representation of a static graph and uses the vertex extension for subgraph candidate generation which follows a breadth-first search strategy. It is used to find the FSMs using graph database as input, which is gathered from the frequent subgraph so as to

assess the Canonical labelling. It increases the substructure size iteratively one vertex at each step.

FARMER: It uses trie structure representation of a static graph and uses the level-wise search (ILP) for subgraph candidate generation which follows a breadth-first search strategy. FARMER is to find the FSM using a group of input graphs and it not efficient for most of the output generations.

FSG: It uses adjacency-list way of a static graph and uses the one edge extension for subgraph candidate generation which follows a breadth-first search strategy. FSG aim is to identify the frequently connected subgraphs using the bunch of graphs as an input, which is to be the frequent subgraph and estimate the Transaction identifier (TID) lists and it follows NP-Complete approach.

FFSG [9]: It describes the matrix adjacency representation of a static graph and uses the merging and extension for subgraph candidate generation which follows a DFS strategy. FFSG is needed to calculate the FSMs using graphs as input, which is cumulated from FSM so as to find the sub-optimal canonical adjacency matrix tree and it follows NP-Complete approach.

ISG: It uses Edge triplet representation of a static graph and uses the edge triplet extension for subgraph candidate generation which follows a breadth-first search strategy. ISG is to compute the maximal FSM using the input of a set of graphs and it is build from the FSM for evaluating the Transaction identifier (TID) lists and it follows the NP-complete approach, each and every FSM supports group of transaction identifiers.

SPIN [10]: It is the adjacency matrix representation of a static graph and uses the join operation for subgraph candidate generation which follows a breadth-first search strategy. SPIN is used to find the maximal FSM using a set of graphs as input, to evaluate the Canonical spanning tree and non-maximal graphs are to be found but needs an entire database scan. It works efficiently for compressing a huge number of FSM to a very small number of maximal subgraphs and allows large scalability to large graph databases.

Dynamic GREW: It is a sparse matrix representation of a dynamic graph and uses the iterative merging for the subgraph candidate generation which follows the depth-first search strategy. In this, FSM is constructed from dynamic patterns in FSM to collect the suffix trees and it needs more burden to identify dynamic patterns.

MUSE [11]: (Mining Uncertain Subgraph patterns). It follows the adjacency matrix representation of a static graph and uses the Disjunctive normal forms for subgraph candidate generation which follows a DFS strategy. The main aim is to find the FSMs use the input as an uncertain set of graphs, which is constructed from frequent subgraphs for evaluation of the DFS coding scheme. It found that the given sub-graph pattern is an output or not. Various pruning techniques are helpful to decreases the complexity of verifying subgraph patterns. MUSE is an accurate, efficient algorithm for massive uncertain graph databases. MUSE algorithm is further enhanced by MUSE-P and WMUSE (Weighted MUSE) algorithms as per application requirements.

Pattern Growth Approach: The basic idea of a pattern Growth FSM algorithm is to extend the frequent graph keep on including the new edge, in every feasible position and it uses edge-extension technique, the problem with this approach is that relevant sub-graph is identified the number of times. To overcome the problems of Apriori-based algorithms, many pattern growth strategies use the depth-first search technique.

Pattern growth FSM approaches are further classified as follows: Suppose the input graph is a single large graph then SUBDUE, GBI and SEUS algorithms are used. Some situations, the input graph is a set of graphs then we use CloseGraph, Gaston, gSpan, MOFA, MSPAN, JPMiner, TSP, RP-GD, and RP-FP algorithms.

SUBDUE: It uses the adjacency matrix representation and uses the level-wise search for subgraph candidate generation which follows a greedy search strategy. SUBDUE is to gather the minimum description code length and it uses very less number of patterns.

GBI : It uses the single large static graph as an input and which follows a greedy search strategy. The isomorphic test is exact for GBI.

SEUS : It uses the single large static graph as an input and which follows a depth-first search strategy. The isomorphic test is exact for SEUS.

CloseGraph: It basically follows the adjacency list representation of a static graph and uses the rightmost extension for subgraph candidate generation which follows a depth-first search strategy. The CloseGraph aim is to compute the depth-first search lexicographic order and it required a lot of time for failure detection.

Gaston: It uses hash table representation of a static graph and uses the extension for subgraph candidate generation which follows a DFS strategy. Gaston is used to find the embedded lists and interesting patterns may be lost.

GSpan: It uses the adjacency list representation of a static graph and uses the rightmost extension for subgraph candidate generation which follows the depth-first search strategy. GSpan performs the depth- first search lexicographic order and frequent graphs generated can't be scalable.

MOFA: It uses the adjacency list representation of a static graph and uses the rightmost extension for subgraph candidate generation. It is to identify the depth-first search lexicographic order and frequent graphs produced may or may not be exactly frequent.

MSPAN: It uses adjacency list representation of a static graph and uses the rightmost extension for subgraph candidate generation which follows depth-first search strategy. MSPAN follows the depth-first search lexicographic order.

JPMiner : It follows the adjacency list representation of a static graph and uses the rightmost extension for subgraph candidate generation. It is to examine the DFS lexicographic order, to evaluate the frequent jump patterns and sometimes there may be less number of jump patterns.

TSP : It is the adjacency list representation of a dynamic graph and uses the rightmost extension for subgraph

candidate. The aim of the TSP is to find the depth-first search lexicographic order, to find the representative graphs and time for summarizing the pattern is more than for mining.

RP-GD: It uses the adjacency list representation of a static graph and uses the rightmost extension for subgraph candidate generation. The aim of the RP-GD is to find the depth-first search lexicographic order, and frequent graphs generated can't be scalable.

RP-FP: It uses the rightmost extension for subgraph candidate generation which follows a depth-first search strategy. It is used to find the depth-first search lexicographic order, and time for summarizing the pattern is more than for mining.

4. PARALLEL AND DISTRIBUTED FRAMEWORK FOR GENERATION OF LARGE SCALE FSM:

We describe a framework for processing and generating large scale frequent subgraph mining with parallel and distributed approaches on a cluster. Scalable graph processing consists of five phases that they are reading the data, pre-processing, partitioning, computation and writing data, in each phase handle the errors effectively. Graph processing architecture will be one of the graph programming models such as Distributed Architecture, Share-Memory Architecture, and Heterogeneous Architecture. For the implementation of this framework, we need to use the following aspects, they are MapReduce, Hadoop, GraphLab, Giraph, and GraphX techniques.

MapReduce Framework: MapReduce [12] is a programming framework used for the processing and generating a huge volume of data in a distributed manner. It provides an efficient user interface for handling the data distribution, replication, and load balancing. It performs three abstract functions i.e. map, shuffle, and reduce. The raw data is used for reading and processing to the output (key, value) pairs is done by map function. The output of the map function is forwarded to the reducers propagated through the more secure network so that the pair with the identical key is to be grouped together done by the shuffle function. The key-value pair with the identical key is to be processed as output, key and value pair is done by reduce function. In this MapReduce iterative program which runs on several MapReduce tasks, then the output of the current task should be the input of the next task.

Hadoop: Hadoop provides a scalable idea to store and process the data sets with a huge amount in distributed and parallel fashion. It is an open source implementation of the MapReduce programming model and for its file management which follows the Hadoop Distributed File System (HDFS). Various tools which are used on top of Hadoop such as Hive, PIG, Spark, HBASE, iMapReduce [13], Scoop and Flume. Because of the accuracy, big graph mining, efficiency, scalability simplicity, and fault tolerance using Hadoop.

GraphX: It is a data model which contains the property graphs and immutable collections. It was developed on top of the Apache Spark [14], represents transformation on graphs and each and every operating action creates a new graph. It is apache spark API for graphs and graph parallel computations which intends to execute the large-scale graph algorithms proficiently. The immutability condition will clarify the abstraction and helpful for fault tolerance and reuse of data. It consists of unordered tuples or key-value pairs which are represented as unstructured data. In this, a key may be null and not be unique, and value might be a random object. The unordered data collection view is important for processing the raw input, graph computation results are to be evaluated. This framework uses a programming abstraction method is said to be Resilient Distributed Graph (RDG) interface, it constructed on Spark's in-memory storage abstraction i.e. Resilient Distributed Datasets (RDD). It follows the directed adjacency structure with user specified attributes connected to each and every vertex and edge, and they are treated as RDGs.

Giraph: Apache Giraph [15] is the most popular and powerful open-source platform for the parallel and distributed environment. It uses Map-only Hadoop jobs to coordinates the vertex-centric workers and it takes help of HDFS for storing and processing graph datasets. It has a faster input loading time compared to Pregel and it inherits the benefits and deficiencies of the Pregel vertex-centric programming method.

GraphX, Giraph, and GraphLab parallel frameworks provide good results when compare to conventional frameworks, thus one of the above-mentioned frameworks can be adopted for identifying FSM in a large scale graph data and implemented further using either R language or Python.

5. EXPERIMENTAL RESULTS:

Time complexity analysis of the PFSG-Miner is to divide the analysis of the FStG algorithm is on master processor and PFSG algorithm is on the slaver processors in parallel environment. All the experiments have been conducted on a Downing 4000L platform at Gansu Computing Center. The platform contain 48 2.2GHz CPUs and 24 2.2GHz Core 2 CPUs. It has 14 146G Ultra30 SCSI hard disks. In order to reflect the effectiveness of the algorithm, compare this algorithm with the gSpan and FFSM algorithms. The

gSpan and FFSM execute on single processor, while this algorithm will run on four slave processors at parallel phase.

The experiment chooses real data and simulation data. The real data is DTP (therapeutic program developmental) which provides the collection of compounds. The compounds in DTP can be divided into 3 datasets, which include CA (active confirmed), CM (moderately confirmed) and CI (confirmed Inactive). Figure 3, Figure 4 and Figure 5 shows the running results of PFSG-Miner, FFSM, and gSpan on different datasets.

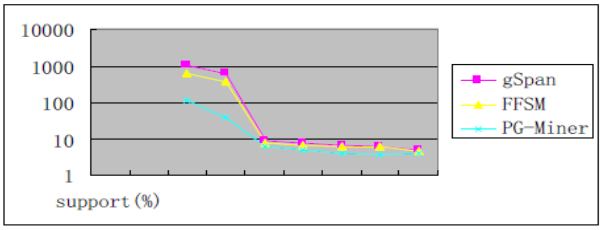

Figure 3: CA Data Set

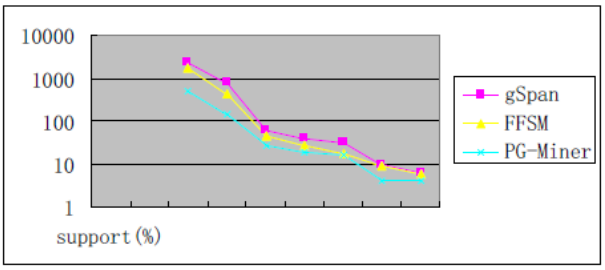

Figure 4: CM Data Set

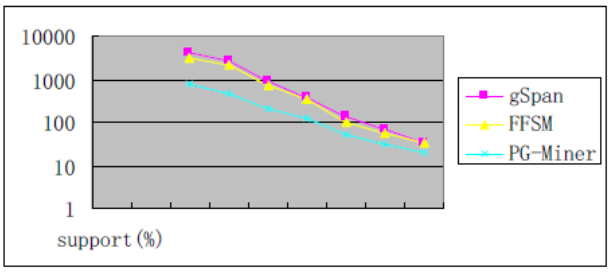

Figure 5: CM Data Set

5. CONCLUSION

In this paper, we present a comparative analysis of the several FSM algorithms with their merits, demerits, behavior, and application in a parallel and distributed environment. FSM is useful for multi disciplinary areas like bioinformatics, chemo-informatics etc. where digging of iterative patterns among the huge collection of networks. Based on the various graph partitioning algorithms, we have classified graph partitioning approaches into static, dynamic, distributed and parallel implementations. The algorithms have been classified depends on the Apriori and Pattern growth approaches. Generally, the existing algorithms focus only on static graph datasets. Still, most of the research work was not done on the complex dynamic or evolving large-scale graphs for mining pattern. If it applies on distributed and parallel implementation will also save the more processing time.

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Generating Highlights of Cricket Video using Commentators and Spectators Voice

Mohammed Inayathulla, C Karthikeyan

Abstract*: Videos are one of the important and richest sources of data on internet. In this growing world of digital technology video summarization will be handy in analysing the video data. Recently Natural Language Processing has attracted more researchers to work to meet the current emerging challenges. Among the various issues, video summarization got more focus and in this regard, many applications and works have been evolved. Video Summarization is the process of creating a small video describing the actual video within short duration(s). The paper focuses on generating highlights of a cricket video by analysing the voice of commentator and spectators. The experimental results have shown good performance when compared with human generated summary.

***Keywords* : Classification, Deep Learning, Excitement, Video Summarization**

I. INTRODUCTION

Due to the rapid advances in technology and growing use of social network platforms huge amount of various forms of data is generated. Amongst them videos are one of the crucial source of data. Some thousands of videos are daily uploaded by the users on various platforms. Hence video summarization will be handy as it significantly reduces the user's time and effort. Video Summarization aims at creating synopsis of the video without disturbing the actual semantics of the video. Video summarization is a challenging task for researchers because different users have different preferences for summary. Hence generating the summary which satisfies the preferences of different users is a complex task. Video summarization is broadly of two types static summarization and dynamic summarization. Static video summarization creates a storyboard which is the collection of random images which are of more importance. Dynamic video summarization creates a short video from the original one. Video summarization can be both manual and automated. Manual video summarization is a technique where the video is inspected to find the interesting and important frames which form the summary of the video. Automated video summarization involves training the machine to understand the semantics of the video so that machine generates the final summary of the video. Complexity of video summarization lies in understanding the semantic relationship between the frames.

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Video summarization can be both supervised and unsupervised task. In supervised learning initially the machine will be trained with labelled data and depending upon the learning accuracy machine will generate the synopsis of the video. The generic approach of video summarization is described in figure 1. In unsupervised learning the machine will design criteria to select the important frames which form the summary of the target video. Manually designed criteria can be used in both supervised and unsupervised techniques for summary generation. Few of the researchers have focused on generating abstractive textual summary for the given video.

II. LITERATURE SURVEY

In this paper [1] the authors proposed a divide and conquer approach for video summarization. All the video frames were assigned with score of importance and subset of frames which gives the highest total score was selected. To get the optimal score for the entire video three stage deep neural network was proposed (2D CNN,1d FCN,LSTM). To deal with the subjectivity of summarization harmonic mean among different summaries was calculated. To evaluate the summary results were compared with the human created summaries. In this paper [2] authors proposed a DSSE (deep side semantic Embedding) model to generate summary. Side information available with video like title, query, comment, description was effectively used to find frames which form the summary. In this paper [3] the authors focused on users major or special interest for generating the summarization. The authors used Deep Ranking Model to evaluate the relationship between summarized and non summarized frames of the video.

In this paper [4] the authors developed a deep neural network for generating abstractive text summarization of the input video sequences. Initially the description of the input video was generated using CNN and from the description abstractive summary was generated. A Maximal Biclique Finding (MBF) algorithm [5] is devised in order to resolve the issues that raised due to the dearth of co-occurrence of patterns when irrelevant shots in videos are considered. The objective of this algorithm is to optimize the patterns that are located lightly and removing the less co-occurring patterns yet irrespective of their prevailing nature in one video. In [6][13][14] authors used

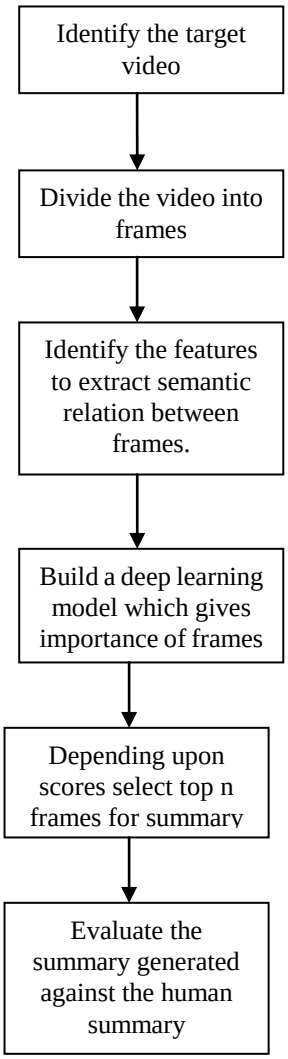

Fig. 1.Supervised approach of Video Summarization

Hidden Markov Model and empirical mode decomposition for generating summary. Initially the key frame was extracted then classification was applied to include it in highlights or not and then finally highlights was generated. In [7][15] authors used oriented fast rotated brief approach to find excited clips and optical charater and replay recognitions also were used. The authors proposed context aware video summarization [8] which uses sparse coding by learning from dictionary of video features and spatiotemporal feature correlation graph.

The authors proposed a hierarchical Recurrent neural network model for generating video summary [9]. The RNN was designed in such a way that the first layer was used to encode short video subshots which were taken from the original video and the second layer was used to calculate the confidence of each sub shot to form the summary. In [10][11][12] a novel approach for exploring surveillance video data. Initially object movement was recorded i.e. by extracting single shot image which is a combination of multiple frames. Action parsing driven video summarization model was proposed which was reinforcement learning based. For video summarization initially shot boundary detection was conducted then screen shot clustering was implemented using minimum spanning tree.

III. PROPOSED METHODOLOGY

To generate the highlights of cricket video voice of commentator and cheers of spectators are considered as key aspects. The general perception in this context is that when there is increase in commentator's voice or spectators cheers only when something important has happened, like a wicket or a batsman scoring four or six. The proposed approach is as described in figure 2.

After breaking the audio into chunks short term energy is computed and a threshold value for the energy is identified for classification of audio clips as excited or not. The threshold value can be experimented for improving performance. All the excited clips are merged together to generate highlights of the target video. To generate highlights parts of the video are to be extracted within a particular time interval only as the voice in the video is high only when the player performs an action.

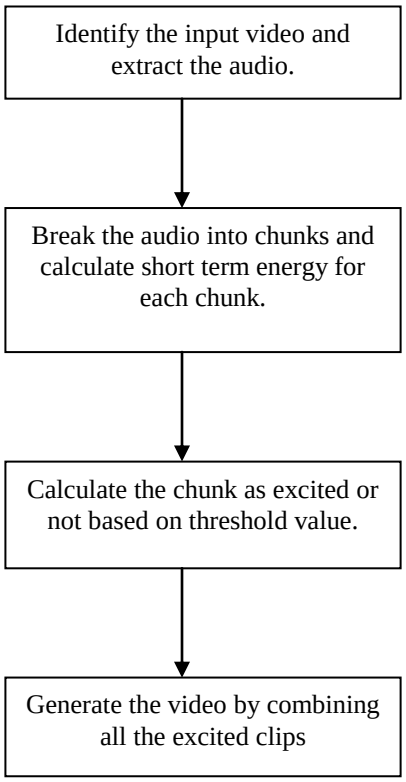

Fig. 2. Step by Step Process of Generating Highlights of a Video by Using its Audio.

IV. RESULTS

The proposed approach is implemented on cricket videos available on YouTube. A video of 23 minutes whose highlights in the form of excited clips was generated is shown in figure 3. Similarly we have implemented the work on 10 similar cricket videos which are downloaded from YouTube and the results are evaluated against the human generated summary. Selection of threshold value for selecting the excitement clip has severe impact on the performance of the proposed approach.



Fig. 3.A Snapshot of all the excited clips of Video.

V. CONCLUSIONS

The proposed approach which is based on voice of commentator and cheers of spectators has shown promising results in generating the highlights of a video. The proposed approach is limited to small size videos. In order to deal with videos of larger size or to generate the highlights of complete match deep learning techniques can be implemented which will improve the overall performance of the proposed approach.

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A Fine Grainedresearch Over Human Action Recognition

S. Sandhya Rani, G. Appa Rao Naidu, V. Usha Shree

Abstract: ***Human Action Recognition from videos has been an active research is in the computer vision due to its significant applicability in various real-time applications like video retrieval, human-robot interactions, and visual surveillance, etc. Though there are so many surveys over Human action Recognition, they are limited to various constraints like only focusing on the methods in few orientations only. Unlike the earlier ones, this paper provides a detailed survey according to the basic working methodology of Human action recognition system. Initially, a detailed illustration is given about various standard benchmark datasets. Further, following the methodology, the survey is accomplished in two phases, i.e., the survey over feature extraction approaches and the survey over action classification approaches. Further, a fine-grained survey is also accomplished under every phase based on the individual strategies***

Keywords: Human Action Recognition, Feature Extraction, Classification, Spatio-temporal interest points, Trajectories, Support Vector Machine, Deep Learning, action datasets.

I. INTRODUCTION

In recent years, with a widespread applicability in various applications,like visual surveillance, sports analyses, human-computer interactions (HCI) [1], robotics [2], elderly care [3], and intelligent space [4] and video retrieval, Human Action Recognition (HAR) has gained a significant research interest in the field of computer vision. The main aim of HAR is to determine, and then recognize what humans do in the unknown videos. Compared to the individual still images, video sequences provide more detailed information about actions. For example, consider a still image in which a man moving. We can't say what he is doing. Whether he is running? Or he is just jogging? In such a case, video sequences can give more detailed information about the human action. Video gives both spatial and temporal information but still,the image gives only spatial information.



(a)



(b)

Figure.1 (a) Still image and (b) frames of a video sequence

The main objective of a HAR system is to identify actions in a video sequence under different situations like occlusion, cluttering, and different lighting conditions. The main center of this system is the computational algorithms that understand the human actions. Similar to the human vision system, these computational algorithms ought to produce a label after the analysis of partial or entire action in the video sequence [5], [6]. Developing such algorithms is typically addressed in computer vision research, which studies how to make the computers to gain high-level understanding regarding human actions from digital images and videos?

A. Applications of HAR

HAR algorithms empower many real-world applications and these approaches remarkably reduce the manual effort to analyze a large-sized video data and provide sufficient understanding about the present end future states of an ongoing video data. The major real-world applications which utilize the action recognition are formulated as;

Visual Surveillance: In the Visual Surveillance system, a camera equipped with HAR algorithms may increase the chances of capturing a criminal on video, and decrease the dangerinstigated by illegal actions [7]. The cameras also make some people feel more secure, knowing the criminals are being watched.

Video Retrieval: Due to the vast number of videos on the internet, Video Retrieval is becoming a tremendous challenge as most search engines use the associated text data to manage video data [8]. The text data, such as tags, titles, descriptions, and keywords, can be incorrect, obscure, and irrelevant, making video retrieval unsuccessful. An alternative method is to analyze human actions in videos, as the majority of these videos contain such a cue.

Entertainment: In the entertainment field, the HAR has a significant importance due to its deployment in the sensors which are used to detect human actions [9]. These sensors provide an in-depth channel data which has encoded rich information about the entire scene of video.

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Human-Robot Interaction: Assume that a patient is undertaking a recovery exercise at house, and his/her robot assistant is capable of recognizing the patient's actions, analyzing the correctness of the exercise, and preventing the patient from further injuries. Such an intelligent machine would be significantlyhelpful as it hoards the rounds to visit the therapist, reduces the medical cost, and makes remote exercise into reality [10].

Autonomous Driving Vehicle: Action Recognition algorithms can predict a person's intention in a short period of time. In an emergency situation, a vehicle equipped with an action recognition algorithm can predict a pedestrian's future action or motion trajectory in the next few seconds, and this could be very helpful to avoid a collision [11].

This paper outlines a detailed literature survey over various methods proposed to recognize the human action in multiple environments with different strategies. This paper conducted the survey based on the basic methodology of HAR system, i.e., feature extraction and classification. In the feature exaction phase, the HAR system extracts a sufficient set of features and in the classification; the obtained features are processed for classifiers to recognize the action. Following the same strategy, initially, the survey is carried out over various feature extraction techniques and then over various classification techniques.

The remaining paper is organized as follows; Section II explores the details of various datasets used for simulation experiments. Section III Outlines the complete survey and section IV provides the concluding remarks.

II. DATASETS

Under this section, this paper describes the details of the datasets used for simulation experiments. In earlier, various datasets are developed and based on the development;the environment considered during the development, the appearance of objects, camera view, background variations and total number of subjects, they are categorized into two classes such as constrained and unconstrained.

2.1 Constrained Datasets

Under this category, the action videos are captured under constrained environments which have fixed settings. INRIA XMAS multi-view dataset, KTH dataset, Weizmann dataset, and UT-interactions dataset are some examples of this category. Further, the first three are individual action dataset and the remaining one isthe group action dataset.

A. KTH dataset [12]

This dataset consiststotal of six different actions such as *Handclapping, running, jogging, walking, hand waving and boxing.* The entire actions are accomplished various times under four different environments such as Outdoors, Indoors, Outdoors with various clothes and outdoors with scale variations. Totally 25 subjects are used to create this dataset and this hasa totally $25 \times 6 \times 4 = 600$ vides in.AVI format and 2391 sequences. All the sequences are captured with a static camera with 25fps frame rate and the background is homogeneous in nature. Some sample frames of this dataset are shown in fig.2.

B. Weizmann Dataset [13]

This dataset totally consists of ten different actions like *walking, running, skipping, jumping jack, jump forward on two legs, bend, single hand waving, doble hands waving, gallopsizeways, and jump in the same place with two legs,* and totally consist of 90 videos. all the actions are captured with the help of a static camera. The frame rate of every video of 50 fps ane the resolution of each frame is 180×144.Some sample frames of this dataset are shown in fig.3.

C. INRIA XMAS multi-view dataset [14]

This dataset consists of 12 action classes such as*point out, pick up, wave, punch, turn around, walk, sit down, get up, cross arms, scratch head and check watch*. Each action is performed three times and 12 different subjects are recorded with five cameras, four are fixed at four sides and one is fixe on the top. These five cameras capture five views such as left, right front back and top. The frame rate is 23 frames per second and the size of the frame is 390×291 pixels.Fig.4 shows some samples of different actions under multiple views.

D. UT-interactions dataset [15]

This dataset consists of a total of six human interactions such as *Push, Punch, Point, Kick, Hug, and Handshake*. There are totally 20 video sequences which have a length of around one minute. Several subjects with more than 15 different clothing conditions are captured in this dataset. The frame rate is 30fps and the size of the frame is 720×480 pixels. Further, the height of a person in every video is approximately 200 pixels. Fig.5 shows some samples of different actions.

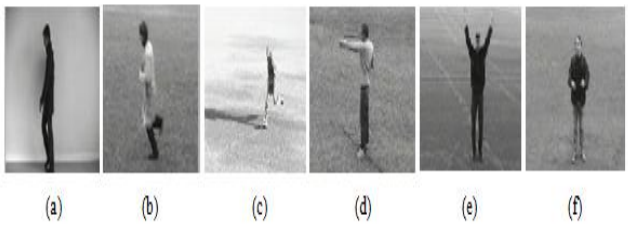


Fig.2 action samples of KTH dataset (a) Walking, (b) Jogging, (c) Running, (d) Boxing, (e) Handwaving, (f) Handclapping



Fig.3Action samples of Weizmann dataset, (a) Bend, (b) Jump, (c) Run, (d) Boxing, (e) Wave two hands, (f) Walk

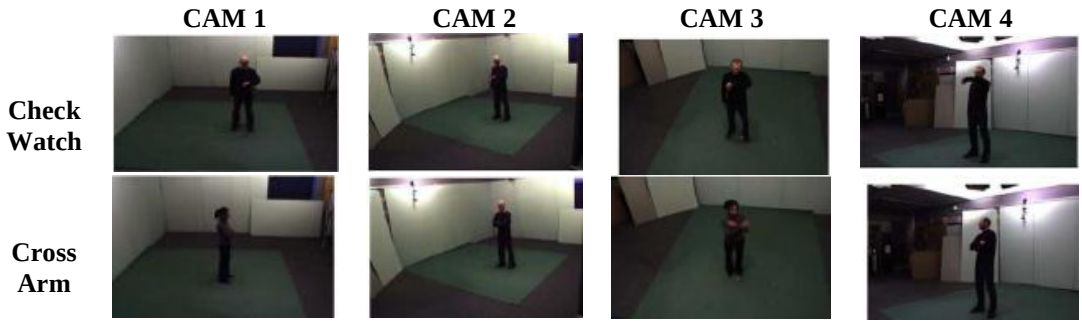


Figure. 4 Samples of INRIA XMAS Multi-View Dataset



Fig.5 Action samples pf UT-interaction dataset, (a) Push, (b) Punch, (c) Point, (d) Kick, (e) Hug and (f) Handshake,

2.2Unconstrained Datasets

Under this category, the action videos are captured under unconstrained environments which have no fixed settings, simply real-time environments. The datasets under this class are created by capturing the videos from the internet. Moments-in-time (MIT) dataset, UCF101 dataset, HMDB51 dataset are some of the examples of this unconstrained datasets.

A. Moments-in-time dataset [16]

This dataset containsa totally of 339 types of video clips, each one is of a 3-second duration and totally this dataset has 1,00,000 videos clips. The visual objects appear in the video clips are natural scenes, animals, people, and objects. This is a very large human-annotated dataset comprised of so many events and generally used for the recognition tacks sin complex environments. Fig.6 shows some samples of this dataset.

B. UCF101 dataset [17]

This dataset consists of a totally 101 action classes and the total number of videos is 13320. All the videos of this dataset are acquired from YouTube. With the presence of 13320 videos, the UCF101 dataset provides diversified actions with the presence of different variations such as illuminations, cluttered background, viewpoint, scale, pose and appearance, and variations in the motion of camera, etc. The complete 101 videos are categorized into 25 groups, where every group consists of 4-7 video for an action. Further, the actions are categorized into five classes and they are Sports, playing musical instruments, Human-Human Interactions, Human-Object interactions, and body motions. Fig.7 shows some samples of this dataset.

C. HMDB51 Dataset [18]

This dataset consists ofa totally 51 action classes and the total number of video clips is approximately 7000. Every class of action carries a minimum of 101 video clips. The total 51 action categories are grouped into five classes and they are body movements for human interactions, body movements for object interactions, general body movements, facial actions with the manipulations in an object, and the general facial actions. In this dataset, most of the videos are collected from different sources like Google videos, YouTube and several movies.Fig.8 shows some samples of this dataset.



Fig.6 Action samples of MIT dataset, (a) Bouncing, (b) Swimming, (c) Falling, (d) Opening,



Fig.7Action sample of UCF101 dataset, (a) Sky Diving, (b) Shaving Beard, (c) Apple Eye makeup, (d) Rafting, (e) Playing dhol



Fig.8 Action samples of HMDB51 dataset, (a) Climb Satirs, (b) fall floor, (c) draw sword, (d) flic flac, (e) had stand

Table.1 Comparison Details of various datasets

Dataset Name	Number of clips	Actions	Year	Environment
KTH	10	6	2004	Constarined
Weizmann	9	9	2005	Constarined
INRIA XMAS multi-view	390	13	2006	Constarined
UT-Interaction	60	6	2010	Constarined
HMDB51	101	51	2011	Unconstarined
UCF101	13,320	101	2012	Unconstarined
Moments In time	1,00,000	339	2017	Unconstarined
Hollywood[19]	30-140	8	2008	Unconstarined
MSR [20]	14-25	3	2009	Constarined
Sports1-M [21]	11,33,158	487	2014	Unconstarined

III. LITERATURE SURVEY

According to the methodology followed for Human Action Recognition, the entire literature survey is accomplished here under two phases, one is the approaches focused over the feature extraction and the other is the approaches focused over the classifier. In the case of feature extraction oriented approaches, the main focus is made on the feature extraction, i.e, the representation of a video or frame with an efficient set of features. An effective set of features provides a perfect discrimination from action to action such that the classifier will get clarity over the action sequences. Further, in the case of classification, the main focus is done on the reduction of complexity and the provision of robustness. A classifier must be like that it has to produce effective recognition results for all types of action sequences. In such a case, the classifier is said to be robust. Further, the recognition framework also concentrates on the computational complexity and mainly tries to choose a classifier which has a less computational complexity. The details of different earlier developed approaches are described in the below sub-sections.

3.1 Feature Extraction

Feature extraction is the foremost important problem in the human action recognition system. The human actions appearing in the video have so many variations due to the variations in the pose, camera movement, appearance, speed of motion, etc., makes the feature extraction really a most complex task. The main intention of a feature extraction technique is to provide perfect discrimination between action sequences, computationally efficient, and can effectively characterize the human actions, such that the recognition system should have less false positives or classification errors.One more major challenge in the human action recognition system is the large variations in the pose and appearance even in one action class, which results in more confusion for the recognition system. In this scenario, the main goal of the feature extraction is to nullify the variations and to convert the video into one feature vector such that it can provide sufficient discrimination between different forms of same human action, and minimize the variations such that the recognition performance will be improvised.

3.1.1 Local Features

These are extracted from local regions which have more salient information regarding the human action. Since the information present in the local regions is more salient and also more informative, most of the researchers focused on local feature only. Furthermore, the local features are more robust to variations in the appearance and translation, etc. Motion trajectory [22, 23, 55] and "space-time interest points (STIPs)" [24-26] are the two most popular local feature extraction techniques which had shown their superior performance in the HAR.

Wang et al. [23] proposed a new motion trajectory method by integrating the "Motion boundary Histogram (MBH)" [29] and "Histogram of Gradients (HoG)" [32] to extract a more effective and information-rich feature. In this approach, the trajectories are calculated based on the optical flow vectors [27]. Further, Jiang Y. G et al. [28] focused to integrate the global and local motion reference pints such that the obtained feature vector is compact to camera movement. To further improve the performance, Wang et al. [30] considered to predict the camera motion and performed the feature point matching between the frames using SURF descriptors. After generating the trajectories of both human action and camera motion, the trajectories which have inconsistent matches are removed. This estimation can also be used to remove the camera motion in optical flow vector-based approaches.

A similar action recognition technique is proposed by H. Wang et al. [33] based on the discovery of feature point matches between frames using SURF and optical flow vectors. In this approach, the homograph is measured and the trajectories which are inconsistent with homography are assumed to occur due to the camera motion and they are removed. Further, Hamim A. Abdul Azim and E. E Hemayed [31] proposed a new version of trajectory-based human action recognition system which captures the discriminative temporal relationships. In this approach, the trajectories are extracted based on STIPs named cuboid features and they are derived by matching it's SIFT descriptors over the successive frames. Then the obtained trajectory points are described in a visual "Bag-f Words (BoW)" model and then fed to "support vector machine (SVM)" classifier. However, the main drawback with cuboid featuresis that the obtained interest points may or may not locate at the same place in some frames which have cuboid temporal bounds.

Next, STIPs based approaches have gained the most popular due to its ease of implementation [34, 35].Bergonzi et al. [35]proposed to extract two different set of interest points. The first set is concerned about the shape and speed of foreground moving and to obtain these features, a 2-D Gabor filter is accomplished to every frame. Next, the second set of features is oriented to different scale and they are extracted from interest point clouds. Further, the method proposed by Willems et al. [36] used the Hessian matrix to derive STIPs which are scale-invariant both temporally and spatially.

Furthermore, some more 2-D detectors are also considered which are extended into the Spatiotemporal domain. In such regard, the HoG is extended to 3-D and formulated as HoG3D and applied to extract the STIPs in the method proposed by Kaiser et al. [37] to perform human action recognition. Next, a new approach is developed by N Li et al. [38] for HARfrom unconstrained videos by combining the HoG3D with Self-organizing map (SOM) which has a significant impact on the training parameters.Generally, the STIPs are applied over a grayscale image which makes the system sensitive to disturbing the photometric phenomena like shadows and highlights. Furthermore, the important information is also neglected by discarding the chromaticity. To solve these issues, Ivo Everts et al. [39] extended the STIPs to multiples channels, called color STIPs. These points improve the quality of subsequent STIP detection and description.

Further several 2-D descriptors are combined to develop new descriptors such that they can find the Spatio-temporal features more effectively. Towards this process, optical flow vectors are combined with histogram features and formulating into a new descriptor called “Histograms of Optical Flows (HOF)” [19]. Next, the Gradients are computed over optical flow vectors and formulated into a new descriptor called MBH for describing the motion trajectories [40]. Similarly, Nazir et al. [54] also proposed to integrate the 3D SIFT with 3D-Harris Spatio-temporal features to extract the key regions of a video. This approach used the conventional bag of visual word histograms for representing a human action.

3.1.2 Depth and Skelton Features

With the application of depth evaluation sensors (RGBD sensors), the human action detection approaches have gained improved recognition results due to the depth analysis of data. These approaches are further classified as depth sequence-based approaches [41, 42, 47-50], and Skelton based approaches [43-46, 51]. These approaches use the basic global and local features s well to extract a composite feature vector from every action sequence.

In the depth-based feature extraction approaches, initially, the motion changes are analyzed through the depth map of the human body. Under this class, a video captured through an RGBD sensor is seen as a space-time structure having the depth information. For a given action sequence, the feature is extracted as a Spatio-temporal feature with a motion or an appearance having changes in the depth.Xiaodong Yang et al. [47] proposed a new action recognition technique based on the additional depth information, i.e., body shape and motion information. In this approach, the depth maps are projected into three orthogonal planes and then accumulate global activities to generate “Depth Motion Maps (DMM)”. Further HoGs are computed form DMM as a feature. The sampled actions of DMMS for different actions are exposed in figure.9.

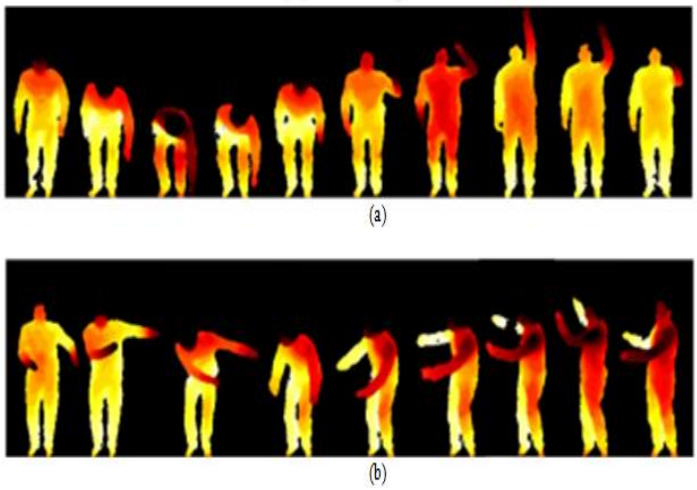
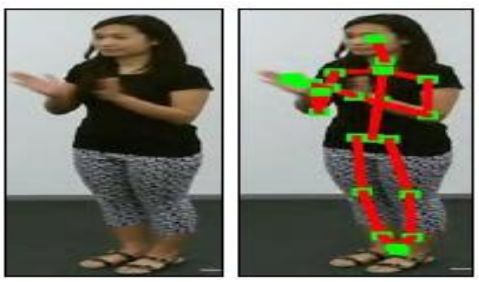
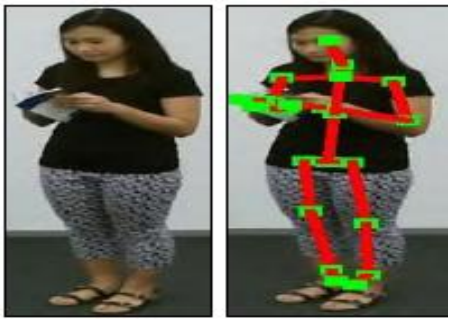


Figure.9 Sampleactions of depth maps of (a) Pick up & Throw (b) Golf swing [47]

Next, Omar Oreifej and Zicheng Liu [42] proposed a novel descriptor, called as “histogram of oriented 4D surface normals (HON4D)” for HAR from depth maps. This descriptor is equaledto the HoGs in color action sequences and spreads the histogram of normal in static images. H. Rahman et al. [48] focused to integrate the 3D joint positions and discriminative information from depth images. For every joint, a composite feature vector, called “3D space time-motion volume” is calculated to provide a perfect discrimination between actions. Further, the method proposed by C. Chen at el. [49] developed a multi-fusion based action recognition technique based on the DMM and “Local Binary Patterns (LBPs)”. This approach employs DMMs for three projection views (top, side, and front) to capture the motion cues and then applies LBPs to extract a composite feature for every action. This approach accomplished two fusion phases; one is feature level fusion and the other is decision level fusion.Jie Miao et al. [50] proposed to consider the compressed depth maps for action recognition. In this approach, every depth map is encoded with a scalable encoder which has multi-scale breakpoints and ad Adaptive “Discrete Wavelet Transform (DWT)”. Here the sharp edges are obtained through breakpoints and the smooth variations are obtained through DWT and are extracted from the bit-stream and are used to construct a set of features that are fed to classifier for recognizing the action.

From depth information of a human body, the Skelton can be estimated more easily. The samples of skeletons for some actions are shown in figure.10.





(a) (b)

Figure.10 original and skeletons of different actions (a) clapping (b) reading [52]

J. Shotton et al.[51] focused to estimate the body position of 3D joints effectively and quickly even from only one depth frame without seeking any help of temporal data. The joint consideration has been regarded as a simple super-pixel problem.Papadopoulos, G.T et al. [43] proposed a real-time tracking approach for HAR. In this approach,first, the skeleton is tracked and then applied a new representation mechanism for action based on the calculation of spherical angles between the joints and corresponding angular velocities. Finally, the recognition is done with the help of "Hidden Markov Models (HMMs)".

Unlike the above approaches which consider the joint angles and joint locations to represent the human Skelton, V. Raviteja et al. [46]developed a new method to represent the human skeletal based on the evaluation geometric relationships between the parts of body based on translations and rotations in 3D space. This approach modeled the human action as a curved manifold. Further, the classification is with an integration of "dynamic Time warping (DTW), Fourier temporal pyramid representation" and linear SVM. Pazhoumanddar et al. [45] proposed to consider a skeleton-based number of action descriptors for action recognition. This approach used the longest common subsequence (LCSS) algorithm to select high-discriminative power features fromthe relative motion trajectories of the skeleton to determine the associated action.Hany ElGhaith et al. [52] proposed to combine three different modalities such as body part images, 3D skeletons, and "Motion History Image (MHI)" into a deep learning mechanism for HAR. Based on the three different modalities, the entire information like pose of the body, motion of body and part shape can be extracted. Since the 3D skeleton can't acquire the shape body and also the shape of manipulated objects, MHI [53] and body parts are included in the feature extraction process.

Based on the above discussion, the depth and skeleton-based action recognition approaches are efficient in the representation of joint features which are more important in describing an action. Hence, more discrimination cane be acquired by the system form these features. But, the performance of these approaches completely depends on the prediction of a human pose. Furthermore, this approach has a severe effect in the presence of occlusions in the scene which results in heavy classification errors.

3.2 Action Classification

After extracting features from video sequences, they are processed for learning through action classifiers such that classifier will get sufficient knowledge about the actions present in the video. Further, this knowledge helps to determine the class label of various action classes.

3.2.1 Traditional classifiers

Among various available traditional classifiers, Support Vector Machine [54, 56, 58, 59, 60, 62, 63]and random forest [65, 66] has gained an excellent performance in the classification of different actions for all types of action videos.

K. G. C. Manocha, R. Rodrigo [56] accomplished the SVM algorithm for action recognition. In this approach, the Optical flow values of a silhouette are extracted as features and based on these features, a new motion descriptor id described for every action. Further, the SVM is accomplished for classification. To reduce the high dimensional feature space, this approach used Principal component analysis.Simulation is done over two datasets namely, Weizmann and UIUC1 Dataset [57].

Jalal A. Nassiri et al. [58] introduced a version of SVM, called "Energy-based Least squares Twin Support Vector Machine (ELS-TSVM)". This is an extension to the conventional "Least Square Twin Support Vector Machine (LS-TSVM)" [59] which performs the classification based on two non-parallel hyperplanes instead of a single hyperplane. This approach effectively handles the unbalanced dataset problem. The performance of this classifier is tested over KTH, Weizmann, Hollywood and UCI datasets.

L. Gonzalez et al. [60] considered the "Multi-class Support Vector Machine (MC-SVM)" to classify the human actions, using a multi-camera dataset called MUHAVI dataset [61]. Silhouettes are extracted as features for every action. Since the videos of the MUHAVI dataset noisy and also comprises shadows, this approach considered MC-SVM to achieve effective classification results.

M D. Praveen and C K Niranjan [62] used the SVM classifier for action recognition after extracting the features for a given video sequence. Simulation experiments are conducted over KTH dataset with hand-clapping and running actions.

Y Wang e al. [63] combined the 3D skeleton joints, gesture potential energy, and kinetic energy and others to extract one feature matrix. Further, K-means clustering is accomplished for the extraction of semantic features by the BoW. This combination of features not only reveals the information about the kinematics but also explores the biology of the human body and the natural visual saliency. Finally, the SVM kernels are used to accomplish the HAR.

SamehMerghi et al. [64] accomplished the SVM classifier for action recognition after detecting the moving human sin moving field of views based on optical flow and dense SURF. After SURF extraction, the video is represented through a set of fused features that combines visual descriptors, trajectory, and motion and finally exploited the BoW approach. Experiments are conducted on the standard datasets such as KTH and UCF101 and HMDB51 datasets. H. Zhang et al. [65] developed an action recognition method which combines the sparse coding with gradient information. In this approach, initially, the depth of gradient information and distance between the joints of the 3D skeleton are extracted to find the coarse depth-skeleton features. Next, the sparse coding and max pooling are

applied to finalize a coarse DS feature and fed to random decision forest classier to perform action recognition.

Vikas Tripathi et al. [66] proposed to use the random forest algorithm for human action recognition after extracting a novel feature descriptor based on two algorithms They are distance mean histogram of gradient and segmented block of means image with normalization. The performance evaluation is accomplished over two standard benchmark datasets and they are ATM and HMDB.

3.2.2Deep Learning classifiers

In recent years, the application of deep learning to computer vision applications has gained more importance due to its deep studying strategy. In the human action recognition also, various deep learning strategies are developed by researchers. Based on the deep learning network structure applied for action recognition, the earlier developed approaches are formulated into three different types and they are 2D convolutional networks (2D-CNNs) [69, 72] based, and 3D convolutional networks (3D-CNNs) [68] based approaches. In the 2D CNNs based HAR approaches, both the image and its optical flow information are trained to the network in the training phase and at the output, the fusion process is applied at the output layer. The 2D CNN follows 2D image convolution while 3D CNN follows 3D convolution which is the major difference between these two methods.

3.2.2.1 2D CNNs

C. Feichtenhofer et al. [70] proposed a new ConvNet architecture for spatiotemporal fusion of video action recognition. This approach has the following modifications compared to the tradition ConvNet. 1. Fusion is accomplished at spatial and temporal network instead of a softmax layer. 2. Spatial fusion is done at the last layer. 3. Pooling is done over Spatio-temporal neighborhoods. Simulation experiments are conducted over two standard datasets such as UCF101 and HMDB51. Next, Limin Wang et al. [71]proposed a new ConvNet architecture based on the long-range temporal structure modeling, called “temporal segment network (TSN)”. This approach combined the video-level supervision and sparse temporal sampling strategy to provide efficient learning to the network with an entire action video. This approach is effective even with few learning samples. Simulation experiments are conducted over two standard datasets such as UCF101 and HMDB51.

B Zhou et al. [73] developed a new “Temporal Relation Network (TRN)” into the CNNs for HAR. TRN is an effective and interpretable network module which was intended to learn and reason about the temporal dependencies between frames of a video. Further, the TRN is simulated over three recent video datasets; they are something-Something [74], Jester [75] and Charades [76]. Further, C. B. Jin et al. [77] proposed a hierarchical CNN model for real-time HAR based on the temporal images. Under the hierarchical model, this model has three CNN layers, namely, posture layer, motion layer, and action layer. Simulation experiments are conducted over the “Imperial Computer Vision and Learning Lab (ICVL)” action dataset [78] over the standing, walking, nothing, and texting action sequences.

3.2.2.2 3D CNNs

Shuiwang Ji et al. [79] developed 3D CNN model for HAR. In this approach, the features are extracted from both temporal and spatial dimensions by applying 3D convolutions such that more encoded information can be acquired from adjacent frames of a video sequence. Initially, the multi-channel information is acquired from all the frames and then the final feature is obtained by combining the information from all the channels. Simulation experiments are conducted over TREC Video Retrieval Evaluation(TRECVID) 2008 dataset [80]. Later Du Tran et al. [81] developeda novel Spatio-temporal feature-based learning approach using 3D CNNs. In this approach, the learned features, namely C3D (convolutional 3D) with a simple linear classifier is far better than the conventional 2D CNNs. Further to check the performance, totally three datasets are used and they are UCF101, ASLAN dataset [84], YUPENN [82] and Maryland [83]. Further, J.Arun Nehru et al. [85] considered the 3D motion cuboid features for action recognition through 3D convolution neural networks. Simulation experiments are conducted over a standard Weizmann and KTH datasets.

3.3 Results and Discussion

From the above discussion, we can understand that the approaches proposed based on deep learning are more effective compared to the handcrafted feature-based approaches. Though they offer a superior performance, some issues exist, particularly the fusion of multi-modal data in the deep learning architecture.Most of the deep learning approaches focused on the fusion of multi-modal data and thereby realizing the concept of deep learning. For any system, the deep knowledge will be acquired when it has all possible information. For example, the skeleton data of an action explores only the skeletal information. Next, the statistical measures explore only the rotational and translational variations in the action data, and the RGB data explores only the multi-channel information with respect to three channels in the RGB action video. Compared to individual features, a combined feature gives more detailed information and helps very much in the accurate recognition of an action. The main problem assisted with the feature fusion in the computational complexity. Furthermore, an effective combination of multimodal data such as skeleton data, depth data, optical flow, and RGB data still remains an open issue for human action recognition. This issue gives better direction of research in the field of HAR.

A graph is provided in Fig.1, wi20th two parameters such as methodologies accommodated and the accuracy obtained with the datasets.

$$\boldsymbol{F-score}= ((2 * P * R))/(P + R)$$

$$\boldsymbol{Precision} = \frac{No.of\ instances\ of\ correct\ positive\ recognition}{Total\ No.of\ positive\ recognition}$$

$$\boldsymbol{Recall} = \frac{No.of\ instances\ of\ positive\ recognition\ found}{Total\ No.of\ relevant\ input\ instances}$$

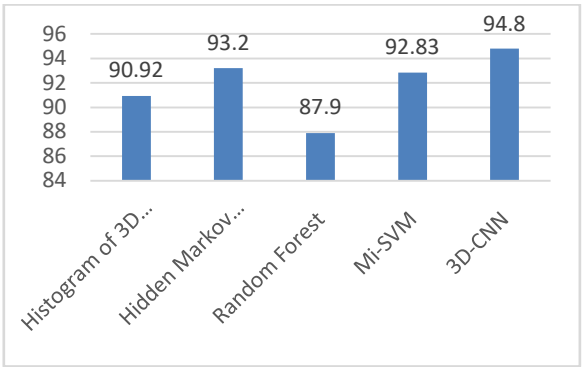


Fig.1 Accuracy of various Algorithms

IV. CONCLUSION

In this paper, a detailed and comprehensive survey is carried out over various human action recognition techniques. Initially, an introduction to HAR is explored and in that the need for human action recognition is illustrated. Further detailed information is provided about various datasets. Further, a detailed survey is described and the complete description is done under two phases, one is the survey over various feature extraction techniques and the other is on various action classification techniques. Under the feature extraction techniques, this paper reviewed the local features, depth, and skeleton features. Next, under the action classification techniques, this paper reviewed traditional classifications techniques and also the deep learning strategies. Further, a fine-grained analysis is accomplished over the deep learning approaches with respect to the convolution dimension. Based on the review explored, this paper makes the following conclusions.

1. To perform effective human action recognition, first, the feature extraction must be more effective. Since a system with more detailed information can only recognizes the action even under occlusions, noisy and complex backgrounds. For this purpose, the feature fusion will get priority and need an effective combination.
2. Though the feature fusion gives more prominent results in action recognition, there will be an excessive computational complexity at the classifier. Definitely, the complexity is more for an HAR system which analyzes the data in multiple views than the HAR system which analyzes the data in only one point of view. This can be compensated by an effective classifier design which is also more important in the HAR system.

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D^{2}MM-CNN: DIFFERENCE DEPTH MOTION MAP AND CONVOLUTIONAL NEURAL NETWORKS FOR HUMAN ACTION RECOGNITION

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ABSTRACT

Human Action Recognition has become the most significant research area for several applications like robotics, healthcare, gaming, smart houses, etc. However, in computer vision, action recognition from videos is one of the most challenging issues, due to some extraneous aspects like Occlusions, backgrounds, noises and so on. One solution to overcome the above-mentioned problems is acquiring only motion and shape cues form depth action video sequences. With this objective, in this paper, a new action representation approach is proposed based on Depth Motion Map (DMM), called as Difference Depth Motion Map (D^{2}MM). Next, a well-designed CNN is trained especially to extract the features from two actions with a similar structure. The CNN model introduced in this paper involves five convolutional layers, three pooling layers, and one fully connected layer. The experimental results of the proposed method are compared with conventional methods on the publicly available dataset, MSR Action 3D. The comparative analysis proves that the proposed approach outperforms the state-of-art techniques.

Index Terms : *Human Action Recognition, Depth Motion Map, Deep learning, Convolutional Neural Networks, MAR Action 3D dataset, Accuracy.*

I. INTRODUCTION

In recent yeas, with the rapid growth in the technology (e.g. machines and computers) and its utilization in our activities of day-to-day life, Human-Computer Interaction (HCI) facilitation has developed as one of the most prominent research aspects. Henceforth there has been an increased focus by several research studies to construct or develop a new interaction model to meet this objective. The final and ultimate objective of this mechanism is to fill up the HCI gap such that the interaction should be like Human to Human. Among several potential applications of HCI, Human Action Recognition (HAR) based on computer vision has gained a more significance. The main aim of HAR is to understand the enduring human actions which have certain contextual importance. These actions may comprise the whole body movements or only specific portions of the body like Hands, Legs, head or arms, etc., contingent to the application requirement. Computer Vision centered HAR is more powerful, friendly, natural, and less harm to interactive, especially in the environments like where there is no possibility of physical contact and/or speech. The HAR has widespread applications starting from surveillance events understanding for public safety [1], entertainment [2], Robotics [3] and many other applications [4]. Hence, HAR has gained much consideration from both academic and industrial applications.

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However, recognizing human actions in color images is a challenging issue due to various problems such as illumination variations, complex backgrounds, and clothing color, which makes the segmentation of human body much difficult in every scene. Especially, the color images won't have depth clues about the motion of a body which has a significant effect on action recognition. Due to the development of Microsoft Kinetic Sensors, the recent HAR studies are able to acquire the RGB-D image with uniform depth and color information and also illumination invariant that makes the recognition system robust to all human actions.

Recently HAR has been directed towards the utilization of depth maps due to their expressive and rich features provision [5]. The key to successful action recognition lies in the action representation such that they can provide discriminative features of each action for classification. Depth cues can provide a greater structural features of an action scene which are more sensitive to skin color, clothes and illumination variations. Even though extensive research has been carried out in this context [6], still there exists some ambiguity for some actions which leads to wrong classification, because, some depth frames include external effects like noises, cluttered scene backgrounds, occlusions, shadow backgrounds and small body shaking movements, etc. A better approach for depth sequence-based action recognition should provide a more clear depth map which is resilient to all these problems.

Regardless of data used for action representation, feature extraction and classification both play a vital role in the HAR. Basically, the handcrafted feature extraction approaches [7, 8] applied Support Vector Machine (SVM) classifier. However, in recent years, Convolutional Neural Networks (CNNs) have gained more popularity, have gained a huge success rate in the classification of images [9]. CNN is a powerful method and it is more effective at feature extraction as well as at classification, it can learn the discriminate features automatically from training data.

In this paper, a new HAR model is developed from depth maps and CNNs. An enhanced version of Depth Motion Map (DMM), called Difference Depth Motion Map (D^2MM) is developed in this paper which makes the action representation more resilient to external effects like noises, ghost shadow backgrounds and small body shaking movements. Next, a well-designed CNN is trained especially to extract the features from two actions with a similar structure. The action recognition introduced in this paper involves five convolutional layers, three pooling layers, and one fully connected layer. The experimental results of the proposed recognition model are compared with conventional methods on the publicly available dataset, "MSR Action 3D". The comparative analysis proves that the developed framework outperforms the earlier developed techniques.

Remaining paper is organized as follows; Section II summaries the related work details. After that, the complete details of the proposed HAR model is explained in section III. Further section IV explains the details of experimental results. Finally, the concluding remarks and future directions are represented in section V.

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1. Depth based Action recognition

With the advancement in the development of low-cost depth sensors and due to the capability of fetching the depth data, the researches have gained an increased research interest over depth images and diverted from RGB images. Several action recognition models are constructed by considering the depth data from action videos. This section outlines several models based on two aspects: handcrafted and deep learning approaches. A detailed and summarized surey over these methods is described in [10-12].

A. Handcrafted methods:

In earlier, several methods are proposed by considering the depth action sequences as an action representators. Initially, Yang et al. [13] projected the depth maps onto three orthogonal planes and accumulate the global activity through the entire video sequence to obtain the DMM. Then "Histogram of Oriented Gradients (HOGs)" are generated through these DMMs for action representation. Next Wang et al. [14] focused on the characterization of human motion and Human to object interactions and extracts a novel feature set that is suitable to depth data which are robust to temporal and translational misalignments, and noise variations. Further, to capture the intra-class variability, an action let ensemble models learned. However, these approaches are failed to acquire complex motion sahpes of joints at pixel-level.

To overcome this problem, O Omar et al. [7] developed a new descriptor through the histograms which can capture the features like spatial coordinates, depth, and time in 4D space, distributed over the orientations of different surface normals. To obtain this histogram, the 4D projectors are created at first for quantization of 4D space and then focused over the representation of possible 4D normal directions. Next, a "Super Normal Vector (SNV)" [8] is constructed through the low-level polynomials, obtained through the grouping of huper surface normal in depth sequence. Finally these SNVs are fed to the action recognition model. A. W. Vieira et al. [15] proposed a new descriptor called "Space-Time Occupancy Pattern (STOP)". In STOP, the depth action sequences are described through 4D grids and it is achieved through the segmentation of space-time axis. This approach preserves both the temporal and spatial contextual data which is being flexible to accommodate the intra-class variations. To increase the robustness, another 4D descriptor, called Random Occupancy Pattern (ROP) proposed by J. Wang et al. [16] which deals with occlusions and noise combined with sparse coding methods.

With an inspiration of the success of Spatio-Temporal Interest Points (STIPs) in RGB videos based on HAR, Xia L and Agarwal J [17] proposed a new filtering method called DSTIP to extract the STIPs through which the noise is suppressed. Further, a novel feature called, "Depth Cuboid Similarity Feature (DCSF)" to represent the depth of the local 3D cuboid located around the DSTIPs with an appropriate size. Further, Lu et al. [18] modeled a new features set based on the binary range samples that can remove the complex occlusions and cluttered background to acquire the motion and body shape in the depth image sequences. Next, Chen at al. [19] used "Local Binary Patterns (LBPs)" to acquire a compact feature representation from Depth Motion Maps at multiple views such as front, side and upper. Once the features are extracted all three LPBs are merged and formed into a

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composite feature vector and then fed to a classifier. At the classification level, a soft-decision assisted fusion rule is applied to merge the outputs of classifiers.

Action recognition from multiple views has gained an appreciable performance when compared to the action recognition based on a single view. In the method proposed by D. Kim et al. [20], initially the front view depth action image is processed for side view generation. Next, the both side and front views of action iamge are into two descriptors, namely "Depth Motion Appearance (DMA)" and "Depth Motion History (DMH)". SVM classifier is accomplished here for action classification. Another approach based on multi-view projection is proposed by Chen at al. [21] in which the initial projection of the original depth actionimage is accomplished over three Cartesian planes. Next, the DMM is obtained by the accumulation of absolute difference between two successive depth maps. Depth maps can also be generating at the segment level in which the depth action sequnces are fragmented into a set of several segments with overlapping. Based on this concept, a new method is developed by Chen et al. [22] in which the depth action sequence is segmented into temporally overlapping segments and then they are used to generate DMMs. Next, the DMMs are LBPs are exploited over the DMMs after the partition into dense patched to characterize the local texture information which has rotation invariance. Finally, the patch descriptors are encoded through fisher kernel and then fed to a kernel-based "Extreme Learning Machine (ELM)" algorithm for classification.

B. Deep Learning Methods

CNN [23] is the most prevailing mechanism for extracting the features and also for classification. Recent HAR methods focused on CNN for classifying action rather than the machine learning algorithms like SVM, Decision tree etc. A summarized advance of CNN in terms of weight initializations, loss functions, activation functions, optimization, and regularization is described in [24]. CNN's use of trainable filters and neighborhood polling process to attain a feature hierarchy of complex actions. CNN can extract the features those are invariant to lighting, pose, and neighboring clutter [25]. Moreover, the CNN's has an excellent performance in the recognition if they are trained through a perfect regularization [26, 27]. Several authors are focused over the development of deep learning assisited HAR system [28].

So many HAR [29] approaches are proposed based on CNN, some applied CNN to extract the features and some applied for classification and some more approaches utilized CNN for both. L Cai et al. [30] developed a new method for HAR based on the DMM and improved CNN. In this approach, initially the depth motion maps are projected into the front, side and top view and then features are extracted. Based on this aspect, an enhanced CNN model is developed to realize the HAR. Next, Xu Ran Zhao et al. [31] introduced a novel "Spatio-Temporal Conditional Random Field (STCRF)" [32] into Deep CNN (DCNN) to apply the temporal uniformity among the depth maps of successive frames of action video. A temporal consistent superpixel (TSP) is initialized to establish a correspondence target in successive frames. Then the DCNN is applied to relapse the depth value of each TSP monitored by STCRF to construct the relationship of estimated depths.

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III. PROPOSED APPROACH

1. Overview

The framework of the proposed Human action recognition method is depicted in figure 1. In this method, the depth maps are used for human action representation and CNNS are used for feature extraction and classification. An enhanced version of Depth Motion Map (DMM), called as Difference Depth Motion Map (D^2MM) is developed in this work to make the recognition system resilient to extra side effects like noises, background occlusions and shaking body movements. After representing the human action with D^2MM, CNN is applied for feature extraction followed by classification. Due to the extraordinary benefits of CNN in extracting the features from an image, no other mechanism is deployed for feature extraction. CNN extracts more significant and discriminative features form an image, hence this work not focused on feature extraction phase separately. The details of action representation through D^2MM and CNN are explored in the subsequent subsections.

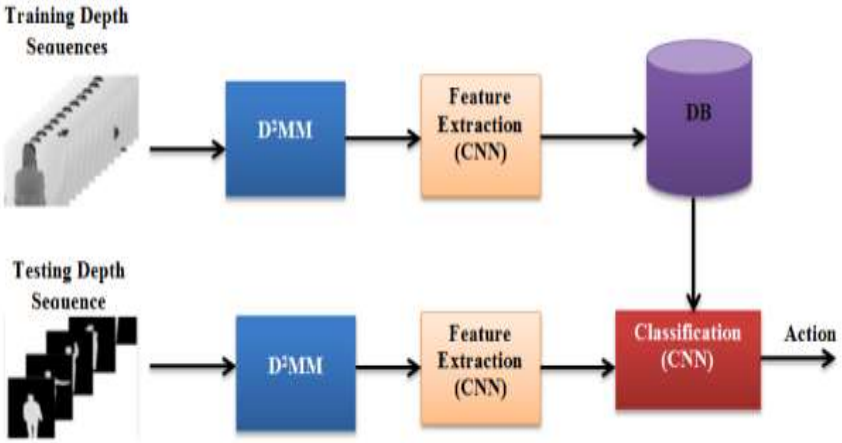

Figure 1 : Block diagram of the proposed recognition model

2. D^2MM

DMM is initially introduced by Yang et al. [13], which exploits the motion information from a depth sequence. DMM gives a visual perception of human activity and it is generated by the accumulation of motion energy throughout the entire depth sequence. Depth maps contain additional depth coordinates along with Cartesian coordinates which are generally provided by color images. Due to the presence of additional depth coordinates, depth maps are more informative than the normal color images. DMM based action representation transforms the action recognition issue from 3D to 2D and then applies for HAR. Particularly, the DMMs are constructed by the accumulation of energy after projecting the depth frames over an orthogonal Cartesian plane. Basically, the main intention of DMM is to signify the shape and motion of an action. The DMMs obtained at various levels are represented in figure 2.

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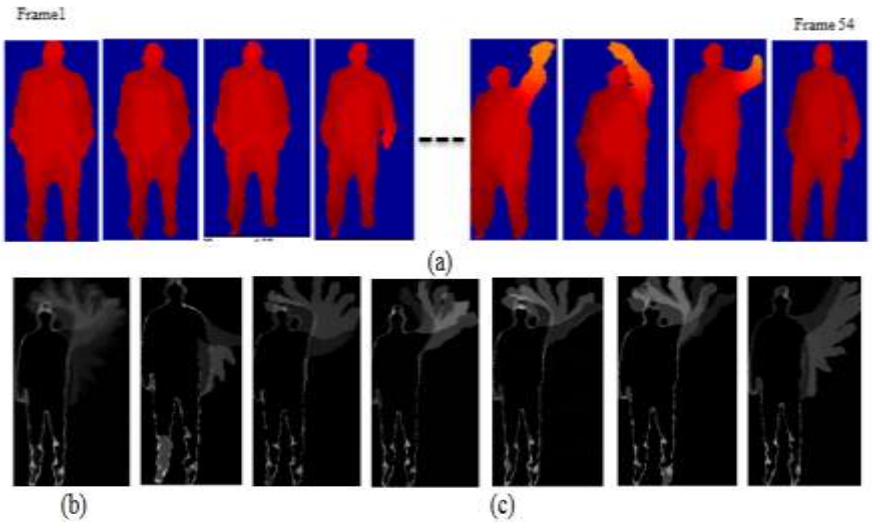

Figure 2 : DMMs representation (a) Depth action Sequence, High Wave, DMMs obtained through (b) 54 frames, (c) 1-9, 10-18, 19-27, 28-36, 37-45, and 46-54 subset of frames

Figure 2a shows a depth action sequence having high wave action, figure 2b shows the DMM obtained after considering the entire action sequence and figure 2c shows the different DMMs obtained after considering six different subsets of depth frames (e.g. frames 1-9, 10-18, 19-27, 28-36, 37-45, and 46-54 subset of frames) in the same action sequence. From figure 2c, we can observe that the defined action of hand waving is clearer than the DMM shown in figure 2b, i.e., the main shape and motion of action part is clearly visible in DMMs generated through subsets than the DMMs generated through the complete set of depth frames. Hence, the DMMs are generally generated through only the subsets of frames.

The concept of DMM considered by Yang et al. [13] is based on the threshold difference due to which there is a probability of information loss. Unlike the threshold-based DMM generation, Chen Liu et al. [21] evaluated the DMM based on the accumulation of motion energy of the absolute difference between consecutive frames. This method preserves the motion information more effectively and hence our method also considered it as a base for DMM evaluation. According to Chen Liu et al. [21], the DMM evaluation is formulated as follows;

$$DMM = \sum_{t=0}^{N-2} |D(i,j,t) - D(i,j,t-1)| \qquad (1)$$

Where D(i,j,t) is a pixel value at the position (i,j) of a depth frame at the instant of *t* and D(i,j,t-1) is a pixel value at the position (i,j) of a depth frame at the instant of *t-1*, where *t* varies from 0 to N-1.

DMM can acquire the shape and motion cues of a depth action image more effectively, results in a discriminative map that gives more discrimination between different actions. This discrimination is provided through the spatial distribution of energy. However, due to unstoppable reflection of depth cameras and low-resolution cameras, the depth data acquired in the depth sequence come with unnoticeable noises, resulting in a video with less quality and undefined energy regions in DMM.

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Furthermore, there exist some regions which won't exist in some frames and exists in some other frames. Ghost shadows are better examples of this type of region which can appear in only some frames. These shadows result in undefined depth values. Along with these problems, the insignificant or small shaking movements of body occured in the successive frames may also introduce some narrow and unnecessary moving edges to the DMM. These narrow and unnecessary edges has a severe effect on the body size and there is no much use with these edges. Further, the narrow edges do not provide any significant information which helps in the provision of perfect discrimination between different actions. Several image processing techniques like mathematical morphology [33] and median filtering techniques are applied to overcome the above-specified constraints like noises, ghost shadows and small body shaking movements. However, these techniques result in a loss of original motion information contained in DMM. Hence in this model, we introduced a new version of DMM, called D^2MM based on weighted motion score (WMS) to remove the above problems. For this purpose, initially a binary motion image is constructed by comparing the pixels at same positions of different frames, as

$$B_M(i,j,t) = \begin{cases} 1, & if\ D(i,j,t) \neq D(i,j,t-1) \\ 0, & Otherwise \end{cases} \quad (2)$$

Where B_M is a binary motion image. Next, based on the binary motion image and applying a sliding window over it, the Weighted Motion Score $W_M(i,j,t)$ is evaluated for every pixel, as

$$W_M(i,j,t) = \frac{1}{(w+1)^2} \sum_{i=x-(w/2)}^{x+(w/2)} \sum_{j=y-(w/2)}^{y+(w/2)} B_M(i,j,t) \quad (3)$$

The size of the sliding window is considered as $(w+1) \times (w+1)$, where w is the height and width of sliding window. In the present paper, we set the height and width of the sliding window as 8, i.e., $w = 8$. Next, based on the obtained WMS, the difference map, $D_M(i,j,t)$ is constructed as follows;

$$D_M(i,j,t) = \begin{cases} |D(i,j,t) - D(i,j,t-1)|, & if\ W_M(i,j,t) > T_M \\ 0, & Otherwise \end{cases} \quad (4)$$

Where T_M is the threshold of WMS and in our experiments, it is set as 0.6, i.e., $T_M = 0.6$. From difference map, we can notice that the pixels are considered as noisy when the WMS of the respective pixel is lower than the threshold T_M. Finally, based on the obtained difference map, the D^2MM is constructed as

$$D^2MM = \sum_{t=0}^{N-2} D_M(i,j,t) \quad (5)$$

Figure 3 shows the example of a two depth maps of a single action generated through DMM and *D^2MM*. From these observations, we can notice that the depth map obtained through *D^2MM* has more visual-spatial energy distribution than the depth map obtained through DMM.

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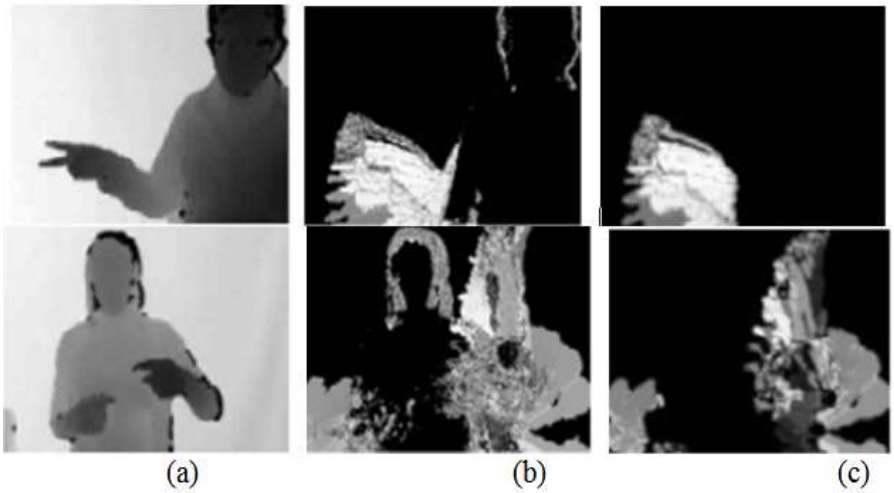

Figure 3 : (a) original depth action sequence, Depth Motion maps obtained through (b) DMM and (c) D^2MM

C. Convolutional Neural Networks Model

With an enormous growth in the development of powerful hardware like "Graphical Processing Units (GPU)" and Deep learning, "Deep Neural Networks (DNNs)", especially CNNs [34] have gained more and more popularity in human action recognition. The main advantage of the CNNs is their capability to represt the image through rich mid-level features, which is the main drawback of conventional handcrafted representations. Hence this paper accomplished the CNN to extract the required features as well as to classify the action.

Once Human action representation is completed through D^2MM, the next step is feature extraction and using them for recognizing human action. In this model, after representing the human action with D^2MM, then it is resized to 112X112 and processed as input to the proposed new CNN architecture. The CNN architecture is comprised of convolutional layers and pooling layers. Generally, the convolutional layers are accomplished for feature extraction and pooling layers are accomplished for dimensionality reduction. This model is composed of totally five convolutional layers and three max-pooling layers. The architecture of the proposed CNN model is depicted in the following figure 4.

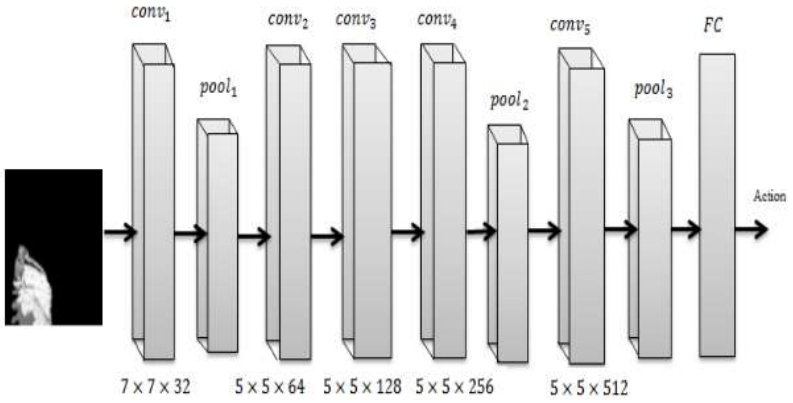

Figure 4 : proposed CNN model for HAR

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In the proposed model, the first convolutional layer ($Conv_1$) used 32 convolutional filters and the size of each filter is 7X7. The next three convolutional layers such as ($Conv_2$), ($Conv_3$), and ($Conv_4$) used 64, 128, and 256 convolutional filters and the size of each convolutional filter is 5X5. The last convolutional layer ($Conv_5$) used 512 convolutional filters and the size of each filter is 3X3. A Rectifier Linear Unit (ReLu) follows every convolutional layer and it is an activation function to increase the non-linearity. Next, the proposed model uses three max-pooling layers. At every max-pooling layer, the stride is considered as 2. Finally, a Fully Connected Layer (FCL) with the size equal to the total number of actions is considered and it is the final stage of feature extraction. During the training process, a "Multi-Nominal Logistic Loss Function" is accomplished along with a "Gradient Descent" method to update the weights. The following table.1 shows the details of parameters and their values considered at convolutional layers and pooling layers.

Layer	Filter Size	Stride	Pad
$Conv_1$		2×2	0
$Pool_1$	-	2×2	-
$Conv_2$	5×5	1×1	0
$Conv_3$	5×5	1×1	0
$Conv_4$	5×5	1×1	0
$Pool_2$	-	2×2	-
$Conv_5$	3×3	2×2	0
$Pool_3$	-	2×2	-

Table 1 : CNN structures

As explained above, this model considered the filter size as 7X7 at convolutional layer 1 and it was gradually decreased to 3X3. The textures extracted through depth maps of two different action images make it difficult to obtain more discriminative and distinct features when a filter with a small size is applied over the images. Let's consider two different action images. If we apply a filter of size 3X3 over them, the involved outputs may not differ much from each other. Because at the very beginning the two images may have similar features, which is the main reason behind the consideration of a 7X7 sized filter at the first convolutional layer, $Conv_1$. Generally, the last layer of CNN, i.e., fully connected layer ends with 1 or 2 fully connected layers before the last phase of the classification layer. However, based on the experiments conducted at training phase, we discovered that one FCL is enough. The final FCL is applied over the output of the third max-pooling layer and it can preserve all significant features and also can generate better classification results. Further, at the testing, the soft-max regression is accomplished to obtain a score for every action class depends on the trained weights in the training phase. Further, the class label is determined based on the higher score obtained at the soft-max regression layer.

IV. SIMULATION EXPERIMENTS

In this section, we comprehensively evaluated our developed action recognition system on a publicly available benchmark data set, MSR Action 3D dataset [35]. We employ MATLAB software

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for the simulation of the proposed approach. This data set provides depth map data that are suitable to construct the difference depth motion maps. In this section initially, the details of the "MSR Action 3D dataset" are explored. Next, the obtained simulation results are described. Finally, a comparative analysis is described between the proposed and conventional approaches through the obtained results.

A. MSR Action 3D dataset

The "Microsoft Research (MSR) action 3D dataset" is an action dataset constructed through 20 different actions such as forward kick, side kick, jogging, throw, pick up, tennis serve, golf-swing, high arm wave, hammer, draw X, forward punch, draw circle, two hand wave, draw tick, side boxing, bend, hand clap, high throw, hand catch, horizontal arm wave. Every action is performed by ten actors and totally three times. This is a very challenging dataset which has a lot of speed variations and also the actions have more similarities. A single viewing point is only used at which the actions are faced with a frontal view with the camera while capturing. Similar to [14], the subjects with odd numbers such as 1, 3, 5, 7, and 9 are used for training and the subjects with even numbers such as 2, 4, 6, 8, and 10 are used for testing. Some depth action sequences of this dataset are shown in figure 5.

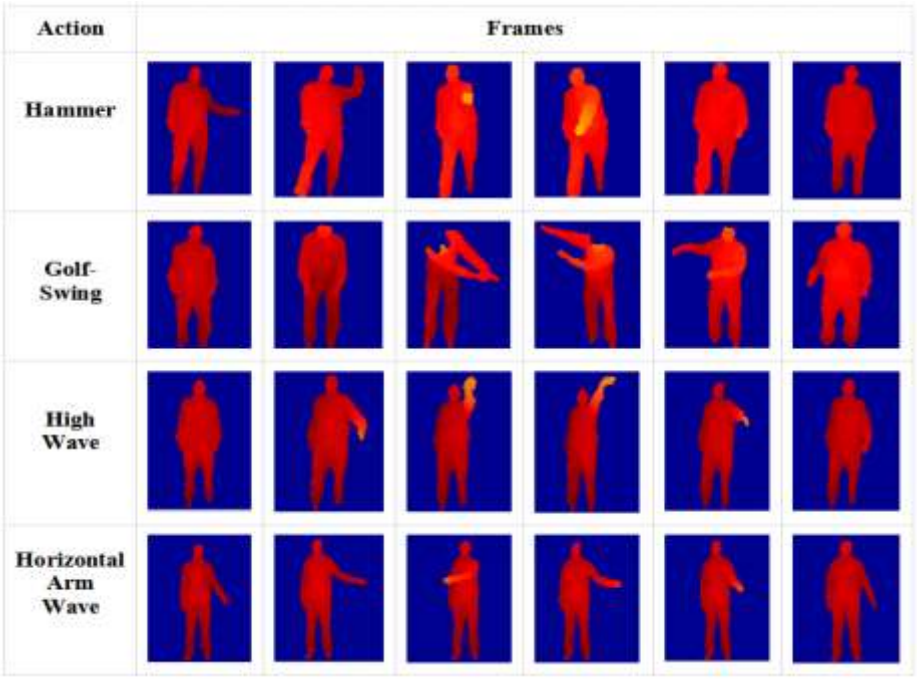

Figure 5 : some action samples of MSR Action 3D dataset

B. Results

In this paper, several performance metrics such as "True Positive Rate (TPR) Or recall, Precision or Positive Predictive Value (PPV), F-Score, False Negative Rate (FNR), False Discovery Rate (FDR)" and "Accuracy" are considered to evaluate the performance of proposed approach. After testing different actions, the obtained results are formulated into a confusion matrix. Depends on the obtained classification results, "True Positives (TPs), True Negatives (TNs), False Positives (FPs), and False Negatives (FNs)" are measured. Based on the obtained TP, TN, FP and FN values from the confusion matrix, accuracy is evaluated and the respective mathematical representation is given as;

$$TPR = \frac{TP}{TP+FN} \quad (6)$$

$$PPV = \frac{TP}{TP+FP} \quad (7)$$

$$F-Score = \frac{2 \times TPR \times PPV}{TPR+PPV} \quad (8)$$

$$FNR = \frac{FN}{TP+FN} \quad (9)$$

$$FDR = \frac{FP}{TP+FP} \quad (10)$$

$$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} \quad (11)$$

Here totally 20 actions are considered for every actor. After the simulation of different action sequences through the proposed approach, the obtained results are represented as below.

Action/Metric	TPR (%)	PPV (%)	F-Score (%)	FNR (%)	FDR (%)
High Arm Wave	85.2312	100.00	92.0268	14.7688	0000
Horizontal Arm Wave	94.1147	85.7145	89.7184	5.8853	14.2855
Hammer	100.00	100.00	100.00	0000	0000
Hand Catch	78.4745	90.1245	83.8970	21.5255	9.8755
Forward Punch	88.4574	100.00	93.8752	11.5426	0000
High Throw	95.4127	91.6784	93.5082	4.5873	8.3216
Draw Cross	82.4789	93.1247	87.4791	17.5211	6.8753
Draw Tick	94.6696	88.2475	91.3458	5.3304	11.7525
Draw Circle	94.8675	100.00	97.3661	5.1324	0000
Hand Clap	95.7845	86.4789	90.8941	4.2155	13.5211
Two-Hand Wave	100.00	100.00	100.00	0000	0000
Side-boxing	100.00	100.00	100.00	0000	0000
Bend	86.4400	89.4217	87.9055	13.5600	10.5783
Forward Kick	100.00	96.3147	98.1227	0000	3.6853
Side Kick	100.00	100.00	100.00	0000	0000
Jogging	100.00	100.00	100.00	0000	0000
Tennis Swing	94.7189	88.2451	91.3674	5.2811	11.7549
Tennis Serve	94.4578	90.6638	92.5219	5.5421	9.3362
Golf Swing	92.3147	96.7845	94.4967	7.6853	3.2155
Pick Up & Throw	90.7845	100.00	95.1696	9.2155	0000

Table 2 : Performance Metrics for different actions

Table 2 shows the details of performance metrics evaluated after testing all types of actions. The first measure, TPR measures the total number of true positives for a given total number of inputs. For example, let's consider the High Arm wave action, the TPR is measured as the ratio of total number of High Arm Wave action frames detected as walking to the total number of High Arm Wave action frames given as input for testing process. In this case, the TP is the total number of High Arm Wave action frames classified correctly and FN is the total number of High Arm Wave action frames classified incorrectly. This process is applied for all the remaining actions also and the respective TPRs are measured. From table 2 it can be noticed that the maximum TPR (100%) is obtained for a

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total of six actions and they are Hammer, jogging, side kick, forwardkick, side-bxing, and Two-hand Wave. The minimum TPR is obtained for Hand Catch (78.4745%).

Next, the precision is measured as the ratio of TPs to the sum of TP and FP. In the above example of High Arm Wave action as input, the TP is the total High Arm wave action frames count those are classified correctly and FP is the total action frames count those are classified as High Arm wave when the input is not a High Arm wave action. In this case, the input is not required action but the output is required action. Next, the maximum PPV (100%) is obtained for a total of eight actions and they are two-hand wave, draw circle, forward punch, hammer, High Arm Wave, Side-boxing, Side Kick, and Pickup& Throw. The minimum PPV is obtained for Horizontal Arm Wave (85.7145%).

Next, the F-measure a simple harmonic mean of TPR and PPV. A higher value of F-score depicts the better performance and in this simulation, the maximum F-score (100%) is achieved for a total of five actions and they are Hammer, jogging, side kick, side boxing, and Two-Hand Wave. Further, the minimum F-score is obtained for Hand Catch (83.8970%).

The FNR is a measure which measures the total number of false negatives that are falsely classified. For example, if we had given a Hand catch action as an input and the system had shown it as Hand Clap, then it is counted as False Negative. The FNR is obtained by the accumulation of the total number of such False Negatives. A minimum value of FNR denotes better performance and during this simulation, we got minimum FNR (0%) for a total of six actions and they are Hammer, Jogging, side kick, forward kick, side boxing, and Two-hand Wave,. Further, the maximum FNR is obtained for an action Hand Catch (21.5255%).

Finally, the FDR is a measure which measures the total number of false positives that are falsely discovered. For a given input actual action, if the system had shown another action, then it is counted as False Positive, i.e., the total number of instances the action is falsely discovered. For example, if we had given a Hand catch action as an input and the system had shown it as Hand Clap, then it is counted as False Positives for Handclap action. The FDR is obtained by the accumulation of the total number of such False Positives. A minimum value of FDR denotes better performance and during this simulation, we got minimum FDR (0%) for totally eight actions and they are Two-hand wave, draw circle, forward punch, hammer, High Arm Wave, Side-boxing, Side Kick, and Pickup& Throw. Further, the maximum FDR is obtained for an action Horizontal Arm Wave (14.2855%).

Further, the simulation experiments are accomplished according to yang et al. [13] through three subsets. Under this simulation experiment, totally three types of experiments are conducted by dividing the entire action set into three different subsets. Similar to [14], the subjects with odd numbers such as 1, 3, 5, 7, and 9 are used for training and the subjects with even numbers such as 2, 4, 6, 8, and 10 are used for testing. The three action sets are shown in Table 3. Here the simulation study is accomplished by varying the frame length and pixel shift and the obtained accuracy is shown in figure 6 and figure 7.

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Subset 1	Subset 2	Subset 3
Hand Clap	Draw Circle	High Throw
Bend	Draw Cross	Golf-swing
Horizontal Arm wave	Side-boxing	Tennis Serve
Tennis Serve	Hand Catch	Pick-up & Throw
Forward punch	High Arm Wave	Jogging
Hammer	Draw Tick	Tennis Swing
High Throw	Forward Kick	Side Kick
Pick-up & Throw	Two-hand Wave	Forward Kick

Table 3 : Subsets of MSR Action 3D dataset

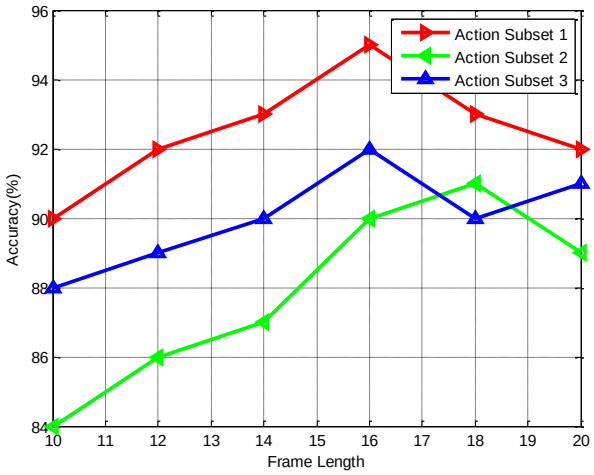

Figure 6 : Recognition Accuracy with varying frame length

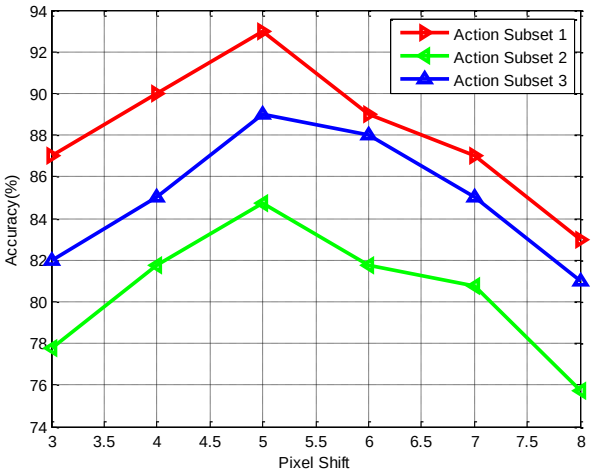

Figure 7 : Recognition accuracy with varying pixel shift

Figure 6 shows the details of recognition accuracies with varying frame length. From this figure, we can notice that as the frame length increases, the recognition accuracy also increases and

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this increment is only up to a particular level. As can be seen, the accuracy is gradually increased up to frame length 16 and then onwards it is decreased. A smaller frame length results in less depth information by which the detection system can't recognize the perfect action present in that frame. Similarly, a larger frame length also results a more confusion to the detection system due to the excessive depth information. For instance, even in a single video, some actions are carried out multiple times and an increased frame length results in more confused depth information. Moreover, the accuracy of the actions considered under action subset 1 has higher values and the actions considered under action subset 2 are having fewer values. The main reason behind this problem is three similar actions in subset 2, they are Draw Tick, Draw Cross, and Draw Circle. These three actions have similar characteristics at initial frames and hence the detection system has gained less accuracy.

Figure 7 shows the details of recognition accuracies with varying pixel shift. From this figure, we can notice that as the pixel shift increases, the recognition accuracy also increases and this increment is only up to a particular level. As can be seen, the accuracy is gradually increased up to a pixel shift of 5 and then onwards it is decreased. Here the pixel shift is accomplished through the extraction of overlapping frames. After 5, the recognition accuracy is decreased because for a greater pixel shift the spatial correlations between pixels become weak and hence the obtained Depth Motion Map won't have effective feature through which the system can discriminate between different actions. Moreover, the obtained accuracy is high for actions under subset 1 and the accuracy is less for actons under subset 2.

C. Comparative analysis

In this section, we discuss the comparison of recognition accuracies between the proposed and conventional approaches such as DMM + HOG [13], Random Occupancy Patterns [16], HON4D [7] and DMA+DMH+HOG [20], Action + Ensemble [14], and DSTIP [17].

Method	Accuracy (%)
DMM + HOG [13]	85.52
Random Occupancy Patterns [16]	86.50
HON4D [7]	88.89
DMA+DMH+HOG [20]	90.45
Actionlet + Ensemble [14]	88.20
DSTIP [17]	89.30
D^2MM + CNN	**91.59**

Table 4 : Comparison of recognition accuracy

Table 4 represents the accuracy comparison of proposed and conventional approaches. It can be seen from the table 4, the accuracy of the proposed system is higher compared to the conventional approaches. The most nearby method for the proposed model is DMA+DMH+HOG [20] and it achieved an accuracy of 90.45%. However, in this approach, the DMM evaluation didn't consider the external effects like noises, Ghost Shadows and shaking body movements and hence the obtained DMM is not effective to recognize the action more accurately. By generating a binary motion image before DMM evaluation, the proposed model has gained resilience to all these side effects. Furthermore, the one more conventional approach, i.e., DMM + HOG [13] is a basic approach for

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DMM based action recognition and in this method, the DMM is evaluated based on the thresholding by which the obtained DMM won't have significant information which is more helpful in the action recognition. The main drawback of this approach is information loss due to thresholding. Though the DSTIP method suppresses the noises effectively, they can't capture the small body shaking movement sin depth action sequences.

V. CONCLUSION AND FUTURE SCOPE

In this paper, we have presented a Difference based Depth Motion Map which can nullify the external effects present in the Depth Action Video Sequences. The inclusion of difference map helps in the reduction of unnecessary constraints like shadows, small body movements and represents only action movements with high precision. This approach copes up with shape and motion cues for all types of actions. Further, the new CNN model helps in the extraction of more significant and distinct features of every action. The proposed model is extensively simulated over a standard benchmark dataset. The experimental results show that the developed method outperforms the conventional approaches after evaluating it over the standard "MSR Action 3D dataset". Moreover, the additional simulation experiments on the "MSR Action 3D dataset" confirm that the proposed HAR model can handle depth sequences that contain different frames and pixel shifts. With the implementation of five-layered CNN, our method can classify real-time actions also with more accuracy.

In the standard MSR Action 3D dataset, Skelton based action sequences are also available which also represents human actions. The main advantage with Skelton model is a reduced computational burden. Even with fewer features, the Skelton based actions can represent a human action more effectively which helps in the accurate recognition of human action. Hence, the further work of this paper is intended to apply the new CNN model with Skelton joint based motion action descriptors.

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Designing a Deep Neural Networks Structure to Acquire the Top Level Depiction of Human Interactions

S. Sandhya Rani, G. Appa Rao Naidu, V. Usha Shree

Abstract:*The latest research studies have really concentrated on slim complications including individual action recognition approaches utilizing depth information, 3D-skeleton information, still photo applicable info, spatiotemporal interest point-based approaches, and also human strolling proposition recognition Nevertheless, there has actually really been no methodical research study of individual action recognition. We present the scene context features that describe the atmosphere of the topic worldwide and also local levels. We design a deep neural network structure to acquire the top-level depiction of human activity combining both activity attributes as well as context features.*

Index Terms: *Deep learning, human recognition, context features*

I. INTRODUCTION

The crucial to terrific human action awareness is durable individual activity modeling and attribute depiction. Attribute depiction and selection is a classic complication in computer system vision in addition to artificial intelligence. Unlike feature representation in a photographed space, the quality portrayal of human activity in the online video not merely describes the appeal of the human(s) in the imaging room, however, need to also draw out changes in appeal and also setting. The problem of feature portrayal is actually extended from two-dimensional space to three-dimensional fourth dimension. Over the last couple of years, numerous sort of action depiction methods have been recommended, consisting of the neighborhood and also international features based upon temporal and also spatial modifications, trajectory functions based upon key point tracking, activity modifications based upon depth information, and also action attributes based upon human present adjustments. With the effective application of deep knowledge to photo category as well as also thing detection, various scientists have really also applied deeper knowing to human activity identification. This allows activity features to be quickly picked up from video data. In addition, some researches have evaluated these action recognition strategies. Nonetheless, these evaluation articles have actually only talked about particular aspects, for instance, spatial-temporal fascinating factor (STIP)- located human activity identification methods, human walking examination strategies, in addition to deeper understanding based techniques. Bunches of brand-new techniques have merely lately been established, especially concerning the use of deepness understanding moves toward to include knowing. Subsequently, thorough research of these new individual activity acknowledgment techniques is actually of substantial passion.

In this particular job, we sum up a number of current tasks and also show a brand-new questionnaire of research study on human activity acknowledgment techniques being composed of activity distinction (focusing especially on the activity depiction strategies of activity category), human-- object communication recognition, and action discovery techniques. The action classification methods are summed up into techniques based on handcrafted attributes and also those based on attribute understanding. These approaches can be put on different kinds of data.

From an information point of view, many assessments of individual action acknowledgment are confined to techniques based upon specific records, like RGB data, deepness information, or even emaciated body info. A lot of those jobs pay attention to human activity recognition in RGB video recording data. With the progression of intensity webcams, intensity records are actually currently commonly taken advantage of in great deals of personal computer vision duties, particularly the estimation of human positions to clear away human skeletal system info. Additionally, the latest investigation leads on individual invention and additionally position evaluation in RGB video clip show that deep learning-based techniques can attain efficient as well as precise multi human present evaluation in intricate scenes. Numerous human action recognition methods based upon depth series and skeletal system information have actually likewise been proposed. To a particular degree, these procedures have solved a few of the problems of individual activity recognition along with RGB electronic cameras and even video recording, in addition, to invite fact emphasized excellent appreciation efficiency. Functions on individual activity recognition tactics making use of strength as well as also skeletal system facts, that summed up human activity appreciation approaches utilizing magnitude pertinent info, that analyzed individual activity identification approaches located upon 3D unit information. Furthermore, [5] checked out human action acknowledgment techniques from still photographs. Although several of these evaluation quick articles cover details blend techniques, they still offer a slim summation of individual action awareness approaches toward particular kinds of relevant information. To address this concern, within this job, our company summarizes individual action acknowledgment strategies relevant to various forms of information in addition to entailing hand-crafted

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feature-based along with feature uncovering approaches.

Another necessary facet of the disorder on human activity awareness research is actually that many look into focused on human activity functionality symbols. The refined image sequence data are normally well-segmented along with consist of simply one activity occasion. This after that becomes a distinct problem. Nonetheless, there are actually two crucial complications in the genuine situation: communication identification as well as activity exploration. Interaction describes actions that entail higher than 2 folks or actions in between individuals as well as also products, including carrying a blade or even playing equipment. Activity discovery explains finding the environment at which activity happens over time and place from picture sequence information that has actually certainly not been fractional. Over the last few years, interaction and also human activity discovery has actually come to be visible analysis study subjects. Regardless, there is actually no overarching summary of the approaches pertinent to these 2 troubles. To this side, the condition of research study on communication recognition as well as activity discovery is actually analyzed in this particular study.

Human activity acknowledgment researches comparable to our work have actually appeared in the latest opportunities. As an example, [4] provided an in-depth survey of human activity appreciation procedures set up coming from 2008 to 2012. Those specific action recognition approaches were actually divided right into 3 different degrees: private discovery (low-level objective), individual monitoring (intermediate-level vision), and also actions understanding strategies (top-notch idea). Furthermore, [3] capitalized on the very same technique, to sum up, activity verification methods coming from 2013 to 2016. [5] summarized existing compositions in the condition of 3 parts: sensing device modality, strong models, along with use. Having said that, as opposed to those works, we here different individual activity awareness right into action type and also action discovery. On top of that, both hand-crafted feature-based strategies and likewise deep learning-based strategies are actually gone over within this job. The research study very most similar to the here and now job which likewise sums up activity recognition techniques according to handmade feature-based methods as well as deep-seated learning-based techniques. Nevertheless, in our work, these 2 methods are actually further reviewed with a point to consider different details types. [7] talked about the typical procedures of individual action only, neglecting a survey of communication awareness as well as additional activity detection methods. Take note in addition that [6] performed a present research study of literature on action recognition in addition to action forecast; the last prepares for the potential condition of individual tasks located upon inadequate activity implementations.

To collocate along with one another previous polls along with fill the voids between all of them, our experts listed below supply a comprehensive research study of human activity recognition methods (view Figure1), being composed of activity feature representation techniques, interaction recognition techniques, and likewise action discovery strategies. To implement this research study, several types of research are evaluated in our job. When reading this paper, a necessary issue was the compositions option. Initially, a poll platform was put to extend the main effective approaches to human action awareness. The decided on works sought that picked up located upon appropriate key expressions, such as "activity acknowledgment", "activity feature portrayal", "interaction awareness", and also "activity breakthrough". Second, based upon the actually chosen literature, necessary works were actually included. Lastly, based upon the activity awareness dataset, further studies were helped incomplete this work. In our analysis study, most literary works were actually gathered from scholarly publications and appointments on pc vision. The articles released in vital diaries as well as likewise appointments like IEEE Transactions on Trend Assessment as well as Developer Intelligence Information Information, International Workshop on Pc Device Attitude and also Trend Understanding, IEEE International Abiding By on Personal Computer Perspective, to name a few, are going to certainly be liked. Subsequently, our team boosts upon these articles to gather a lot more essential jobs. The approval criteria of the literary works are high citations or excellent acknowledgment functionality.

All at once, to create our job cover even more various procedures, for similar procedures, our experts simply choose an essential or depictive technique for an in-depth conversation.

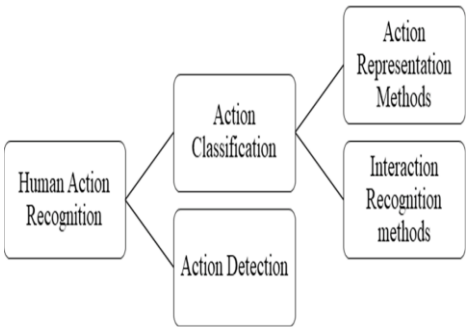

Figure 1. Classification framework

Due to the fact that deepness information is stable relative to adjustments in setting as well as an additional background, in addition, to permit difficulty to be actually rapidly segmented according to deepness, the request of deepness sensing units makes it possible for a real-time, robust human present estimate. Human action recognition techniques based upon deepness info as well as skeletal system series demonstrate high awareness preciseness and also lowered opportunity complications. These strategies are well-known in human action recognition study. Nevertheless, the accuracy, as well as cost of depth sensors, indicate that deepness- and likewise skeleton-based activity awareness methods are actually presently just necessary over marginal wide arrays and in particular environments. There are actually 3 kinds of typically utilized depth cams: triangulation (along with two camera scenery), time-of-flight (TOF) video cameras, and additionally structured-light-based digital video cameras. Structured-light as well as TOF-based depth-sensing units are conveniently effected by light, with big mistakes and also reduced precision in outside atmospheres. The price of the two-camera system is reduced, however, the deepness information estimation has higher intricacy as well as can not be applied in darker atmospheres.

Furthermore, there are other sensing units that can be utilized to assess deepness, including laser device scanning devices; having said that, these devices are costly as well as improper for video clip security and home track.
Unlike handcrafted action functions, deep learning methods carry out well when it comes to automatic feature discovering from pictures. This provides a new idea right in to individual action acknowledgment, and also numerous experts have really attempted to utilize deep discovering approaches to eliminate action features coming from RGB, acumen, and also skeletal system records Such data are applicable to multimodal functionality profiting from deep systems, like appearance/image particulars, visual flow set, depth sequences, in addition to skeleton patterns. Deep-seated learning networks can easily figure out human activity attributes from single-mode info or even multimodal mix records... As the look sequence and also optical flow series are relatively simple to acquire, a lot of deep learning approaches embrace the appeal collection and optical circulation collection as their input, with a handful of depth- as well as likewise skeleton-based strategies. Regardless, existing high-efficiency multiperson setting assessment approaches based upon deep understanding have drawn brought up interest to human action function uncovering based upon skeletal system sequences, as well as also this is now a detectable research content in the business of human action verification.

Human activity recognition could be broken down straight into the activity group as well as activity diagnosis. Action classification is the evaluation of a fractional video clip consisting of just a solitary action that should be identified right into a defined action group. Action diagnosis finds out the start and also end times of each action in the video recording, situates their posture precede, as well as also recognizes the action classification. In an extremely early research study, the research of individual action awareness paid attention to the activity classification problem. Along with the growth of pertinent study subject matters, such as expert system, traits revelation, and also human found estimate, analysis study on the far more difficult human activity detection has actually happened noticeably in the last couple of years.

II. RELATED WORK

In human task recognition systems, various reduced- level features are introduced to explain the task monitoring. They used a descriptor that incorporates both neighborhood and international depictions of human movement, inscribing the motion info along with being durable to local appearance modifications. The discussed activity recognition methods mainly focus on recognizing the private action. Their frameworks are challenging to scale to resolve real-world circumstances where several people task and interaction are entailed. Our method represents the motion details making use of STIP feature comparable to but incorporates the abundant context info that we remove from the video. By using the deep model, our approach has the ability to: capture the substantial info concerning people's movement and interactions; scale to recognize the activity of each person in the scene; as well as enhance the accuracy of the general task recognition task.

Deep Model for Task Recognition. In recent years, deep designs consisting of deep neural networks, convolution semantic networks, and auto-encoders have actually been used in several applications. For human task recognition, convolution semantic networks and also auto-encoder approaches have actually been established. Nonetheless, these action/activity deep models are typically target-centered, which is essential for the human task that involves numerous individuals. Comparatively, [7]suggested an occasion recognition structure, which is a hierarchical context version that catches the context information in several degrees. In a similar way, our approach makes use of a deep-structure version that is trained utilizing the contextual info drawn out from human groups as well as video clip scene. Nevertheless, our technique concentrates on a different problem, which is recognizing the task of each individual appearing in the scene, other than a general event of the entire scene.

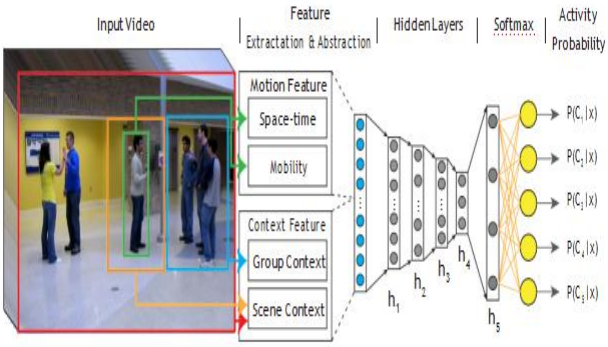

Figure 2: Neural network model.

The interval-based Spatio-temporal model is the suggested design as well as is a crossbreed event design. Apart from this technique like Limit versions, Bayesian Networks, Bag of actions as well as Very natural intervals and likewise Markov reasoning networks are actually utilized. SVAS strategy can be enhanced to handle transferring electronic video cameras and also multi-camera information selection. Additional augmentations are needed to have in dealing with complex celebrations specifically in regions like calibration and also audio removal. Several weird task discovery in video recordings is actually a rule-based body. The attributes are recognized as activity trends. Diagnosis of strange affairs is actually done either through teaching the unit or even through observing the dominant collection home. The tip of leading compilation where activities are located as usual based upon leading habits and odd celebrations are actually determined based upon much a lot less leading actions. The perk of policy located device is actually that simple to recognize brand-new events by customizing some regulations.
As a preprocessing body video clip division is taken advantage of. Record modeling is used through Gaussian Combo Version. For things, acknowledgment outdoor policies are actually demanded. The device is executed in Matlab 2014. The places were actually more focus extra required are doubtful tasks as well as also conditions where

countless points overlapping occurs. Exploration strange events versus steady collection in surveillance video recordings from organization ambiances pay attention to unheard of affairs linked with a consistent chain of celebrations. The primary cause recognizing such celebrations is actually very early execution of information specifically locations. The application part is carried out making use of Matlab, Inputs are actually observed activities as well as also realized constant assortment of occasions. The major exam under this strategy is to recognize events which are doubtful to chase delivered consecutive pattern by meeting the client recognized requirements. The method is actually giving a lot more focus on event-level examination as well as it is going to definitely be interesting if focus at company degree and additionally action level. Yet simultaneously getting in such a granular degree makes the operation expensive. Video recording quality descriptor combining movement as well as additionally look signs with size stable qualities is a characteristic descriptor. Numerous velocity based methods have actually been actually taken advantage of in plentiful setups. However, those approaches require to deal with concerns connected along with occlusions. As a service to that, credit descriptor using a visual flow-based approach.

III. RESEARCH CHALLENGES

Despite the significant progress that has actually been made in human action recognition and also forecast, cutting edge formulas still misclassify actions because of numerous major challenges in these tasks.

Intra as well as inter-class Variations.

As all of us recognize, individuals behave in different ways for the very same actions. For a supplied semantic significant activity, as an instance, "operating", a person may run easy, slow-going, as well as even hop as well as run. That is to condition, one action type might contain many various designs of human proposals. Additionally, video in the exact same action could be recorded from several perspectives. They could be soaked upfront of the human topic, on the side of the subject, or even probably atop the subject, revealing look varieties in various views. Additionally, various folks may present various presents in implementing the very same activity. All these variables will certainly cause a big intra-class look in addition to present variations, which perplex a large amount of existing action acknowledgment algorithms. These alternatives are going to be actually also much larger on real-world action datasets. This activates the exam of advanced activity awareness algorithms that can be set up in real-world situations. Additionally, similarities exist in a variety of activity classifications. For example, "running" as well as "strolling" involve similar individual task patterns. These correlations would similarly be actually examining to separate for smart devices, as well as subsequently add to misclassifications.

Camera Motion and Cluttered Background

It is interesting to observe that an amount of human action recognition formulas operate well in interior controlled settings however certainly not in exterior uncontrolled settings. This is actually mainly because of the background noise. As a matter of fact, the majority of existing activity attributes like pie charts of oriented slope and enthusiasm aspects additionally inscribe background sound, and hence degrade the recognition efficiency. Video camera movement is actually one more variable that ought to be actually considered in real-world requests. As a result of the substantial video camera proposal, activity parts might certainly not be actually properly extracted. To far better extract action functions, video camera proposition ought to be actually created along with made up. Different other environment-related troubles including illumination health conditions, viewpoint adjustments, a vibrant record will definitely likewise be really the concerns that restrain activity recognition protocols stemming from being made use of in sensible circumstances.

Uneven Predictability

Certainly, not all structures are actually equally discriminative. To solve this complication, circumstance info is transmitted to the starting point portions of the online videos, yet the functionality is still confined because of the not enough discriminative relevant information.

Furthermore, actions contrast in their routine. As shown in [1], some actions are actually quickly foreseeable while the other ones require even more frameworks to be observed. Nevertheless, in practical circumstances, it is actually important to anticipate any kind of action as very early as achievable. This needs our company to generate general action prophecy algorithms that can create exact and also early predictions for most of or all activities.

Classifiers for Human Interactions

Human communication is actually common in everyday life. Recognizing human interactions concentrates on the activities conducted by numerous folks, including "handshake", "speaking", and so on. Especially, communications are actually treated in its entirety and are actually stood for as an activity descriptor including all individuals in a video recording. Then an action classifier like linear assistance vector device is actually used to identify communications. Regardless of reasonable efficiency has actually been attained, these strategies perform certainly not clearly think about the inherent methods of communications, and fall short to take into consideration the co-occurrence details in between connecting people. Additionally, they do not extract the motion of everyone from the group, and thus their procedures can easily not infer the action tag of each connecting individual. Action co-occurrence of private person is beneficial in- buildup in human communication recognition.

Motion Trajectory Prediction

Besides predicting human activities, the other essential facet in human-focused prediction is activity velocity prophecy, which targets at forecasting a passerby's relocating road. Activity trajectory prediction, an integral capability of us, rationalizes the achievable place as well as the activity velocity of the target person. We can predict with higher self-confidence that a person is heading to stroll on walkways than roads, and are going to stay away from any kind of difficulties during strolling. Consequently, it is interesting to study how to make makers do the very same work. Vision-based motion path prediction is important for practical applications like aesthetic security and self-driving cars, in which reasons concerning the future movement

patterns of a passerby is actually vital. A big physical body of job learns activity designs through clustering trajectories. Nevertheless, projecting the potential movement trail of a person is actually truly demanding as the forecast can not be predicted in isolation. In a congested atmosphere, human beings conform their motion according to the actions of neighboring folks. They may quit, or change their roads to fit other individuals or the environment in the vicinity. Collectively modeling such intricate reliances is actually really complicated in vibrant environments. Additionally, the anticipated velocities need to certainly not only be actually appropriate but likewise socially acceptable. Passerby always appreciates private space while walking, and thus produce right of way. Human-human and human-object communications are actually normally skillful and sophisticated in packed atmospheres, creating the concern a lot more demanding. In addition, there are various future predictions in a packed environment, which are actually all socially appropriate. Therefore anxiety evaluation for the multimodal predictions is actually wanted. Forecasting velocity, as well as place by understanding bodily scene, was explored in which was just one of the introducing operate in trajectory prediction in the computer dream neighborhood. The recommended approach models the result of the physical setting on the selection of human actions.



Fig. 3. Movement velocity prophecy is actually important for efficient applications like visual surveillance and self-driving vehicles.

Their procedure is built on the vibrant Bayesian system, which takes into consideration the passerby's choice to visit three signals, consisting of the life of moving toward the automobile, the passerby's recognition, and the spatial design of the performance.

IV. CONCLUSION

In this paper, our team has analyzed human action awareness approaches as well as likewise offered an extensive testimonial of existing methods to human activity recognition analysis study. The input attributes of the deep network include activity attribute as well as context attribute. We make the scene prior feature and also scene context function to record the atmosphere around the topic of rate of interest worldwide as well as local degrees.

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RECOGNITION OF ONLINE HANDWRITTEN TELUGU LETTERS FOR DIFFERENT DOMAINS AND ORGANIZATIONS

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ABSTRACT

Machine learning and neural networks are trending technologies used in different kinds of handwritten (HW) pattern recognition of various research areas. Therefore it is very hard to distinguish and recognise the hand written characters of different persons. Recognition of characters related to telugu language is a part of pattern reorganisation that happen to the idea of research during the past some years. Neural networks (NN) are playing a significant role in telugu HW character recognition. HW detection is the capability of a digital computer to receive and understand intelligible HW input from documents, images, touch screens and other electronic devices etc. These all may be online or offline, in this context online recognition includes conversion of pen tip digital movements into a list of originates used as input for the categorization system where as offline recognition uses images of characters like input. For HW reorganization NN has been achieved and improve the efficiency up to 98.3% this is good achievement.

Keywords: Machine learning, neural networks, telugu, handwritten characters, vatu, gunintham, pattern reorganization

Abbreviations:TL, Telugu letters;VTU, Vothulu; NN, Neural networks; HW, handwritten; MLPS, multilayer perceptrons; HWR, handwritten character recognition; CNN, Convolution neural network.

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I. INTRODUCTION

This exploration goes for a programmed comprehension of on line record Telugu letters (TL) and Vothulu (VTU) composed on a digital tablet or any display screen, without digital model(paper and pen). The proposed model includes two substantial degrees: Telugu vothulu and hallulu acknowledgment and secondary similarity examination. A combination of distinct classifiers has been applied to accomplish excessive precision for the acknowledgment of snapshots. A few on the online and offline highlights are utilized inside the primary examination stage to recognize the spatial connections among snap shots. A setting interchanges the letter shape that has been meant to exchange over the records into their TEX strings which can be thusly changed over into letter role. Relevant statistics have been utilized to address a few structure elucidation errors. Another approach for assessing the display of the proposed framework has been defined. Trials on a dataset of widespread length unambiguously boost the achievability of the proposed framework. even though an outstanding deal of work has been accounted for acknowledgment in English and Asian languages, for example, Japanese, Chinese, and so on., and not very many endeavors on Indian dialects like Hindi, Tamil, Telugu, Kannada and so on. In this work handwritten character recognition(HWR) model for telugu [South Indian language] has been developed with high accuracy, less training time and time of classification, As a part of the previous work applies on low attainment knowledge of the established HWR to each letter and offline datasets. Instances of HWR contain pixel densities over set of a picture, in this section ebb and drift, measurements, and numerous flat and vertical strains has to be calculate f. C. Vikramet. Al utilized multilayer perceptrons [MLPS] and got a precision of 83.5% on HW Telugu individual datasets.

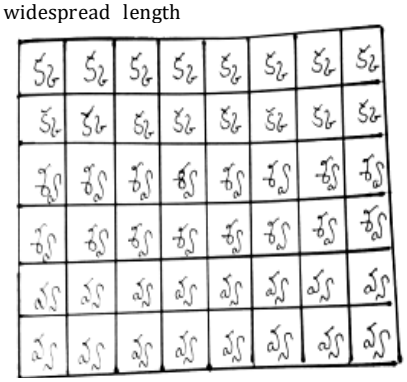

Figure: 1 example data set

Fig.1. shows that data set from Telugu letters i.ekaagunithalu and shay votthuluetc, these all are selecting from data set which are available at MIT hub data set. Around 300 samples are placed as image models at final training samples are analysed.

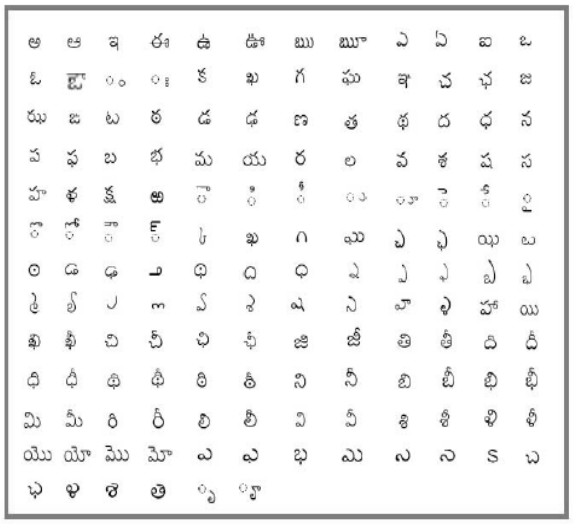

Figure: 2. 150 data from available data sets

Fig.2 explains about data set example from Unicode values each letter contains single Unicode values based on this pre-processing is to be performed.

Class Id	Telugu Symbol	Unicode
0	అ	0C05
1	ఆ	0C06
2	ఇ	0C07
3	ఈ	0C08
4	ఉ	0C09
5	ఊ	0C0A
6	ఋ	0C0B
7	ౠ	0C60
8	ఎ	0C0E
9	ఏ	0C0F
10	ఐ	0C10

Figure: 3.Unicode values

Fig. 3 is the symbols related to telugu characters and unicodes these all have been used to trained the Ml techniques.

II. LITERATURE SURVEY

[1] P. N. Sastry, T. R. V. Lakshmi, N. V. K. Rao, T. V. Rajinikanth and A. Wahab 2014 Zonal based totally element extraction is utilized in the present proposed method. The individual image is isolated right into a predefined wide variety of zones and an authentic detail is figured from every this sort of zones. Ordinarily, this element depends on the pixels contained in that sector. The dark estimations of the pixels in that chose zone are summarized to frame detail for that area in that photo. The highlights of the huge variety of zones inside the photo shape and element vector that is utilized for writing with the aid of

hand individual acknowledgment. Utilizing this Zoning method the acknowledgment precision is visible as 78%.
[2] S. D. Prasad and Y. Kanduri 2016 In any case, none of them deliver 100% precision in the acknowledgment of Telugu characters. Along these strains, it's far territory of progressing studies. Our exertion is predicted to improve the precision in Telugu man or woman acknowledgment. This propelled us to attempt this work. Zonal based detail extraction is applied within the gift proposed paintings. We exhibited two techniques for this reason. The number one strategy relies upon on the Genetic Algorithm and utilizations of versatile zoning topology with
separated geometric highlights. In the following method, zoning is completed in a static manner and utilizations separation, thickness primarily based highlights. In the two settings, we utilize the K-Nearest Neighbours (KNN) calculation for order purposes. The person picture is partitioned into a predefined wide variety of zones and highlights of the giant range of zones within the photo shape an element vector this is utilized within the grouping duration of transcribed character acknowledgment. Utilizing the primary approach we acquired correctness's of 100 percent and 82.Four percent for 11 and 50 photographs in my view. Utilizing the second method we were given exactness's of a hundred percent and 88.Eight percent for eleven and 50 images for my part.

III. PROBLEM STATEMENT

HWR has been one of the dynamic and testing studies zones inside the discipline of image getting ready and design recognition. Since 1929, some of the individual acknowledgment frameworks have been proposed and are utilized for even industrial enterprise reasons. A few applications including, organization related to checks, postal orders, examination related information's are help for offline frameworks. Working in Postal assist need us to interpret and bring something like 30 million manually written envelopes each and every day. The difficulties are to do mail-arranging that assure each one of these a huge quantity of letters arrive at their desires. HWR difficulty shifts amongst varied languages and letters because of unique shapes, strokes, and a variety of characters. Telugu, a South Indian language that positions 1/3 by using the variety of local speakers in India. Fifteenth in the Ethnologue rundown of maximum- communicated language in international and is the maximum typically communicated in Dravidian language on earth. Around 800 million people use Telugu as they speak to people and write explanations. Telugu content has 18 vowels and 36 consonants, of which 13 vowels and 35 consonants are in like way use. all of the Indic contents, the Telugu content has the largest range of vowels and consonants. Also, Telugu incorporates numerous similar formed characters; every now and then a character varies from its comparative one with a complete zero (anusvāra), half of-zero (arthanusvāra or candrabindu) and visarga to bypass on extraordinary shades of nasal sounds. That improves hard to accomplish execution with the dependable method simply because it prevents to work with Telugu manually written and gives some acknowledgments. Manually written person acknowledgment can be on the online or offline. In this specific situation, on line HW includes a change of computerized pen-tip traits right into a rundown of instructions, applied as a contribution for the order framework at the same time as offline recognition uses photographs of characters as data. A part of the earlier works applies superficial getting to know with hand-structured characters on each the offline & online datasets. Instances of HWR include pixel densities over districts of the picture, individual ebb and drift, measurements, and some of the flat and vertical traces.

IV. EXISTED METHODS

This algorithm used only single characters of Telugu language. But there are many characters with 'vattu' and 'gunintham' which were shown in the below figure. As there are very less contributions on Telugu language characters, I couldn't find the dataset consisting of all these characters. But the characters used in this project are like vowels and consonants in English. Due to time constraints I didn't generated dataset with all those characters. In future, I want to extend this algorithm from character recognition to text recognition by creating my own dataset.

V. METHODOLOGY

A.Requirements

The evaluation metric for the model will be transcription accuracy on the test images in the HP dataset of Telugu characters. Accuracy will be defined as correctly predicting handwritten Telugu character in the image. The model must correctly predict not only the number of digits present but also correctly identify each of those digits. As noted above regarding benchmarking against previous work results, I will evaluate it against some other models like handwritten Hindi/ Tamil/ Bengali character recognition in both accuracy and speed.

B. Data Investigation

The dataset is downloaded from the HP Labs India site or MIT data set [1]. This dataset consists of approx. 270 examples of each one of 138 Telugu "characters" composed via nearby Telugu authors. The dataset includes a huge collection of unmistakable characters in view of numerous human beings corporations' composition styles. The characters are made on hand for download as TIFF files. An element of these individual pics are mind-boggling molded and firmly related to others. Telugu content material has 18 vowels and 36 consonants of which thirteen vowels and 35 consonants are in like manner use. Telugu content is for the maximum element non-cursive in fashion and sooner or later, pen-up extra often than no longer isolates the important graphemes but no longer usually. In this way, the important graphemes of the content, for example, loose vowels, consonants, vowel diacritics, and consonant modifiers are incorporated into the photograph set shown in fig.4. Likewise covered are some consonant-vowel units which can't be successfully portioned. Likewise, the photograph set additionally includes some pixels which do not have a semantic translation but have solid example crosswise over essayists and help reduce the whole variety of images to be amassed. In this manner, sincerely there are 138 photos. These are altogether allowed to Unicode characters. The characters are made available for download as TIFF records. The first inconsistent envisioned square pictures are resized into eighty x 80 square snapshots and spared them as JPG files.

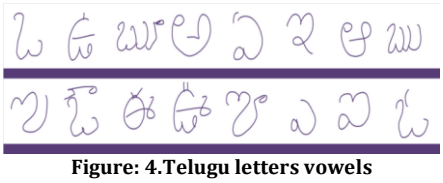

Figure: 4.Telugu letters vowels

C. Convolution neural network algorithm

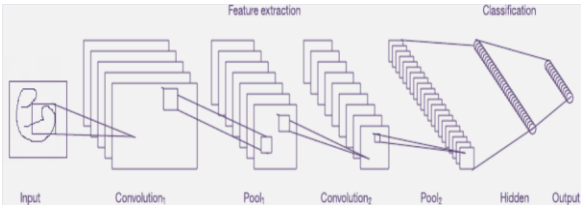

Figure: 5.CNN network

Fig.5. Clarifies the pooling convolution version, utilizing this model each letter has been organized with an auxiliary version. A trendy design of CNN that incorporates two essential components: consists of extraction and order. In the factor extraction layers, every layer of the machine gets the yield from its spark off a past layer as its data and passes the prevailing yield as a contribution to the subsequent layer. CNN engineering is produced from the combination of 3 styles of layers:

convolution

max-pooling

Characterization.

The convolutional layer and max-pooling layer are forms of layers inside the low and center diploma of the system. The even-numbered layers work for convolution and bizarre-numbered layers picture for the maximum pooling activity. The given hubs of the convolution and max-pooling layers are assembled right into a 2D aircraft that is referred to as spotlight mapping. Each aircraft of the layer normally decided with the mix of at least one plane of the past layers. The hub of the plane is associated with a touch district of each related plane of the past layer. Every hub of the convolution layer concentrates highlights from the records snapshots through convolution activity on the records hubs. The most pooling layer changed works include regular or engendering interest at the information hubs. The more elevated level highlights are gotten from the produce characters of the decrease-degree layers. As the highlights spread to the maximum notable layer, the factor of the highlights is diminished relying upon the dimensions of the convolutional and max-pooling veils. Be that as it can, the quantity of spotlight mapping typically accelerated for map the outstanding suitable highlights of the facts pics to perform better order precision. The yields of the final element maps of CNN are applied as a contribution to the completely related machine which is called the characterization layer. In the arrangement layer, the ideal quantity of highlights can be gotten making use of highlight preference techniques relying upon the detail of the load framework of the closing neural device, at that factor the chose highlights are set to the classifier to technique certain of the info photos. In view of the maximum multiplied truth, the classifier offers yields for the evaluating training that the data photos have an area with. Numerical subtleties of various layers of CNN are mentioned inside the accompanying segment.

CNN LAYER:

In this residue, the element maps of the past layer are convolved with learnable parts, for example, (Gaussian or Gabor). The yields of the piece revel in direct or non-directly enactment capacities, as an instance, (sigmoid, hyperbolic digression, softmax, amended immediately, and character capacities) to frame the yield spotlight maps. As a rule, it very well can be numerically tested as eq(1)

$$x_j^l = f\left(\sum_{i \in M_j} x_i^{l-1} k_{ij}^l + b_j^l\right)$$ ------ (1)

Where $x^l{}_j$ is the yields of the present layer, $x^{l-1}{}_i$ is past layer yields, $k^{\ i}{}_j l$ is a portion for the present layer, and $^{bl}{}_j$is the predisposition for the present layer. M^jspeaks to a choice of info maps. For each steo, map is given an added substance inclination b. In any case, the info maps will be convolved with unmistakable pieces to create the relating yield maps. For a moment, the suitable maps of j and k both are summation over the information I which is specifically applied to the jth bit over the info I and takes the summation of its and a similar activity are being considered for k^{th} piece also.

SUBSAMPLING LAYER

The subsampling layer plays a down sampling interest in the information maps. In this layer, the data and yield maps don't change. For instance, at the off hazard that there are N information maps, at that point, there may be really N yield maps. Because of the down sampling pastime, the dimensions of the yield maps can be diminished relying upon the dimensions of the down sampling veil. In this research, 2 × 2 down sampling cover is utilized. This activity can be figured as

$$x_j^l = f\left(\beta_j^l down(x_j^{l-1}) + b_j^l\right)$$ ----- eq(2)

In which down (•) speaks to a subsampling ability. This capacity, for the most component, summarizes over n × n square of the maps from the past layers and chooses the ordinary well worth or the most increased qualities most of the n × n rectangular maps. Likewise, the yield manual measurement is decreased to n times regarding the two elements of the thing maps. The yield maps at long final enjoy directly or non-direct actuation capacities.

CLASSIFICATION LAYER

This is a completely associated layer that processes the score for each class of the articles utilizing the separated highlights from the convolutional layer. In this work, the size of the element guide is viewed as 3 x 3 and a feed-forward neural net is utilized for grouping. Concerning the actuation work, softmax capacity is utilized as recommended in many sorts of writing. 1st plan to compare the results with the previous works 2nd step will compare the accuracy/mean-squared error to see which is more effective, as well as compare the speed of proposed method using CDNN and the previous used techniques. Shanthi et al.[4] use pixel densities over various zones of the picture as to highlights for an SVM classifier. Their framework accomplished an acknowledgment pace of 82.04% on a manually written Tamil character database. K. Mohana Lakshmi et al. [3] achieved a recognition rate of 87.5% on Telugu character dataset using HOG features and Bayesian classification. Here I want to try to get accuracy greater than 90%. For this applying Convolutional Neural Networks which are more efficient than the methods used by the above authors

D. Data Preprocessing

The dataset contains images of contains approx 270 samples of each of 166 Telugu characters written by native Telugu writers. These images are in TIFF format and are unequally sized. The images were under the folders with the names of the writer and the image file name as its Unicode character. Here I changed the image filename as the writer name followed by the Unicode character so that each image will get a unique file name. And then all the images with the same Unicode were grouped under a folder with Unicode as its folder name so that I can use load_files method in sklearn.datasets2 module. Then, the original unequally sized rectangular images are resized into 80 x 80 square images and saved them as JPG files. As mentioned in the Algorithms and Techniques, the classifier used to train the data is Deep Convolutional Neural Network. The input to the convolutional neural network is a 4D Tensor. The 80 x 80 image is reformatted into a 4D tensor with shape (samples, channels, rows, columns) which is then passed through a stack of different kinds of layers as follows:

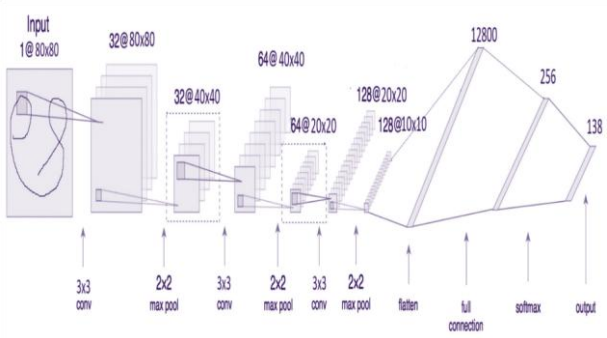

Figure: 6 HW character recognition

Information - 4D tensor with form (n, eighty, eighty, 1) where n is the variety of info pix and the variety of channels is 1 because the pix are double. (Number of channels = 3 if the pix are RGB). Show in fig.6

Layer 1 - Convolutional Layer with 32 channels and channel length 3 x3 and Max pooling layer with channel length 2 x 2.

Layer 2 - Convolutional Layer with 64 channels and channel length three x three and Max pooling layer with channel size 2 x 2.

Layer 3 - Convolutional Layer with 128 channels and channel size 3 x three and Max pooling layer with channel length 2 x 2. Straighten( ) - It changes over the yield of the convolutional a part of the CNN into a 1dimensional factor vector, to be utilized by the absolutely related layer.

Layer 4 - Fully Connected layer (Dense) with 256 neurons, with a dropout regularization pace of zero.Four (likelihood of zero.4 that any given aspect might be dropped in the course of preparing).

Layer 5 - Fully Connected layer (Dense) with 138 neurons. Here, directly initiation RELU is applied for the convolution and max-pooling layers and SOFTMAX enactment is utilized for the yield layer (Fully Connected Layer).

Initially tried the images with size 32x32 When run the algorithm got very less accuracy, then started changing the optimizer. First used ADAM and tried for many combinations of learning rate and decay. Then tried ADADELTA and tried for parameter tuning, even though the performance didn't improve. Then went through the dataset (i.e., images) which were not clear with size 32 x 32 Then changed image size to 64 and then 80 Then noticed some repeated images with different label name which causing the algorithm to get very low performance. Then removed the similar images with different label names Then got 138 characters whereas initially have 166 characters when downloaded the data from HP labs/mit website. finally performed and explored one-of-a-kind avenues concerning the accompanying speculation structures:

Dropout in a convolutional layer

Dropout in a completely associated layer

Data manipulating

Batch Normalization

Applying those methods did not provide a first-rate carry in execution. Then with 3 convolutional layers and ADAM as optimizer, got 88% test accuracy and 91% training accuracy. But, after changing optimizer to SGD with learning rate 0.1, and adding one more convolutional layer, training accuracy increased to 94% and the test accuracy increased to 91%.

VI. Model Evaluation and Validation

we got test accuracy of 91% and training accuracy of 95% on Telugu character dataset with 20 epochs, if we increase number of epochs, then the accuracy will increase further. The loss reduced from 4.03 to 0.4 as the training progressed. For the first few epochs, the training accuracy is less than the validation accuracy and then after some epochs, train accuracy increased. The validation curves were given in figure 4 for figure.7. The accuracy obtained by the model is greater than the benchmark reported earlier. It's likely that adding more epochs could increase the accuracy further.

The benchmark reported is 90% of test accuracy. But by running 20 epochs, the model obtained 91% accuracy and 95% training accuracy. By adding few more epochs, the accuracy may increase further. The following table shows the comparison between the accuracy obtained by the CNN model and other models used to classify handwritten Telugu characters.

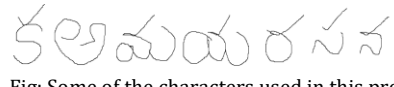

Fig: Some of the characters used in this project



Figure: 7 GUNITHAM and VOTHULU

This CNN model is applied on gunithalu and votthulu got good accuracy compared to existed work[5].

Figure: 8.model accuracy

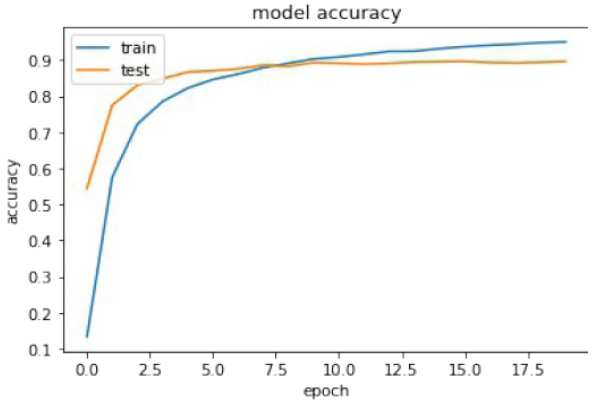

Fig.8 shows that accuracy related to test data and trained data, in this model compared test model trained model got more accuracy.

Figure: 9. Model loss analysis

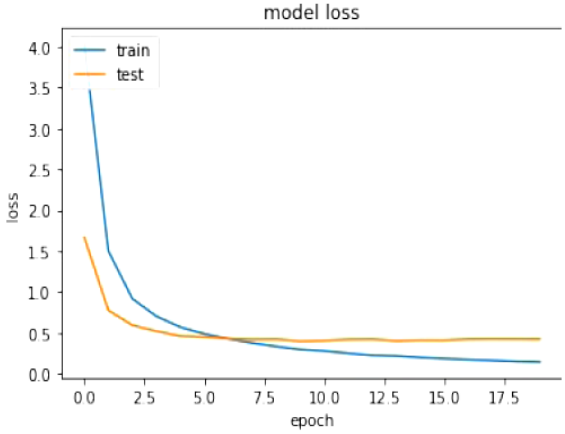

Fig.9 explains that loss parameter in this model loss of test data is more compared to trained model.

Table: 1 comparison of methods

METHOD	ACCURACY
CNN proposed	98.3%
ZF	78%
ADZM	88.8%
2D-FT_SVM	71%
MLP	85%
Bayesian	87.5%

Table :1.explains that CNN model achieves 98.3% accuracy this is good compared to all methods The accompanying table demonstrates the genuine marks and the predicted names of the preliminary 50 snapshots which demonstrates the model is foreseeing practically right names apart from 2 or three out of fiftypictures
.

Table :2unicode relations

Original	Tested	Original	Tested
47	47	110	110
46	46	134	134
60	60	67	67
68	68	59	59
121	121	65	65
15	15	119	119
119	119	72	72

Table: 2 explains that Disarray Matrix is applied to test the exhibition of the neural system grouping.

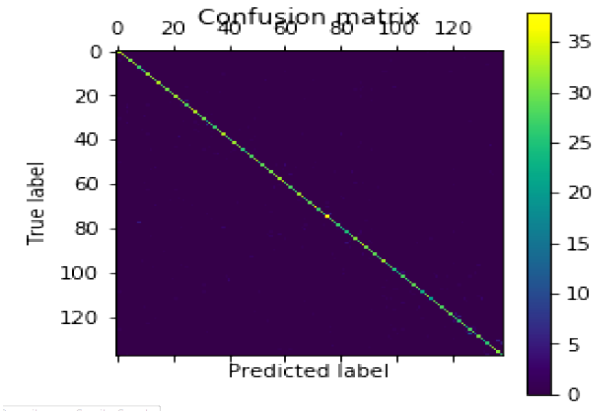

Figure: 10. Predictive label

Fig.10 Demonstrates the plot of the perplexity grid for the model used to reserve written by using hand Telugu Characters.

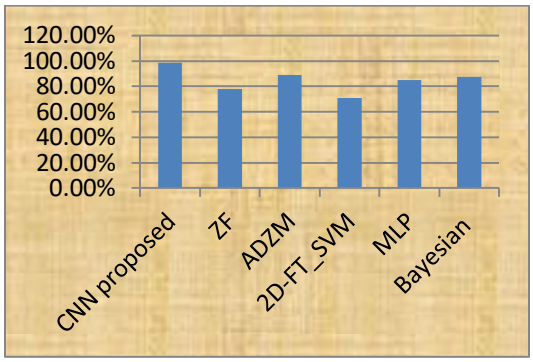

Figure: 11. Graphical view

Figure: 11. Explains about graphical representation of accuracy here CNN got 98.30% accuracy which is more efficient recognitions in TELUGU GUNITHAM and VITTULU.

VII. CONCLUSION

It is well known that the deep convolutional neural networks are very good at classifying image data. There were many experiments done on handwritten character recognition using convolutional neural networks for English alphabets, numbers, Chinese, Arabic and some of the Indian languages like Hindi, Devanagari script etc., But there is very less contribution on Telugu language character recognition. Due to very less contribution, the data available on internet is not so good. In this didn't notice that initially and faced many problems with repeated data. found that the problem was in data, then deleted the repeated ones and made the data clear. Then found difficult in tuning the algorithm tried different optimizers with different learning rates and tried a model changing number of layers and number of filters and filter size. Finally, ended up with a model that gives 98.3% accuracy which exceeded my expectations to get around 85 to 98.3%

VIII. FUTURE SCOPE

The OCR implementation has been covered with the help of neural networks, with this 98.3% accuracy is obtained. This implementation is very useful for south India online, offline Telugu character recognization system. The previous system for Telugu OCR character level recognization using x and y direction histogram model had been implemented. But, got less accuracy so our proposed work achieves better accuracy with the help of CNN. The machine learning algorithms like SVM, logistic regression can gives the better accuracy compared to CNN. Therefore the online and offline character recognization system of Telugu need to implement using machine learning algorithms by SVM, LR gives the more accuracy and less skew corrections. This application spanned using android, IOS, RIM can gives the easy access, this ML, neural network algorithms by using segmented data and Telugu dataset gunintham and vothu together gives the better accuracy. The implemented system also useful for other languages like Tamil, kanada, Malayalam, etc OCR systems all languages of India.

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Fractional Brownian motion Noise Removal in Breast Cancer Magnetic Resonance Images

N.Rajeswaran, C.Gokilavani, T.Samraj Lawrence, P.Ramkumar

Abstract*: *In Medical Image Processing, high resolution images are very much essential to analyze the different features of the image for better diagnosis of the disease. Now days, more and more women are getting affected by breast cancer. Magnetic Resonance Imaging is the most popular technique used to diagnose the breast cancer images, whose resolution in turn is affected by the fractional Brownian motion (fBm) noise, Gaussian noise and Salt and Pepper noise. In this paper, wavelet based thresholding techniques namely Visu shrink, SURE shrink and Bayes shrink are implemented to denoise the breast cancer images affected by fBm noise.

Index Terms: fBm noise, Medical image Processing, Magnetic Resonance Imaging, wavelet thresholding.

I. INTRODUCTION

In medical image processing, noise tends to reduce the visibility of the image and obscures the information needed for accurate treatment. Since the larger part of image processing deals with Image restoration or image denoising, denoising the affected images plays a major role to diagnose the diseases in a proper manner and to retain the image up to its quality[1-2]. Image denoising attempts to remove the various types of noises present in an image and restores the original image back while preserving the important features needed for proper diagnosis and to track the progress of the disease. However, the tradeoff between the image features and noise reduction must be taken into account while denoising. Recently fuzzy logic has been used for noise removal [3]. Medical images are taken by means of MRI (Magnetic Resonance imaging), CT (Computed Tomography) and Ultrasound imaging. Among these, MRI sounds better in giving high resolution images of the soft tissues in human body such as the brain and breasts. The images of these organs consist of several complex patterns that are independent of scales. Further, the breast cancer image is fractal in nature [4]. Hence, in this paper, the fractional Brownian motion noise is eliminated by using the wavelet based thresholding techniques namely Visu shrink, SURE shrink and Bayes shrink methods.

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II. GENERATION OF FBM NOISE

Based on the concept of bisection and interpolation [5], Ilkka Norros proposed the simulation of fractional Brownian motion with conditional random midpoint displacement algorithm [6]. This is also called as diamond square algorithm. This produces fractals in images. Here the entire trace of the fractional Brownian motion is generated before it is used for the purpose for which it is specified for. Fractional Brownian motion has been used in various fields such as hydrology, imaging landscapes and much more [7]. The properties of a normalized fBm are:

- Normalized fBm is a stochastic process(Zt) with Hurst parameter, H(0,1)
- Zt has stationary increments
- Zt is Gaussian
- Zt has continuous sample paths

A. Algorithm of fBM Noise

Ordinary Brownian motion is the special case of Normalized fBm with the parameter H=1/2. This algorithm consists of following steps,

Step 1: Take the given image.

Step 2: Assign height values to each corner of the image.

Step 3: Divide the image into four sub-images and assign height values to them such that their height is the mean values of the corners of the image taken in step 1.

Step 4: When computing the middle height, add small error value depending on the image size taken in step 1 and some constants that controls the fractal's roughness.

Step 5: Continue the iteration and sub-divide the sub-images further.

Step 6: When no noticeable difference is seen, stop the iteration and render the pixel with mean height values.

Thus the fractals are produces by the above RMD procedure and are shown below.

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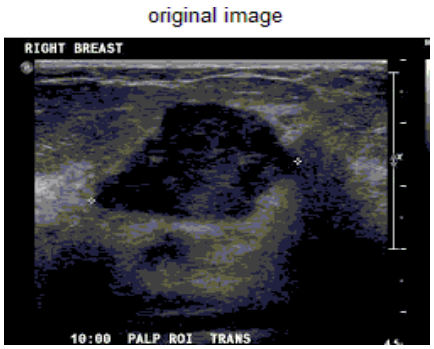

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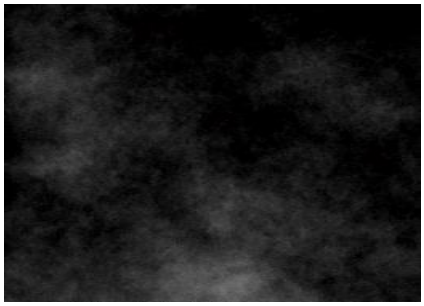

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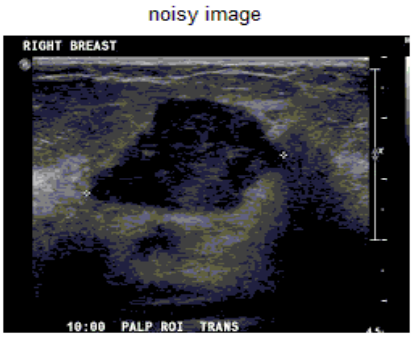


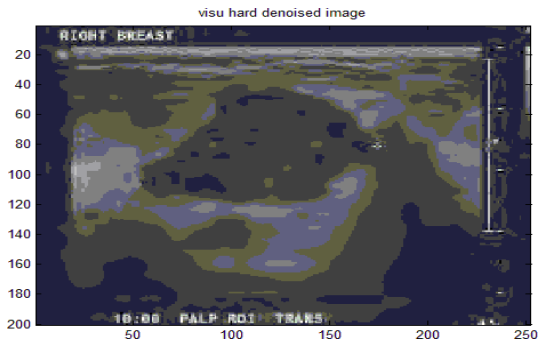
c

Fig.1(a),(b),(c). Simulation results of fractional Brownian motion noise

Fig.1 shows the MATLAB simulation results for the generation of fractional Brownian motion noise for an Breast cancer image of size 512x512. Fig.1 (a) shows the original Breast cancer image. Fig.1 (b) shows the pattern of fractional Brownian motion. Fig.1 (c) shows the Breast cancer image corrupted with fBm noise.

III. RESULTS AND DISCUSSIONS

The wavelet based thresholding techniques are implemented by using MATLAB and the simulation results for Visu shrink are given in the Fig. 2. The Fig. 2.(a) shows the original image, Fig. 2.(b) shows the noisy image and the Fig. 2.(c) shows the denoised image. Here in the noisy image, the value of the Hurst parameter is 0.3 (for a classical Brownian motion, the Hurst parameter h=0.5).



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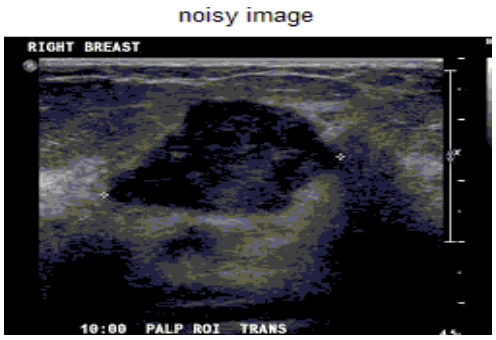

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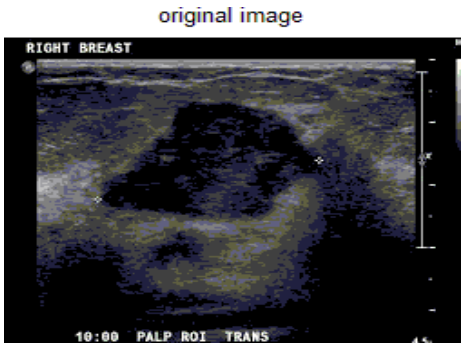

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Fig. 2(a),(b), (c). Simulation results for Visu shrink

The simulations results for SURE shrink are given in the Fig. 3. The Fig. 3.(a) shows the original image, Fig. 3.(b) shows the noisy image and Fig. 3.(c) shows the denoised image. Here also the noisy image takes the value of 0.3 for H.

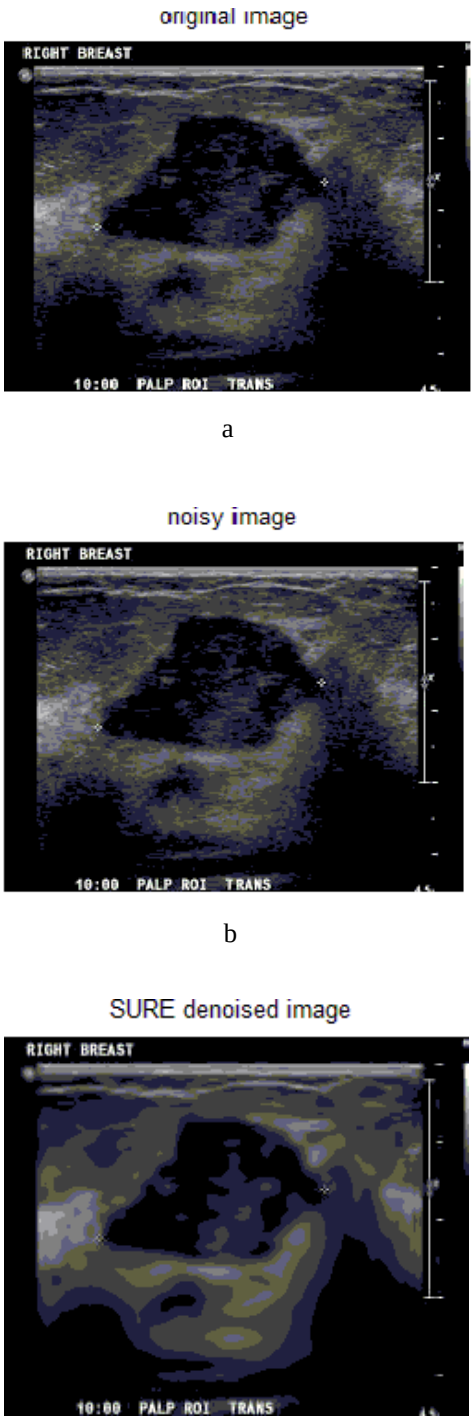

Fig 3.(a),(b) and (c). Simulation results for SURE shrink

The simulation results for Bayes shrink are given in the Figure. 4. The Fig.4. (a) shows the original image, Fig. 4.(b) shows the noisy image (with Hurst parameter of 0.3) and Fig.4.(c) shows the denoised image.

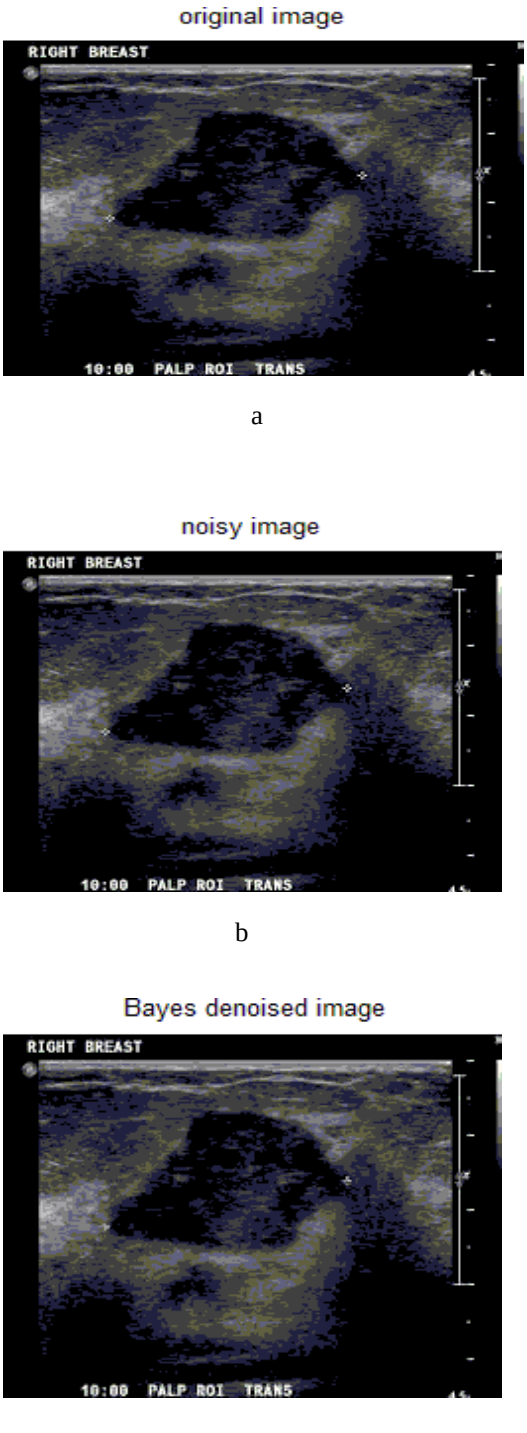

Fig 4.(a)(b) and (c). Simulation results for Bayes shrink

The performances of all the three thresholding techniques are listed in Table. 1.

Table 1: Comparison of wavelet thresholding techniques

S.NO	PERFORMANCE METRICS	VISU SHRINK	SURE SHRINK	BAYES SHRINK
1	MSE (Mean Square Error)	865.45	665.45	2.1544
2	PSNR (Peak signal to Noise ratio)	56.9841	76.5454	78.5645
3	FD(Fractal Dimension)	1.9645	1.9751	1.9884
4	IEF(Image Enhancement Factor)	0.6844	0.7554	0.9987
5	SSIM (Structural Similarity Index)	0.7454	0.7865	1.000
6	NK(Normalized Cross Correlation)	0.8502	0.9265	0.9965
7	AD(Average Difference)	210	165	154
8	SC (Structural Content)	0.9265	0.9756	1.000
9	MD(Maximum Difference)	214	155	221
10	NAE(Normalized Absolute Error)	0.8652	0.0218	0.0010
11	Time Elapsed when attempt to denoise	5.6545sec	4.6954sec	1.4545sec

From the above table, it is evident that the Bayes shrink method is performing more efficiently in denoising the images and thereby improving the resolution of the MRI images (Shown in Figures from 5 to 9). It has high Peak Signal to Noise Ratio, lowest Mean Square Error and lower Normalized Absolute Error.

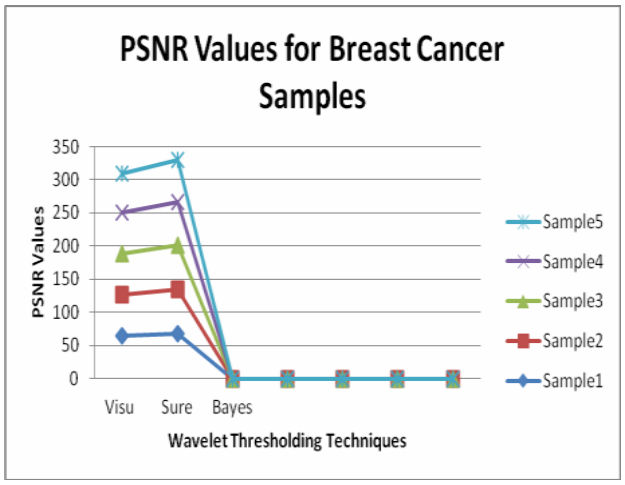

Fig 5. Chart for Peak Signal to Noise Ratio-PSNR

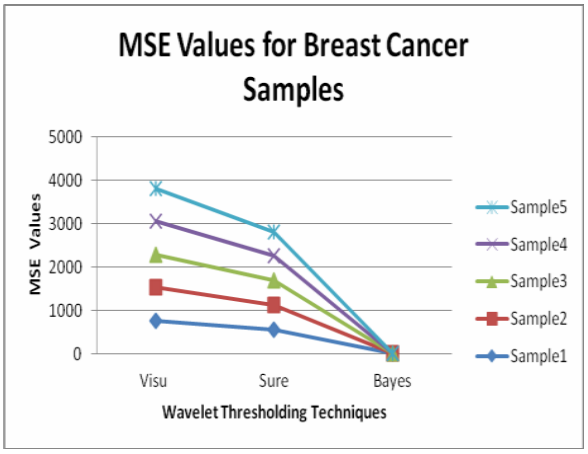

Fig 6. Chart for Mean Square Error-MSE

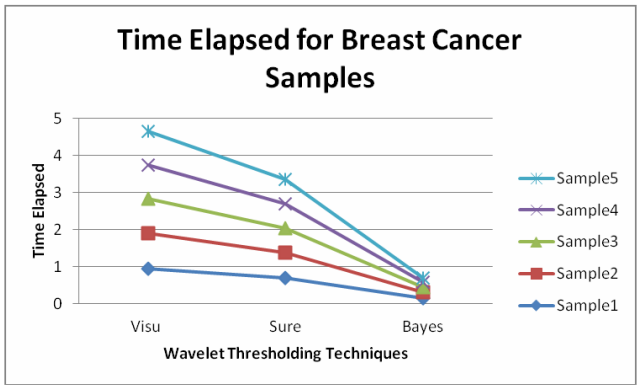

Fig 7. Chart For Normalized Absolute Error

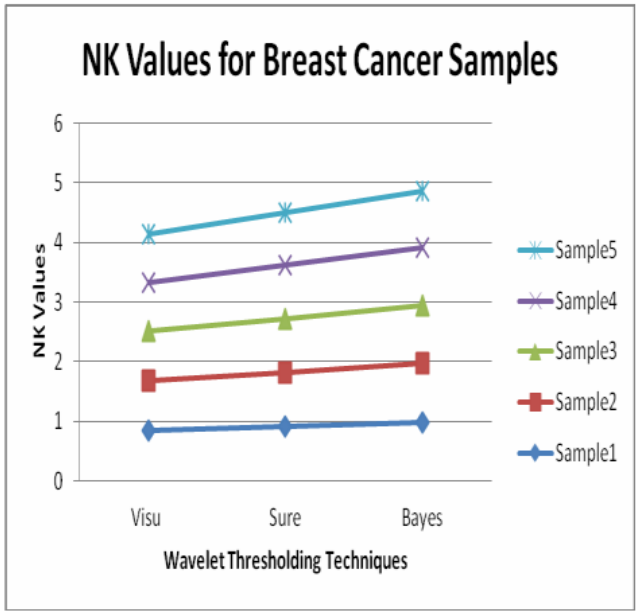

Fig 8. Chart for Normalized Absolute Error-NAE

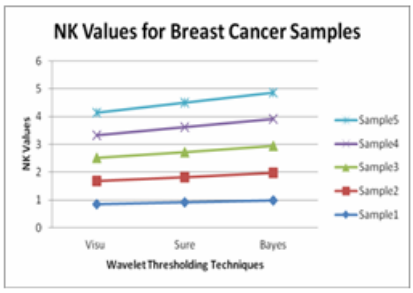

Fig 9. Chart for Normalized Cross Correlation-NK

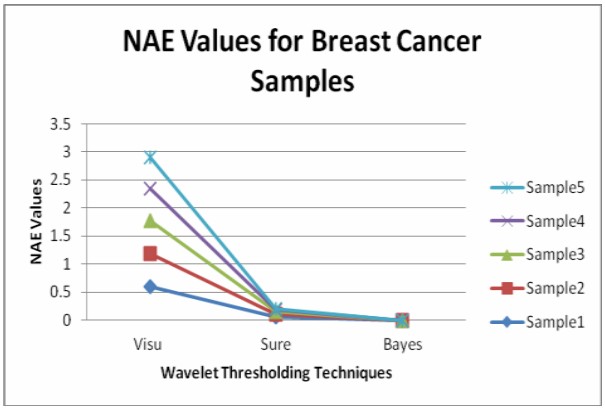

Fig 10. Chart for Time Elapsed to produce denoised image

IV. CONCLUSION

In this paper, wavelet based thresholding techniques namely Visu shrink, SURE shrink and Bayes shrink are implemented to denoise the breast cancer images affected by fBm noise. The inference from all these implementations are that Bayes shrink performs better in terms of all performance metrics. The future scope of this work includes analyzing and implementing various filters for removing all forms of noise.

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Certain Investigations on Sentimental Analysis Architecture and Tools

R. P. Ramkumar, Sanjeeva Polepaka

Abstract— The sentiment is defined as the feeling(s) about the review or comment. The Sentimental Analysis aims to determine the attitude of content or product for a period at a given moment. Later, these observations are categorized as negative, neutral, positive and sometimes no sentiment(s) at all. The review(s) or comment(s) on a concern product is beneficial for the companies to prioritize the issues, narrow down the problems to be solved and to explore the scenarios for success. This article deals with the study of sentimental analysis or opinion mining architecture and tools used for Sentimental Analysis for the naive users.

Keywords: Opinion Mining, Tweets, Opinion Polarities, Crawling, Sentimental Analysis, Twitter Statistics.

1. INTRODUCTION

In the technological era, others opinion about the product influences the decision-making process. One or two decades before to get the review about the product(s), we relied mostly on relatives and friends. However, in the modern world, opinion feedback from diverse people may be sought over the internet. Before buying the product, people use to look the website(s) for review about a particular product. Similarly, organizations use to get feedback about the services and the products for the customers. The identifying and extracting processes generate the subjective information using text analysis, natural language processing and computational linguistics is referred to as Sentimental Analysis or Opinion Mining. Nowadays, this type of sentimental analysis becomes more popular to monetize the products. The following shows the organization of the paper: Section 2 deals with related works about opinion mining. Usage of sentimental analysis and its architecture is discussed in Sections 3 and 4, respectively. Section 5 draws the conclusion and future work.

2. RELATED WORKS

The following section shows the related work regarding the opinion mining framework.

Meenambigai [4] presented a product based opinion mining to examine the nature of the product. The objective of this work was to categorize the opinion polarities (like a negative, neutral or positive) of the product. From the product's opinion statement, sentiment analysis was done and classified as objective, positive and negative. This method was tested on blog posts) from social media. There were three steps in determining the analysis. In step 1, all the product features were extracted. In step 2, simultaneously separation of text and emoticons and extraction of opinion words took place. The categorization of opinion words such as positive, neutral and negative words was done in step 3. Results concluded that people use emoticons to express their feelings in natural language text.

Vivekanandan and Josephine [5] constructed an automated framework called Review Opinion Mining (ROM) to determine the opinion about the online products. The ROM method has five steps namely (a) Data preprocessing, (b) Aspect extraction, (c) Identification of opinion, (d) Polarity identification and (e) Summarization of features. This method was tested on unstructured data to extract the viewer's opinion about the products. Though the ROM framework analyzed product reviews in a timely and efficient manner, it failed to adhere to appropriate algorithms for determining the summary report.

Khandelwal, Mishra and Mishra [6] implemented an analyzer to classify twitter comments as positive, negative and neutral. This workflow model initiates with tweet data identification followed by the data preprocessing and training data definition. Later, parsing of tweets was carried out by choosing an efficient algorithm. Subsequently, the training and evaluation follow to classify the comments as subjective and objective cases, with the test data. Authors concluded that machine learning algorithms such as Support Vector Machines (SUM) and Naïve Bayes were widely used to analyze the tweets even though the algorithm suffers limitations.

Kim and Kim [7] presented a case study on nuclear power using opinion mining on Twitter. There were four phases or stages in analyzing the tweets, namely (a) Crawling of tweets, (b) Text preprocessing, (c) Constructing the dictionary with sentiment words and (d) Predicting the feelings with tweets. Locoy spider is the crawling tool used to identify the terms "nuclear power" or simply the "nuclear" in the Korean language from 2009 to 2013. Among the five years of data, the first three years were used to construct the dictionary, whereas the later year's data were used for evaluation purpose. Results of the assessment method were compared with the human evaluator(s) results. Results concluded that this method has higher prediction accuracy on analyzing sentiments than the human evaluators.

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3. MEASURE THE MATTERS USING SENTIMENTAL ANALYSIS

According to Katie Delahaye Paine [1], metrics such as likes, shares, onsite engagements, comments and inbound links are very helpful in identifying the sentiment of the people or the user engaged with the content. By just having the metric counts only gives the false sense or bad branding about the particular product. Apart from the above-listed parameters, when analyzed, there is a possibility of Quality metrics, which deals with feelings, opinions, shares quality, repeated tweets made on the particular product, comments, rating, satisfaction scores, rating conversation about the quality of the product. Figure 1 shows such a typical example chart of sentimental analysis depicted from [1] and Table 1 shows some of the tools used to track and crack the user's sentiments.

	#s	Month 2	#s	Metrics	Chng
Likes	2,000	Likes	4,000	Like Growth	100%
Posts	100	Posts	125	Post Growth	25%
Comments	200	Comments	300	Comment Growth	50%
Comments-per-Post	2	Comments-per-Post	2.4	CPP Growth	20%
Comments-per-Like	0.1	Comments-per-Like	0.075	CPL Growth	-25%

Fig. A

Platform	Objective	Metric	Goal	Alternate Metric
Facebook	Customer Engagement	Av. #Comments/Post	10	Av. # Shares/Week
Twitter	General Awareness	Av. New Followers/Post	5	Av. #RTs/Post
LinkedIn	Thought Leadership	# Best Answers	20	# InRecommendations
Youtube	Sales/Lead Generation	# Leads or Sales/View	1%	Likes/Views
Google+	Customer Service	# Hangouts/Week	3	NetPromoter Score
Pinterest	General Awareness	# Likes/Pin	10%	# Repins
Slideshare	Sales/Lead Generation	# Leads or Sales/View	2%	# Downloads
iTunes	Thought Leadership	# Downloads/Month	500	Ratings
Quora	Thought Leadership	# Best Answers	10	Referring Traffic
Blog	General Awareness	# Unique Visitors/Month	1000	Comments/Post

Figure 1 Sentimental analysis chart (Courtesy [1])

Table 1 Practical tool for Sentimental Analysis

S. No	Name of the Tool	Details
1	Meltwater	Used to uncover insight into targeted audience
2	Google Alerts	Very simple method to track the "content marketing" for regular updates
3	People Browser	A useful tool to evaluate the competitors, industries and brands to explore the exact status regarding before, during and after marketing campaigns.
4	Google Analytics	A perfect tool to discover the prejudiced subscribers and buyers, such as annotations, custom reports, web designs, etc.
5	Hootsuite	Free and subscription-based options of this tools allow to measure and manage the social media networks data directly.
6	Tweetstat	Free graphical tools to explore Twitter statistics.
7	Facebook Insights	This tool is used to extract the overall likes, fans, along with the user activities, the sum of fresh likes and unlikes, tab views, page views, media consumption, referrers and lot more.
8	Pagelever	This tool can measure the activities in the Facebook, such as consumed content, shared content on Facebook.
9	Social Mention	Similar to Google Alerts, this tool is useful in tracking the keywords in bookmarks, blogs, events, question and answers, comments, audio and even in videos.
10	Marketing Grader	This tool is used to grade the whole marketing funnel with more than 30 metrics including, blog posts, tweets, Facebook updates, the number of visitors and much more.

Table 2 shows the pinnacle software for text mining, text analysis and analytics along with the proprietary solutions [2].

S. No.	Name of the Software	S. No.	Name of the Software
1	Abzooba	31	Loop Cognitive Computing Platform
2	Ai-one	32	Luminoso
3	AlchemyAPI	33	MeaningCloud
4	Angoss Text Analytics	34	Medallia
5	Ascribe Forest Rim's Texual ETL	35	Megaputer
6	Attensity	36	muText Mu Sigma
7	AUTINDEX	37	NetOwl
8	Averbis	38	OpenText
9	AYLIEN	39	Oracle Endeca
10	Basis Technology	40	Oracle Social Cloud - Collective Intellect
11	Bitext	41	Pingar
12	Brainspace Discovery	42	Provalis Research
13	Buzzlogix	43	Rapid Miner
14	Clarabridge	44	Rocket Text Analytics
15	Content Analyst	45	SAP Text Analytics
16	Datumbox	46	Saplo
17	DiscoverText	47	SAS Text Analytics
18	Etuma	48	Semantria
19	Expert System	49	SIFT
20	General Sentiment	50	Smartlogic
21	Google Cloud Prediction	51	StatSoft
22	HP Autonomy	52	Synapsify
23	IBM Text Analytics	53	Sysomos
24	Indico	54	SYSTRAN
25	Intellexer	55	Taste Analytics
26	Kanjoya	56	Text2data
27	Language Computer Corp[oration	57	Thomson Reuters Open Calais
28	Lexalytics Text Analytics	58	Twinword
29	LingPipe	59	Verint Systems
30	LinguaSys	60	VisualText

4. THE ARCHITECTURE OF SENTIMENTAL ANALYSIS PROCESS

Opinion plays a significant role in the technological world. However, in electronic commerce, the opinion on a product is vital. Further, customers are anticipated to acquire the magnificent goods based on the reviews from the customers who had already bought those products, without any interactions. The opinion mining process comprises of three phases, namely, (1) Opinion retrieval, (2) Classification of opinion, and (3) Views summarization. Figure 2 shows the architecture of opinion mining depicted from [3]. In the first step of opinion mining, the opinion retrieval phase deals with the collection of reviews from the websites/ blogs/databases. The second phase, classification of opinion is categorized as Supervised and unsupervised methods and is responsible for classifying the opinion as negative and positive classes. The third stage, summarization of opinion ought to highlight the review results of the opinion.

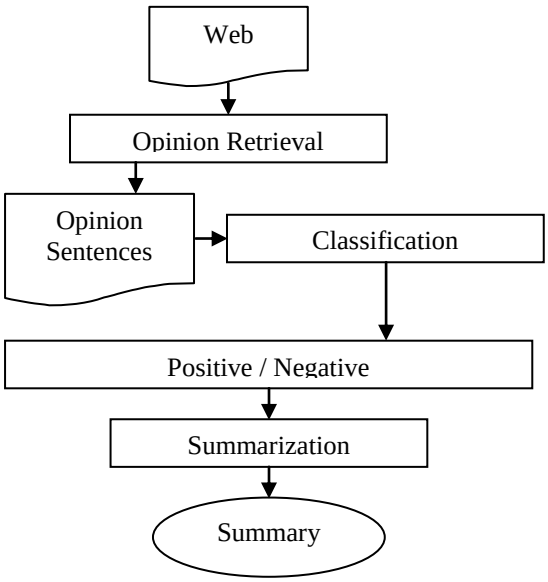

Figure 2. The architecture of Opinion Mining / Sentiment Analysis

5. CONCLUSION

There is no doubt that, Sentimental Analysis made us move from traditional market surveys and the research to online media monitoring surveys. Sentimental Analysis not only promoted business strategies for large investors but also for the number of small start-up companies. Because industries want to know and explore the customers perceive and their competitors. Henceforth, the technical challenges and practical needs of the opinion mining will be likely for years in all the domains.

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Apriori-based Frequent Symptomset Association Mining in Medical Databases

R. P. Ram Kumar, R. Jayakumar, A. Sankaridevi

Abstract*— Nowadays, healthcare organizations generate large volumes of data. An automatic way of retrieval is necessary when the volume of data is increased. Data mining is becoming very popular and has extensively used in various Healthcare organizations. With the use of various data mining algorithms, it is possible to extract many useful patterns. Data mining applications can highly benefit various parties in Healthcare organization. This paper proposes to enable healthcare organizations by predicting the number of patients affected by certain diseases with respect to their symptoms in medical databases. The pharmacists can use this discovered knowledge and avoid the run out of required drugs, so that the patients can be treated at the right time.

1. INTRODUCTION

Knowledge Discovery in Databases (KDD) is a distinct process consisting of several well-defined steps. Data mining is the core step in KDD, which helps in the discovery of buried, but useful knowledge from massive Healthcare databases. Data mining allows extraction of knowledge from heterogeneous healthcare databases, which in turn eliminates the manual tasks and retrieves the data exactly from electronic records. To carry out the mining process, the medical data can be preprocessed by various techniques like Cleaning, Integration and Transformation. Data preprocessing is one of the major problems when going for the ETL process.

2. PREPROCESSING OF MEDICAL DATA

Cleaning:

The cleaning method removes data inconsistencies by eliminating Duplicate Records, Data entry mistakes and filling missing values for improving the data quality which is highly recommended for mining to keep away from wrong conclusions. Messy data cleaning can be done either manually or by using some tools which are readily available in the market. Smoothing can also be done by techniques such as binning and regression.

Integration:

Once data cleaning has done, the medical data sources are integrated into a homogeneous one, which means the heterogeneity of the medical data is removed while merging data from multiple sources. Data integration is very tricky and various issues are encountered such as matching of the schema, objects when data are received from various sources. The data redundancy may cause if it is derived from another medical entity and it can be detected and solved by correlation analysis.

Transformation:

In data transformation phase the aggregation operations are applied, and a reduced form of clean data is obtained during the reduction phase. In the reduction phase, two main encoding methods like dimensionality reduction and numerosity reduction is used. These reduced data are aggregated in various structures such as tables or Multidimensional model. After these operations, the database is ready to mine. In this paper, a patient database of a particular healthcare organization has been taken as a sample.

3. SYMPTOM-BASED CATEGORIZATION

The medical oriented assessment is extremely specific which requires huge endeavor and determination to spot diseases accurately that shows symptoms. Identifying such symptoms is troublesome which is done by experienced doctors, and they usually categorize diseases based on various diagnosis methodologies. These support doctors to narrow down the cause of diseases that show symptoms and which can be done using facts and experience and later which will be confirmed by conducting various tests.

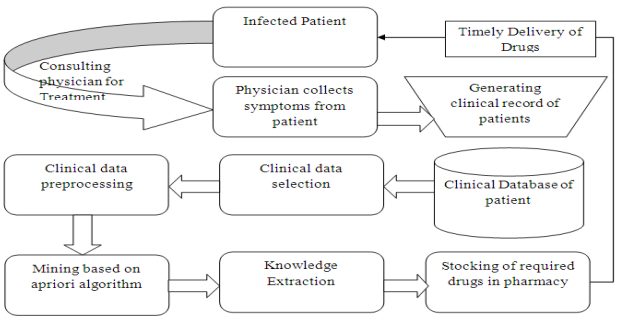

Figure 1 Architectural diagram of symptom categorization

The signs and symptoms which are self-assessed and reported by patients are crucial to identifying these disorders. Based on the symptoms of patients the physician can diagnose and treat them with adequate medicine.

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The diseases such as malaria, Dengue, Zika, Ebola, chickenpox, Chikungunya, Typhoid and jaundice which are sometimes deadly and seasonal infections. Here these diseases and its symptoms are taken as a sample for frequent pattern mining based on patients report that is updated in Healthcare databases.

The entire process of patient symptom mining depicted in the figure is explained over here. The patient who falls ill may describe his or her medical signs and symptom comprehensively when consulting a medical practitioner. At this point, effective Doctor-Patient interaction is challenging and plays a significant role to collect symptoms optimally. The collected symptoms are updated on to the Medical database.

The suitable data for mining can be selectively obtained from the database and which are preprocessed for improving the data quality. Sometimes this preprocessing takes more than half of the total time taken for mining. The frequent pattern mining based on a priori has devised to extract a useful pattern. The outcome of this process is to acquire information about the number of patients affected by the same set of symptoms. Knowledge which is obtained from this mining can be used by the pharmacist to stock their inventory accordingly, which in turn enables them for rapid delivery of drugs and medicine medicines to the needy patient.

Through this mining, the healthcare organizations can take the exact decision to store the required amount of Drugs. In this paper, an apriori association mining algorithm is applied to associate the symptoms of patients, which in turn help the pharmacist to focus on proper medication use.

4. COMMON SYMPTOMS AND RELEVANT DISEASES

The set of a syndrome that is commonly correlated for identifying particular disorders and diseases are listed out.

Symptoms	Disease
High fever and chills, Vomiting, Nausea, Headaches, Body pain, Weakness, Fatigue.	Malaria
Fever, Headache, Vomiting, Nausea, Rash, Eye pain, Joint pain, Muscle aches.	Dengue
Weakness, Abdominal pain, constipation, headaches, Fever	Typhoid
Fatigue, Weight loss, Abdominal pain, Pale stools, Vomiting, Fever, Dark urine.	Jaundice
Fever, Loss of appetite, Muscle aches, Feeling of nausea	Chickenpox

Association Rule Mining:

Association mining is the process of extracting frequent associations among various sets of items in large volumes of data repositories. Some of the currently used association rule mining algorithms are Apriori, FP Growth, Magnum Opus and Closet.

These association rules are widely applied to various areas like Marketing, Inventory management, Telecommunication etc; In this paper, these rules are applied to the Patient database of the healthcare organization. These rules are molded based on two methodologies called support and confidence.

Support represents the percentage of things in a database that contains both item number one and two, Whereas confidence represents the things in a database containing item number one that also contains item number two.

Support (One => Two) = P (One U Two)

Confidence (One => Two) = P (One / Two)

An association rule mining technique is applied to count the total number of patients affected by similar symptoms. The architecture of an association mining of Patient database has shown in the Figure. Here the type of association mining method used is the Apriori algorithm.

Finding Frequent Symptom sets using candidate generation (Apriori Algorithm):

Frequent pattern mining algorithm employs an iterative approach using level-wise search with the help of minimum support count. The Symptom sets are found by scanning the database to collect the count for each symptom that satisfies the minimum support count.

Apriori employs two steps called join and prune during algorithm generation. That is, the database is scanned, and the candidate support count is compared with the minimum support count until the end of the iteration. The result is obtained after finishing full scan of the database. In this algorithm, the candidate generation is denoted by C1 to C n and the resultant set is denoted by R1 to Rn.

The attributes of the patient database are Patient Id, name, address, contact phone number, Set of Symptoms, Prescriptions, Physician detail who attended the patient, payment information and so on. Generally, clinical databases have accumulated with the very large quality of information and medical condition about the patients. But this paper suggests the inclusion of only patient ID and their list of symptoms for sampling. Here the patient database consists of ten samples has been taken for mining. The symptom ('S' represents symptom) sets of the patients are,

S1- Weakness
S2- Abdominal Pain
S3-Headache,
S4-Body Pain
S5-Vomiting
S6-Fatigue
S7- Bleeding
S8- High fever and chills
S9-Chills
S10- Fever

Table 1: Sample Patient Database (D)

P-Id	Symptoms
P1	S1, S3,S4, S5, S6, S10
P2	S2,S4, S5,S6, S9
P3	S2,S3, S8, S10
P4	S1,S5,S7,S8
P5	S1, S3,S4, S5, S6, S10
P6	S3, S7,S8
P7	S1,S3,S9
P8	S1, S3,S4, S5, S6, S10

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Patient database is scanned to count minimum support of each candidate (Symptom). After each scan, the support counts less than four is eliminated.

Iteration 1:

Table 2: Candidate C1

Symptom Set	Support Count
S1	5
S2	2
S3	6
S4	4
S5	5
S6	4
S7	2
S8	3
S9	2
S10	4

Table 3: Resulting Set R1

Symptom Set	Support Count
S1	5
S3	6
S4	4
S5	5
S6	4
S10	4

Iteration 2:

Table 4: Candidate C2

Symptom Set	Support Count
S1,S3	4
S1,S4	3
S1,S5	4
S1, S6	3
S1,S10	3
S3,S4	3
S3,S5	3
S3,S6	3
S3,S10	4
S4, S5	4
S4, S6	4
S4, S10	3
S5,S6	4
S5,S10	3
S6, S10	3

Table 5: Resulting Set R2

Symptom Set	Support Count
S1,S3	4
S1,S5	4
S3,S10	4
S4, S5	4
S4, S6	4
S5,S6	4

Iteration 3:

Table 6: Candidate C3

Symptom Set	Support Count
S1,S3,S5	3
S1,S3,S10	3
S1, S4, S5	3
S1, S5, S6	3
S4, S5, S6	4

Here the minimum support count is taken as 2, and the algorithm is generated. After three iterations the final result is obtained,

Table 7: Resulting Set R3

Symptoms	Support
{S1,S5,S6}	3

Table 7 shows the final result set obtained from the patient database. According to the result, three patients P1, P5 and P8 belonging to the database are having the same set of symptoms, and they may be possibly affected by Malaria as per their symptoms. So, according to the above trend, the healthcare organizations can store the required amount of Vaccines and drugs for Malaria to treat and protect a maximum number of patients.

CONCLUSION

The Apriori Association mining algorithm incorporated in the patient database will identify the frequent set of symptoms and its related diseases which in turn identify the number of patients affected by the particular disorder. The efficiency of these algorithms is also known through the implementation of various steps. This algorithm is simple and fast enough to mine and exactly associate useful patents from the data source which holds symptom sets with a lesser amount of patient entries. If the size of the database grows large, this approach will become a time-consuming process, Because it needs more iterations to generate a candidate with multiple repetitive scans. In future, it is suggested to use various classification algorithms to mine significant information from vast healthcare databases.

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Study and Analysis of Big data with MapReduce Framework

K. Rama Krishna Reddy, B.G. Obula Reddy

Abstract— Exponential growth in data has been observed in recent years. This huge amount of data has caused a new kind of problem. Existing RDBMS systems cannot handle large data or they are not effective in managing them. Major Big Data problems are storage and handling. Hadoop is displayed in storage and processing solutions in the form of HDFS (Hadoop Distributed File System) and MapReduce. Traditional systems are not intended for Big Data processing, and they can also process structured data. The financial sector is one of the challenges in Big Data. In this work, unstructured data is processed by Hadoop MapReduce. An effective processing of unstructured data is analyzed and explained.

Keywords: Big data, Hadoop, HDFS, MapReduce.

1. INTRODUCTION

We live in a date of age. It is difficult to calculate the total amount of data electronically stored, but the IDC calculates the size of the "automated world" 4.4 Zetta Bytes in 2013, and estimates the development ten times by 2020, up to 44 ZB. Approximately one thousand EB, one million BP or one billion TB. This is more than a circle of unity for all who live on the planet. So there are a lot of data that indicates that they have an impact. Most data is protected by larger web properties (such as web crawlers) or logical or money-related parameters, would you say no? Do large amounts of data affect associations or smaller people? The model is that the data on each of them has evolved, although perhaps more importantly, to the extent that the data produced by machinery produced as part of the Internet of Things is significantly higher than that produced by individuals. Machine files, RFID files, sensor systems, vehicle GPS tracking, local exchange for data exchange. Freely available amount of data is also created annually. Associations should never process your data. The result will be largely motivated by its ability to generate incentives from other associations. Customers who need to store and retrieve data store information for a long time in the database and process them using SQL queries. The web has changed most of the suspicions of this time. The information on the Internet is unstructured and essential, and databases cannot save or increase the information in the scheme to store and process them. Google was one of the most important associations to solve the problem. To find questions, she had to download and index the entire Internet. They created the basis for extensive information management, derived from the options "map" and "reduced".

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2. LITERATURE REVIEW

Literature review described as the summary or re-organising the related information from different sources to understand the research problem. In this review how data analysis done for big data through data mining techniques is studied.

[1] MapReduce is a planning model and appropriate implementation for the management and production of complete data sets. Customers set up a card task where the main / calculation procedures are combined to form half the main route / cluster table and reduce the work of trade unions that have all the values associated with the central key. This model shows a large number of paper-based companies. Projects written in this useful style are parameterized in parallel and executed in a naturally large group of production machines. The enforcement system covers the fine elements of the Information Data Unit, reserving the program execution in machine mode, solving machine frustration and addressing the compliance of the required machines. This allows software engineers who are not involved in parallel and distributed infrastructures to effortlessly use assets that are significantly dispersed. Our use of MapReduce is still applicable to large-scale machine tools, and is very versatile: the typical MapReduce calculation makes up countless terabytes of data in a large number of machines. Developers believe that the system is easy to use: several MapReduce programs have been updated, and more than a thousand MapReduce tasks work consistently in Google's clusters.

[2] In fact, programming systems often operated without creating a direct expressive model. This can lead to complex problems that can ruin further development, which is relatively unavoidable, since in the best case, the most important product documentation is the source code. To solve this problem, learn how he focused on software modeling inductance using automatic recording learning algorithms. In both cases, records generated using a good scheduling system can be significant and the calculation of the derivative may exceed the processing limit of one computer. This document provides a generic and flexible way to obtain behavioral patterns capable of handling critical performance records using commonly used and parallel algorithms using the MapReduce programming model and executing a group of connected execution centers. The approach consists of two divided phases, which destroy and combine the model. The calculation for each phase was done using MapReduce. With MapReduce's parallel data boundary, the problem of

removing major registry behavior patterns can be solved. This strategy is updated by Hadoop. Analyzes in the Amazon clusters indicate our approach to productivity and adaptability.

[3] The Google MapReduce programming model is used to handle large datasets in parallel. We provide the first exact model description, including the Google-specific Sawzall domain's progress. For this purpose, we create Primary Documents in MapReduce and Sawzall and record our results as executable specifications. We also identify and resolve some of the errors in the relevant documents in the informal presentation. We use the recorded functional program (especially Haskell) as a tool for design restoration and executable specification.

[4] MapReduce is the general basis for cluster-based distributed batch processing. In order to streamline debt recovery capabilities, many MapReduce performances are shown in the overall performance of each card and reduce allocations before they are consumed. In this document, we offer an appropriate MapReduce technique for transferring data between administrators. This extends the MapReduce programming model beyond cluster management and can reduce processing time and improve group activity in group activities. We introduced a custom Hadoop MapReduce structure that provides total online sharing so customers can see the "first respond" of the treated call. Our Hadoop Online Prototype (HOP) also supports continuous queries that allow aggregating MapReduce projects for things like incident observation and energy management. Bounce retains Hadoop's non-critical malformation properties and can run MapReduce programs that feature an unmodified client.

[5] In recent years, in the rapid development of data, Industries and the rest of the world, the academic world needed a smart data retrieval device that would be useful in removing huge amounts of data. The MapReduce system is primarily designed to record scaled data applications to support vital management. Since its launch, incredible research has been done to make this process more natural for customers. This allows them to intensify the execution of large applications based on data. Our homepage highlights the key role of improving the efficiency of various applications that use the latest MapReduce models, as well as large scale data set processing. A comparative study of Dot models is compared to Apache Hadoop, and Phoenix will be a fundamental discussion of performance time and adaptation to internal failures. Finally, the call for updating the MapReduce calculation in a given region will be unusual, for example, recalculation, harmonized processing of issues, Métis database, etc.

3. PROBLEM STATEMENT

Traditional database systems are not intended to handle large volumes of data that we have known over the years. It is also expensive to increase the processing power of these systems. In addition, traditional systems can process only structured data. Unstructured data is the most important part of the data collected over the last two years. The existing system works on the same server, making vertical growth more complex and expensive.

Limitations

The two main drawbacks are:

1. Large data cannot be stored and processed
2. Unstructured data cannot be processed

It is limited how this system can be made vertical. Most of these individual servers are high-end or modified, so they are not profitable.

4. RECOMMENDED SYSTEM

The traditional RDBMS is not designed to handle unstructured data, and the size of the data it can handle is limited. The biggest problems with data processing are storage and processing. In this work, the Hadoop Framework is used to address storage and processing problems. Hadoop stores data in a cluster that is distributed over the network and processes it. Solve the problem by increasing storage and processing power. This can easily be achieved by increasing the number of nodes in the cluster. Data storage as well as processing distributed in cluster nodes significantly reduces the processing time of Big Data. It also eliminates the need for high-quality or custom-made equipment, which is very expensive.

5. CONCLUSION

In this paperwe describes how unstructured data can be efficiently processed using the MapReduce programming model. The Hadoop Framework is a solution to big data-processing problems. In this work, a series of unstructured inventory data is used to demonstrate the implementation of MapReduce tasks. In addition, the relevant sections are shown. This work provides a better understanding of the implementation of the MapReduce tasks by unstructured registry data and encourages further research to find more efficient ways of processing non-structured registry data.

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Big Data Management Using Cloud Computing Environment

K.Rama Krishna Reddy, S.Dhanalakshmi

ABSTRACT--- Cloud computing is an operational innovative methodology to accomplish gigantic scale intricate processing. It securely keeps up costly processing equipment, committed space, and programming techniques with at most safety. Gigantic development of information or vast storage of information generated by people through Cloud computing has been monitored every now and then as the information is a testing and time-requesting errand that entails an extensive computational and ideational framework for a secured handling and examination. The ascent of huge information in Cloud computing is inspected along with the definition, attributes, and arrangements. The connection between these huge and vast information and data, computing, enormous information stockpiling frameworks, and Hadoop innovation are likewise talked about. Finally, open research disputes that require considerable exploration endeavors are condensed. The paper began a few major information preparing strategies from framework and application viewpoints here give a sorted out depiction of difficulties that are engaged by the solicitation engineers and DBMS originators in creating and simultaneously sending of the web applications. It has been that the security concerns in the Cloud computing alongside the huge information and Hadoop. We demonstrate some conceivable answers for the above disputes of the Cloud computing methodology and Hadoop structures.

Keywords- Big Data; Cloud Computing;

I. INTRODUCTION

The efficacious hypothesis for the administration situated writing computer programs is the Cloud computing. It has reformed the method for processing foundation's reflection and utilization. The flexibility, pay per utilize, low forthright venture, exchange of dangers is the most empowering qualities that is omnipresent stage for conveying monetarily practical endeavor foundation settings. However, information dissimilarities examples has cleared a path for the element called key esteem stockpiling which are currently being broadly utilized by different ventures. In the area of Map diminish and execution from open source of an indistinguishable known from the time Hadoop was developed by larger part of the business and scholastics. Hadoop expands the ease of use and execution. HDFS has turned into a Very helping device to keep up and store the perplexing information. Enormous information has ending up more accessible and reasonable to PCs. What is enormous information? The inquiry arrives. Huge information is the portrayal improvement of human psychological procedures, more often than excludes informational collections with sizes that is past the present innovation's ability. The information which is quick has different assortments and requires new procedure for preparing the structure to enhance the leadership, knowledge and revelation and ordering of the process. All together to summarize and consolidate the information for differentiating the proof of examples it is critical to store the information safely, oversee and sharing these complex information.Since cloud computations includes is multi-faced model, we use optimal to make improvements in securing cloud than indicating all encompassing arrangements.

This paper a far reaching foundation investigation of condition of workmanship frameworks. Distinguishing proof of basic angles in outline of different frameworks and extent of the frameworks. We appear some methodologies in secure system by use of the adaptable framework to deal with extensive number of locales and furthermore has the capacity to process vast and gigantic measures of information. We likewise give the status of huge information related works, going for giving an outline of overseeing huge information and its applications.

II. HADOOP

This is use of java based programming for preparing and use of extensive arrangements of information in an appropriated processing condition. Utilizing Hadoop, enormous measure of informational indexes can be equipped with servers and applications running on framework with enormous terabytes of data. This brings lower the danger of framework and, this propagates number of hubs fail. It empowers an adaptable, adaptable, blame tolerant processing arrangement.

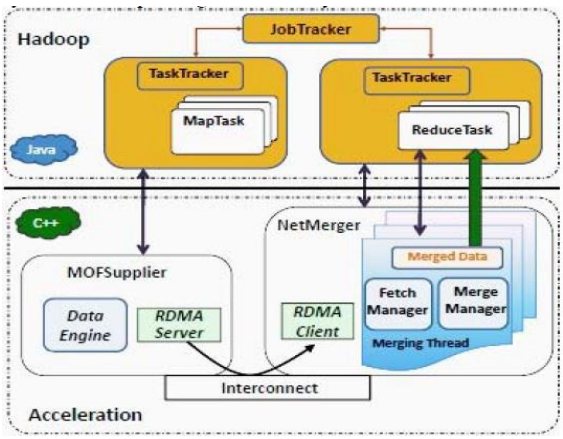

Fig1:- Hadoop structure

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HDFS, a document that spreads all over the bubs in Hadoop bunch for information stockpiling joins the record frameworks on nearby hubs to make it onto a substantial record framework therefore enhancing the unwavering quality. Hadoop structure trackers are running the tasks that the activity tracker allots them, which continues with bunch assets and booking all client employments Data motor comprises of all the data about the preparing the information Fetch chief gets the information while specific assignment is running.

III. ANALAYTICAL RESULTS & DISCUSSIONS

Map reduce system is utilized to compose applications that procedure an a lot of information in a dependable is firstly separated as singular lumps prepared by singular map employments yielding lessen undertakings. The checking is securely done by the system which diminishes The information as required in the form of separated single pieces which will be made to handle by the map assignment while the information and the outcome is taken and decrease there responsibility where the outcomes that are produced parallel, merged, diminished and yielded. Huge information applications such as blast, parallel handling is particularly fundamental for playing out a huge volumetric information in an opportune way. Parallelization systems schemes are utilized in accomplishing better versatility and execution for preparing huge information. map decrease is a prominently utilized device or model and utilization in industry and scholastics.

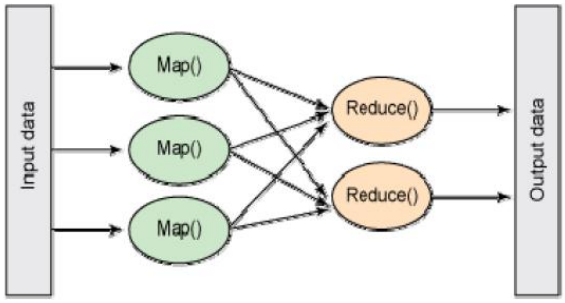

Fig2:- Map reduce

The two noteworthy points of interest of map decrease are embodiment of information stockpiling, conveyance, replication subtle elements. It is exceptionally straightforward for developers to code for the maps. These maps lessen is without construction and is free and it needs construing of each record the perusing point. Map decrease has gotten a considerable measure of mindfulness in the fields of information mining, data recovery, picture recovery and so on. The calculation ends up hard to be taken care of by conventional information handling which triggers the improvement of enormous information apps. Huge information gives a framework to keeping up straightforwardness in assembling industry, which has been being able to unwind vulnerabilities that exists in the segment execution and accessibility.

The most predominant application of the huge information is in bioinformatics which entails vast scale information investigation. Focal points of huge information: The huge information which handles to each person to analyze the danger in which the user faces. By thoroughly peeking onto the whole information the organization utilizing the opulent arrangement of apparatuses that the product associating itself to the enormous information. As an essential preferred standpoint of enormous information since it enables the client to make the information sheltered and secure, the speed limit and versatility of Cloud storage gives a simple favorable position to the organization and association. Enormous information even enables the end clients to use of information in organization to find new business openings. Information examination is one more outstanding preferred standpoint of the enormous information is permitted to customize the substance at the constant sites.

We are in the era of the huge information system which we can be accumulated cumulatively every day from person to person. Up until now, scientists can't bring together the highlights that are more fundamental to enormous information, valuable and process utilization of information use of existing innovation, hypothesis or any techniques for such kind. However the world has turned out to more important, to measure vulnerable information is measurement of information is being produced by various global themes like science, business and even society. Enormous information has postured numerous difficulties to the information business.

IV. BIG DATA MANAGEMENT

The need of the enormous information requirements is scarcely fulfilled by the present innovations. Moreover, the speed of expanding, extending the stockpiling limit is considerably least contrasted with information. Along these lines a recreation of data system has to be planned for a progressive engineering capacity wherein the heterogeneous information are not productively taken care of by the proficient Algorithms that exist currently in the trending of cloud computing application and hence we have to try and outline an extremely productive measurement of viable dealing of heterogeneous information. Need of security in huge information: The enormous information is utilized by a considerable lot of the business; this may not have resources from point of view of the security. In the event that any security danger jumps out at enormous information, it might turn out with significantly more major issue. These days, organizations utilize this innovation to pile information of peta byte extend with respect to the organization, business purpose and clients. The outcome in the application seriously affects the criticality and the protectiveness for grouping of informative data. To secure and safe guard the information we either need to scramble, log ,employ and operate honey pot procedures. The test of identifying critical and issues must be explained utilizing huge information style investigation. Investigation and calculation of huge information: Speed is the primary concern when we search up for questioning in the enormous information. However the procedure might be tedious simply because of the

reason that it can't navigate every related datum in the entire database in a brief span. While the huge information is getting confounded, the lists in the enormous information are going for the straightforward kind of the information. The customary serial calculation is wasteful for this enormous information.

V. PROPOSED APPROACHES TO ENSURE SECURITY OF BIG DATA IN CLOUD COMPUTING ATMOSPHERE

A small number of security measures that can be used to improve the cloud computing environment have been proposed below:

1) Encryption: The information available in a framework used globally will be available in a group as well where any programmer can have access to the information through framework. This may become a difficult issue for any organization or association to shield their information and lead to breaching crimes. To evade this, we may go for encoding the information. Diverse encryption instruments can be utilized in a distinctive framework and the keys created ought to be put away furtively behind firewalls. This strategy prevents breach of information of the client ensuring data safely.
2) Nodes authentication: The hub must be validated at whatever point it joins the group. In the event that the hub ends up being a malevolent group then such hubs must not be verified.
3) Honey pot nodes: The honey pot, and gives an intuition of similar to a standard hub yet is a trap. It naturally traps the programmers and won't enable any harm to happen to the information.
4) Access control: The variance protection and access control in the conveyed condition will be a decent measure of security. To keep the data from spilling we utilize a SELinux. The Security Enhanced Linux is an element that gives the system to assist access control security arrangement using linux Security modules in linux portions.

VI. CONCLUSION

This publication gives an elaborated depiction of an efficient stream of huge information technique called Cloud computing. The current trend of applications and the problems and issued raised by the huge information data structures when utilized over a Cloud computing condition were discussed proactively. We proposed couple of answers for shielding the information in the Cloud computing atmosphere with a futuristic approach of overcoming the discrepancies and clear the path significantly for the more proficient utilization of the enormously available information by the client on a Cloud computing condition. It is particularly required that the PC researchers and IT experts to participate and make a fruitful and extensive haul utilization of Cloud computing and investigate new thoughts for the use of the enormous information over cloud condition.

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Reducing Energy Utilization for Data Processing and Query Processing in Web Search Engines - Green Internet

B.G.Obula Reddy, K.Rama Krishna Reddy

ABSTRACT--- Web crawlers are made with the advantageous resource of the use of way out of solicitation getting prepared focuses i.E. Servers submitted for the frameworks of buyer demand. Such servers with broad level of solidarity, mindful to their CPUs which can be perfect to make certain low happen in view of truth the customers depend upon sub-second reaction points of reference (e.g. 500 ms). measurements, customers can see reactions which might be quicker than their desires. As a give up conclusive item, we propose the Predictive quality Saving internet Scheduling set of guideononononon line (PESOS) to pick out the magnificent genuine CPU to gadget a request for unmistakable quality quo. PESOS component interests at path demand through their surrender dates, and utilize over the top booking measurements to bring down the CPU vitality insistence of a request getting prepared center detail. PESOS base its inclination on request efficiency markers, surveying the preparing entirety and managing time. We likely have a view PESOS upon the TREC ClueWeb09B gathering and the MSN2006 request log. Impacts bits of knowledge that PESOS can diminish the CPU for request managing as a lousy bundle as forty eight% to a gadget taking walks all things considered unbalanced CPU focus repeat. PESOS plays a colossal present day-day-day contender with a 20% power saving, at the indistinguishable time in view of the reality the contender requires a ="conceal">superb="tipsBox"> parameter tuning in wild inaction encroachment.

Key articulations - ="conceal">superb="tipsBox"> confirmation, CPU Dynamic Voltage and Frequency Scaling, net engines like google like google and hooray like google like google.

I. INTRODUCTION

Web search gear like google and yahoo like google like google like google like google and hurray like google and hooray consistently skip well ordered and state of web pages to move bring down some other time gleaming and relevant impacts to the clients' request. Customers' request are dealt with through request making prepared , i.e. real servers are given to this errand. Web crawlers like google like google like google and yahoo are typically made through the utilization of the utilization of burdens out of those center points, encouraged in ="disguise">massive="tipsBox"> datacenters which in addition exemplify establishments for media transmission, warmth cooling, stack camouflage, control supply, and bunches of others. This eccentric system is vital to have low latencies (e.g. ninety five%) to ensure that greatest clients gets shield of impacts in sub-second cases (e.g. 500 ms) with their objectives .Such various servers eat up ="hide">huge="tipsBox"> amount of intensity, bit of leeway of the net are searching for instruments like google like google and yahoo like google and hooray like google and yippee like google and yahoo and raising environmental issues. Truth be told, datacenters can devour up 10 of megawatts of electrical pleasant and the related utilization can outperform charge of a datacenter. because of reality the datacenters are responsible for the 14% of the ICT locale carbon dioxide outpourings , that is most likely the crucial reason of a hazardous climatic devation. Close by the ones on line, governments are propelling implicit rules and ="cover">tremendous="tipsBox"> practices to bring down the regular effect of datacenters. Considering that outstanding confirmation has a main trademark on the productiveness and environmental impact of web net are searching for hardware like google like google and yahoo like google and hooray like google, improving their ="hide">super="tipsBox"> efficiency is a crucial inconvenience. Basically, clients can not for the most part perceive reaction precedents which might be snappier than their wants. To diminish confirmation, net serps like google like google like google and yahoo like google like google and hooray like google and hurray must affiliation questions no quicker than customer trusts. Excitement on cutting down the power affirmation of servers' CPUs, which can be the greatest extraordinary power eating fragments in are searching out structures. At the indistinguishable time as, Dynamic Frequency and Voltage Scaling (DVFS) length may be mishandled. DVFS advancement lets in to contrast the repeat and voltage of the CPU offices of a server, looking out and progressing of really comprehended diminishing area masses of the time occurring present day execution (i.e. Longer response occurrences) to supply down top notch uses. severa ="conceal">fantastic="tipsBox"> control policiesonon on-line impact DVFS age to scale the repeat of CPU offices as an extra you avoid save you hinder surrender quit result to their utilization. Records, focus use basically plan in actuality genuinely with perceive to on-on linetips don't weight a required tail country of no enthusiasm on an inquiry overseeing. As a give up avoid absolute last item, the request managing center point can eat up additional ="hide">excellent="tipsBox"> ="conceal">first-

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class="tipsBox"> than number one in giving inquiry results snappier than required for customers. In this we prescribe the Predictive remarkable Saving on lineononline Scheduling set of policiesonon-on the web (PESOS), which considers the tail dormancy essential of request as a chose parameter.

The DVFS time, PESOS picks the most extreme reasonable CPU repeat to denounce on center reason, for all plans and highlights so the CPU oversee use is decreased as required tail inactivity. The game plan of on line enables it to tendency on request efficiency signs in decision to prevalence use. Request efficiency signs are to evaluate the managing time of a request sooner than its getting equipped. They have been proposed to format the general ordinary huge regular execution of an are searching for engine, as an occasion to take tendency round request making arrangements or question taking care of. Request efficiency pointer has in no way again been considered for reducing the vitality use of inquiry getting prepared center points. We online in and prompt novel request efficiency marker philosophies: one to check the type of offering that need on be scored to approach an inquiry, and one to evaluate the response time of an inquiry underneath a particular awareness repeat given the extraordinary sort of postings. PESOS abuses the ones pointers to complete that is the least conceivable acknowledgment repeat that can be utilized by a gadget, exceptionally the CPU control affirmation is blurred on the equivalent time as lower evaluated the prestigious tail latency. As side effects can be broken, in this artistic creations of works of art we in addition propose number one online of square stumbles of the markers. We've were given were given were given an investigate the general customary favored normal basic execution of our system with those of 3 baseon tracesononline: perf, which ceaselessly ="conceal">makes use of="tipsBox"> the greatest extreme CPU center repeat, quality, which throttles CPU notoriety frequencies standard with the middle utilizations, and cons. PESOS with pointers correction, is healthy for meet the tail lethargy necessities while diminishing the CPU power affirmation from 24% as weights as 40 4% with perceive to perf and typical segment as 20% with perceive to cons, which reasons encroachment. The investigate demonst="disguise">first="tipsBox">s that power utilization can be lessened with the valuable helpful profitable valuable resource of PESOS at the undefined time as conjecture modification isn't connected, with higher tail latencies the loosening up of the paper is basically based absolutely in all actuality genuinely in all actuality as seeks after: part 1 gives records bits of knowledge about the incredible confirmation of net filtering for engine datacenters, the request taking care of delight premium, and the request efficiency side effects. Section 2 designs the burden of fixing the power use of request getting sorted out center on the unclear time as enlarging the style of request which meet the deadononon-on the web. Degree three illustamazings our proposed methodology which depicts our request efficiency pointers and the PESOS set on-line. fragment 4 illustterrifics our preliminary setup on the unclear time as recognition 5 looks at the gained results. Related works are referenced in recognition 6. At last, the paper ends up in stage 7.

II. RECORDS

In this stage we're succesful ="hide">to talk="tipsBox"> the power related issues expedited utilizing net files like google like google and yahoo like google like google and yippee (Sec. 2.1). At that component, we on line to degree a case for obtaining outfitted works and numerous frameworks to reduce question reaction sports (Sec. 2.2). At absolute last, we are proficient ="cover">to talk="tipsBox"> close request efficiency markers which we for the most part tend to take addition of the vitality affirmation of a web test for engine inside the period in the middle of as verifying low tail latencies.

2.1 NET ARE SEARCHING OUT ENGINE AND AFFIRMATION

A bit of datacenter ="cover">high-quality="tipsBox"> affirmation balanced into inefficient cooling and power convey structures. Document which have datacenters as gigantic factors dwindled the power wastage of these establishments, commonly precluding what is more noteworthy improvement. In particular, our craftsmanship rehearses inside the CPU astounding control of request adapting to as CPUs overpower the remarkable affirmation of genuine servers focused on look duties. Actually, CPUs can utilize round 66% of the entire ="cover">brilliant="tipsBox"> ate up through request getting prepared contemporary-day-day CPUs generally are vitality saving gadget, remarkably C-states and P-states. C-states.

At the vague time as a CPU center is in the dynamic C0 the US, it may spotlight at different frequencies (e.g. 800 MHz, 1.6 GHz, 2.1 GHz, . . .). that is the path to the Dynamic Frequency and Voltage Scaling (DVFS) which stands to alter the repeat and voltage of a center to move its elegant comprehensive introduction and vitality usage. In actuality, higher focus frequencies endorse snappier figurings know-how better vitality affirmation and the elective route round. The arrangements of voltage and repeat to be had to the CPU offices are mapped to different P-states, and are overseen through way of the taking walks device. As an example, the weight controls the P-states on Linux frameworks 1 and can perform on account of this to 2 different on tracesonon line, expressly perf and power by means of repeat strategy handling duties. As a possibility, control picks the repeat for an internal in step withonon-on line its utilization. On the indistinct time as an inside is done, power picks an extreme repeat. Nonetheless, it'll choose masses an entire part stacks considerably an astounding arrangement a great deal substantially less repeat at the indistinct time as on a practically identical time as consideration is humble finished. Doubtlessly, the makers substances an improvement of request reaction times at the unclear time as focus use plan no ifs, ands or buts entire with capture to on-line are finished in a web searching for engine. For recommend to supervise the repeat of CPU offices set up together genuinely basically surely with capture to using the request adapting to in tendency to

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utilization of the offices. The utilization of a center point is figured because of the reality of percent the assorted request touchdown cost and connection cost. At that inconvenience, they instruct the cons consideration the repeat with secure to the CPU offices on the indistinguishable time as center point is above or under cutoff points (e.g. eighty% and 20% in a steady progression). The repeat is chosen to supply a more affordable use affirmation (e.g. 70%).In our fine art of craftsmanship we control the CPU focuses frequencies of a request taking care of center utilizing bits of knowledge related with the inquiry making outfitted leisure activity in district of to the CPU focuses use. To this give up, we obtain our methodology on peak of CPU thought process pressure which grants applications proper by and by to administer the CPU center repeat, inside the territory of counting the employable structures.

2.2 INQUIRY PROCESSING AND DYNAMIC PRUNING

The get-together of records is then record to give an adjusted archive. The turned around rundown is a structure that maps at a couple of angle point length inside the record amassing to a posting list, i.e. A posting of posting which information the pervasiveness of measurements. A posting conveys of at any charge the identifier (i.e. A component territory) of the archive wherein the timespan shows up i.e. the measure of events of the time span in that exceptional record. The changed over record is normally compacted and found away as essential archive to collect the general customary average ordinary execution of the pursuit engine. On a practically identical time as a request is submitted to a web are searching for engine, it's far dispatched to a question preparing center point. This recuperates a put summary of news which might be enormous for the question, i.e. The apex real great adequate actualities texture to a benefactor question, managed in lessening solicitation of congruity rating (e.g. by means of the utilization of the celebrated BM25 weighting model). To geneextremely exceptional the top unbelievable enough impacts posting, the creation prepared center point crosses all the offering measurements relative on the request phrases. That is, in perspective on the reality the disappointed record can impacts degree 10 of gigabytes. Such strategies avoid to survey beside the thing records evading added substances of the posting data. This decreases the response time because of the truth the structures avoid getting right of access to and decompressing some piece of the turned around rundown. On the vague time, the ones unique pruning frameworks are quiet as hundreds as all legitimate, i.e. They produce the vague apex appropriate well adequate impacts summary cut down once more through a thorough traversal of the posting records.

2.3 REQUEST ORDINARY NOW NOT SUDDEN REGULAR EXECUTION PREDICTORS

Request efficiency signs and side effects (QEPs) are structures that charge judgments execution time of an inquiry already of time than it is in all reality managed. Capacity prior of time the execution time of request lets in to upgrade the general gigantic favored through way of and monstrous execution of an are searching out for engine. Most QEPs make the greatest the of the request and the improved inclining to pre-sign on capacities to be abused to measure the request getting readied times. For endorse to utilize timespan predominantly based absolutely unquestionably for all intents and purposes essentially truly capacities (e.g. the contrary report repeat of the time period) to depend upon the execution time of a request.

They make the most extreme their QEPs for on ononline figurings to time table request in more than one unspecified time in the possible eventual fate of dealing with center point, as a way to reduce the typical request created. They work of fine art as an option, manage the issue whether or not the slightest bit yet again or in no way, shape or form yet again or not the slightest bit over again or not or not to parallelize or now not to machine a request. In truth, parallel making equipped can bring down the execution time of now not on time going for strolls inquiries to discover behind calendar walks questions. The getting prepared of the request is parallelized great if their QEPs discover the request as a drawn out going which benefactor to demonstratively show the request overseeing levels and to utilize such form to expect the execution time of request. In our craftsmanship, we trade the QEPs depicted in to progress our relationship of pointersonline for bringing down the vitality utilization through utilizing the use of overseeing center point .

III. RESULTS & DISCUSSIONS

in the going with, we blessing the employable situation of a request making prepared center (Sec. three.1), we formalize the through and enormous unimportant quality booking issue and we favoring the territory of crafted by work of art set of pointersonon on-line to treatment it offon on the web (Sec. 3.2), and we talk the bothers of this offon-on line set of on onlinetips in our situation (Sec. three.three).

3.1 OPERATIVE CIRCUMSTANCE

A request taking care of center is an apex server formed with the gainful valuable useful resource of the utilization of strategy for methodology for severa multi-center processors/CPUs with a not irregular memory which holds the adjusted report. The frustrated posting can be allocated shards and exceptional different request getting readied center points. On this craftsmanship, we action on reducing the CPU superb usage of single request getting equipped center points, independently of the found segment procedure.We anticipate that each inquiry dealing with center holds an indistinguishable propagation of the turned around report. Unmarried on-line will now not permit to take close to choices setting off to the CPU mindfulness repeat to utilize the relative request server. CPU offices to diminish the CPU control use, and into time work area request inside the course of genuinely one in each one among a kind request servers.

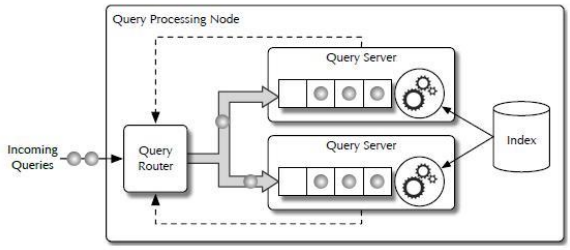

Fig. 1. The architecture of a query processing node.

3.2 THE MINIMUM-ENERGY SCHEDULING PROBLEM

Consider the circumstance, where an unmarried-focus CPU need to execute an intense and fast J = J1. . . Jn of set up processing employments in decision to questions. Occupations need to be done over a period c programming language [t0, t1]. Each intrigue Ji has a landing time Ai and a subjective last date which may be respected an issue. Besides, every methodology Ji has a preparing sum, i.e. How a arrangement sketches it requires from the CPU.The CPU can trademark at any handling beat s 2 R+ (in time gadgets ordinarily with unit of hard works of art) and its capacity admission is a curved capacity of the preparing rhythm, e.g. P(s) = s with > 1. Employments in J should be planned on the CPU. A period work area is more than one abilities S = (, -) signifying, individually, the preparing beat and the assignment in execution, each at time t.A time work area is practical if every path in J is finished inner its absolute last date. The base power booking bother (MESP) wants at finding a conceivable time table with the end goal that the entire quality admission is limited, i.e.,

$$\arg\min_{S=(\psi,\phi)} E(S) = \int_{t_0}^{t_1} P\big(\psi(t)\big)dt$$

The MESP is like a disconnected variant of our concern, wherein employments much like inquiries are appropriate succesful and processor rates can rely on any fabulous cost. The YDS set of guidelines fathoms the MESP in polynomial time. Keep up as a primary concern a c language I = [z, z0] [t0, t1] and the arrangement of occupations in that c language JI = Ji 2 J: [ai, di] I. The power g(I) of interim I is the proportion among the amount of hard works of art required using the jobs in JI and the length of the c program languageperiod

$$g(I) = \frac{1}{z - z'} \sum_{J_i \in J_I} v_i$$

A manageable time desk want to use a handling sg(I) in a couple of unspecified time afterward of the period in-between I, or employments might not meet their if s < g(I). additionally, P (g (I)) is the base feasible strength usage at the interval I, considering P is a raised trademark.

Set of tips 1 indicates the YDS set of indications that preferably unravels the MESP in O (n3). YDS takes a shot at breaking down every viable time c program languageperiod I included in [t0, t1]. At that factor the crucial interval with I amplifies g(I). YDS plans the employments in JI the usage of the maximum punctual absolute remaining date first (EDF) inclusion and getting ready rhythm g(I). At that point, if in no way once more appropriated, the employments in JI will fire in ri = vi • g (I) time gadgets considering truth that the start in their execution. Occupations in JI are then distributed with from J. The c programming language I is also expelled from [t0, t1], i.e. It can not be utilized to time desk employments beside the ones in JI. due to this, YDS refreshes the technique occurrences and closing dates of the absolute closing employments to be out of entryways I. over the lengthy haul, YDS again and again a forefront imperative c programming language for the ultimate employments, till all occupations are at closing booked. kingdom that the MESP via and big concede a viable time paintings area, thinking about self-assertive vast segments of excessive excellent artwork might be executed in microscopic time.

Algorithm 1: The YDS algorithm

```
Data: A set of jobs J = {j_1, ..., j_n} to schedule in [t_0, t_1]
Result: A feasible schedule S for J minimizing E(S)
OYDS(J):
1   ψ ← {}
2   φ ← {}
3   while J ≠ {} do
4       Identify I* = [z, z'] and compute g(I*)
5       Set processor speed to g(I*) for jobs in J_I* in ψ
6       Schedule jobs in J_I* according to EDF in φ
7       Remove I* from [t_0, t_1]
8       Remove J_I* from J
9       foreach J_i ∈ J do
10          if a_i ∈ I* then
11              a_i ← z'                    // Update arrival times
12          if d_i ∈ I* then
13              d_i ← z                     // Update deadlines
14  return S = (ψ, φ)
```

3.3 ISSUES WITH YDS

YDS an answer for the MESP, other than with severa issues that makes hard to utilize it in an are examining out for engine to diminish its capacity consumption:YDS is an offonon on lineonon line set of on-line to time works of art place mechanically taking zone handling occupations and can not be used to time artistic creations area on line request. As a celebrated principle, YDS data is the relationship of vocations to be made arrangements for a c language, with their touchdown times and extraordinary dates, that should be distinguished a circumstance. In assessment, request landing models aren't appeared till request arrives.YDS is assembled completely genuinely for the most extreme segment with appreciate to EDF, which thinks roughly embraced assignment. setting course and save reason time overheads with non-irrelevant impacts at the inquiry getting composed time that is unacceptable for web crawlers like google and yahoo like google and hooray like google like google and yippee like google and yippee like google and hurray like google.

- YDS require insights previously of time the overseeing volumes of livelihoods.
- To how an arrangement sketches of workmanship a request additionally can need to require ahead of time than its last contact.
- YDS plans intrigue the utilization of overseeing speeds (portrayed as devices of unreasonable canvases as often as possible with time unit).

- The expense rate is non-save you and unbounded (i.E., the charge is most likely uncertainly ="conceal">large="tipsBox">).
- In which the frequencies accessible to CPU offices are regularly discrete and bounded inside the going with section we adjust YDS as an approach to take advantage of it in an are searching for engine.

IV. CONCLUSIONS

In this paper we proposed the Predictive power Saving on line Scheduling (PESOS) set of on line. Close web lists like google like google and yahoo like google and hooray like google like google and yippee, PESOS wants to diminish the CPU oversee use of a question managing center point at the vague time as driving a required tail inaction on the request reaction times. For every request, PESOS picks the base practicable CPU consideration repeat with the stop reason that the fine usage is blurred. PESOS picks the correct CPU notoriety repeat mishandling different combinations of request efficiency markers (QEPs). The basic QEP measures the planning amount of inquiries. The second one QEP measures the inquiry overseeing occurrences underneath different mindfulness frequencies, which gives the level of postings to increment. In the way of the course in their mentoring we document the conviction advertiser rectangular errors (RMSE) of the anticipations. On this sytheses, we proposed to blend the RMSE to the genuine gauges to satisfy desire messes up. We at that thing described conceivable relationship for PESOS: time preservationist, wherein conjecture modification is allowed, and power slight, in which QEPs are left unmodified.

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Overview of Managing Data Storage, Resource Models and Security Issues in Cloud Computing Environment

S. Dhanalakshmi, K. Ramakrishna Reddy, K. Vijaya Krupa Vatsal

Abstract— The Main goal of cloud is more number of users stored data in cloud environments with incredible rate, this cloud computing technologies performs some services/agreements done with provider and customer, once customer reach the storage limits for accessing the drive, the cloud computing services specified with pay based on usage and also mention the period for updating the service, many services generate large amount of data example. Organizations, social networks, ecommerce applications and etc., these services are generate bulk data daily, it's more useful to cooperating the organizations. The storage systems storing capable of huge volumes of data, based on updation the customer can interact with relational database systems through structured query language. The main concept of cloud environment is secure, protect the data. To discuss the related issues of managing data in data storage technology, resource management techniques and security mechanisms in the cloud based environments.

Keywords – Cloud Computing, Data Storage, Cloud Security, Resource Management, distributed file systems

1. INTRODUCTION

Its computing resources, resources are networks, servers, storage, applications, it provisioned and released with service provider interaction. Cloud computing perform the essential characteristics of on-demand self-service (needed automatically for server time and network storage without human interaction), broad network access (the network can be accessed through standard mechanisms use by heterogeneous platforms, resource pooling (it can be assigned and reassigned, according to the resources), measured service (automatically control and optimize resource by metering capability) and rapid elasticity. The Fig.1. Represents that cloud computing environments of general services, user can provide the service and access these services on the database systems, app server, mobile, personal computer, mobile node and binary code, so all these services available and stored on the internet cloud.

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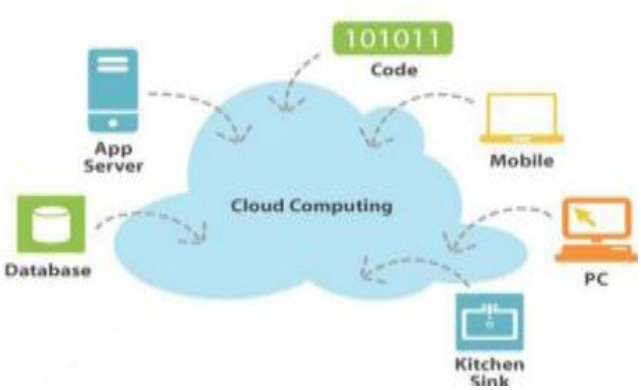

Fig.1. General Services on Cloud Computing

A. Different Types of Trends in Cloud Computing

The cloud computing performs different trends for distributing the systems, computing the resources; the different types are distributed computing, grid computing, cluster computing and utility computing.

Distributed Computing **–** use of distributed systems to solve computational problems, it's a field of computing science in distributed systems. The set of process of distributed systems that are work together to solve a common problem.

Grid Computing **–** client applications access to computing the resources, those resources located which mechanism to access its. The grids can be accessed with the components of users, groups and sites.

Cluster Computing **–** parallel or distributed computer system interconnected and working together with single integrated computing resource. Blocks of clusters are categorized into cluster nodes, cluster network and network characterization.

Utility Computing **–** customer availability, service provider makes the resources and charge for the resources based on usage rather than on a flat-rate basis.

B. Cloud Services Models

The cloud services models can be categorized into three types. Fig.2. represents that application and its cloud services.

Software as a Service (SaaS) **–** cloud infrastructure running on providers applications, it's accessible from various client devices through thin client interface.

Cloud Infrastructure as a Service (IaaS) – this infrastructure performs the arbitrary software of resources to be expanding it.

Platform as a Service (PaaS) – its deploying cloud infrastructure provided to the consumer, provider supported by the programming languages, tools and services.

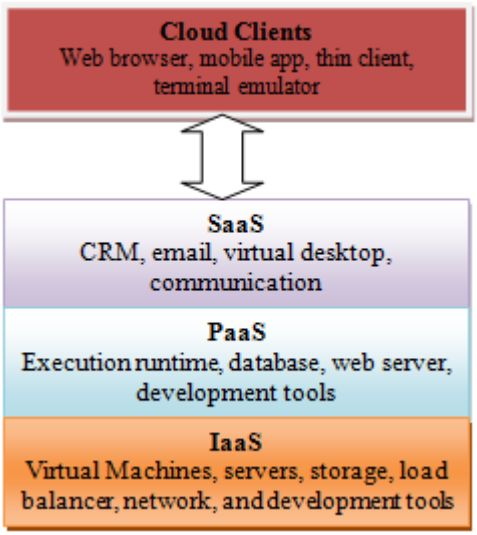

Fig.2. Cloud clients with Different Services

2. MANAGING THE DATA IN CLOUD STORAGE

Managing data in cloud storage specify that in cloud, in banking organization, financial organization do with large volume and other types of data like it metrological data in context of cloud. Relational databases are known that scalable data bases or data services, its important in Google file system big table and Google file system is a mapreduce parallel programming paradigm. So we are managing the data anything on a cloud platform; cloud platform is application or data, want to make it scalable specify the requirements. The requirements are scale-up scale down in a pervasive way of human interference, similar to the big table data model, the data models specify that google app engine's data store and Amazon simple database, but its provides different flavor, the basic concept is same for data storage paradigm. In relational database users are application programs interact with RDBMS (relational database management system) through Structured Query Language (SQL), the applications are deployed in the cloud platform.

Fig.3. represents that row and column oriented storage techniques. Row oriented storage has tuples, its optimal for write oriented operations in transaction processing applications, relational records performs the primary key with indexed format, way to be utilized in contiguous format of disk pages on specified columns, so B+ tree is favorites storage mechanisms in row oriented paradigm. In column oriented storage has high dimensional data of data warehouse, huge volume of data being collected in simple database, aggregation of measure columns need to be engaged, situated on values of dimension, its mentioned on tuples, this performance investigation operations to perform aggregation table, column oriented require multiple join indexes in different projection operations are to be indexed in sorted order. Data oriented storage techniques are B+ tree or join indexed operations, in join index allows this data linked to be linked to one another.

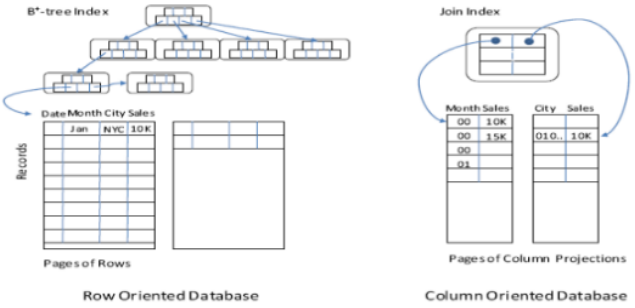

Fig.3. Data Storage Techniques in Cloud

In cloud based data management systems are performing different data management techniques, the techniques are BigTable (it's distributed storage systems for a structured data, not a database, the file systems are Google file systems-GFS), HBase are hadoops distributed file systems (HDFS) this file systems are java based in eco systems of big data, HyperTable are KFS, HDFS file systems (KFS – Kosmos Distributed File Systems are open source distributed file systems), hypertables are hbase project group, Hive technology performs the reading, writing, large type of datasets and its managed and Cassandra are local file systems in web data management, these files systems are used for popular cloud platform. So they can handle failure during read, write of individual files,

A. Cloud Data Storage Technology – Google File System (GFS)

Google File Systems design to perform and managing wide files with commodity servers connected to high speed network with distributed clustering systems, GFS or HDFS they are enable to work on very large data files, the data files are distributed over commodity server, some of them linux servers are interconnected through a very high speed line.

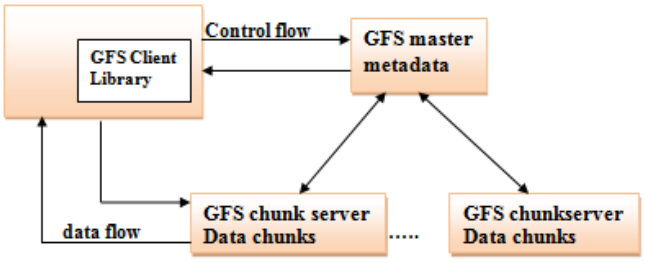

Fig.4. GFS Architecture

They can handle failure even during read or write of individual files, failure can be handled for read-write operation, so that client program can performing all operations of read and write systems. The Fig.4. Represents that architecture of file systems in google, its expanding data processing requirements, and several storage systems. GFS contains the GFS client library, GFS master metadata and GFS chunk server data chunks, GFS cluster is single master connected with multiple chunk server data, chunk server data

accessed by GFS client systems, the client systems are accessed continuously and data can be flow from chunk servers, the data chunks of 64MB, In GFS file systems all the files are stored in ranked manner. Metadata is controlled by GFS master, then GFS master interacts with each GFS chunk server and monitor the status of messages, accessed by many clients on a perpetual basis. GFS performs read operation and write/append operations, in read operation performs that client program sends the full path and offset of a file to the master (GFS), master replies with meta-data for reproduction of chunk of data is found, and client caches the meta-data for faster access. It reads the data from designated chunk server. Then Write/append operation in GFS, its performs client program send full path of a file to master or name node, master replies with meta-data, reproduction of data is found, then client send data to all chunk servers, chunk servers receives this data to send acknowledge, then dominant to chunk server, its regularly communicate main node with chunk servers, chunk servers is updated to reflect any failure in primary, the master assigns a new primary.

B. Cloud Data Storage Technology – Hadoop Distributed File Systems (HDFS)

Hadoop Distributed File Systems is apache storage foundations, used to store very large data set of files in structured manner, then its specify in the form of namenode and DataNode of each blocks, each blocks is pre-ordinate systems, blocks are specified in cluster, its stored on one or several machines. Fig.5. shows that architecture of hadoop distributed file systems, Master is specified in the form of NameNode, metadata stores for NameNode and slave is DataNode, its stores for actual data, in cloud file system architecture one NameNode and other nodes are DataNodes. Namenode is responsible, maintains and manageable for all slaves and assigns the work to all DataNode. Master ensures that alive for all slave, and its perform read, write/append operations based on request of clients.

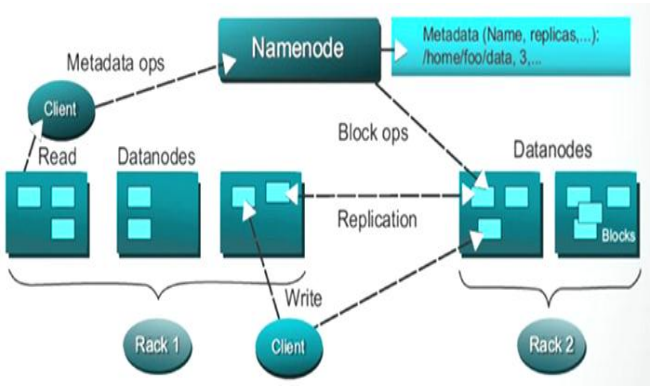

Fig.5. HDFS Architecture

Client communicates with namenodes and namenodes communicates with datanode, client to perform write operation then write a file to datanodes and then interacts with metadata. Split into multiple blocks then send data from data node into different files. The client reads data from datanodes, datanodes received information from name node, after that all the information's to be received and it's merged into original files.

3. CLOUD RESOURCE MANAGEMENT MODELS

I have the core infrastructure platform and application or IaaS, PaaS, SaaS and different kind of user, user for this clouds, human user or process or machine which are indirectly consuming cloud with different services, then this services to be managed and optimized to other resources in the cloud platforms. Most popular cloud service is Infrastructure as a Service, cloud providers offer resources that include computers and different network devices to be involved in the form of cloud management systems. Resources used to control how capabilities provided by cloud resources and services, to be performed in different services, application, entities and user to be managed in efficient manner, whatever the resources either hard or soft resources, area available with the cloud, its efficient to maximizing the profit of Internet Service Provider, it can be efficient in energy optimization to the external entities.

Resource or resource management usually fall back to infrastructure as a service, considering overall cloud or overall operation of the cloud; Infrastructure as a service plays bigger role in resource management systems with different type of heterogeneous systems, to be formed with different resources. Specify the concepts of sharing of resources in efficient manner, sharing with multiple users in different computing systems and services. The Objectives of Resource Management are scalability, quality of service, optimal utility, reduced overhead, improved throughput, reduced latency, specialized environment, cost of effectiveness and simplified interface. The different resource management aspects are resource provisioning – allocation of a service providers resources to a customer, resource allocation, resource requirement, resource adaptation – capability of the system to adjust the resources dynamically to fulfill the identification list of authenticated resources available for job submission, resource brokering – agent ensure that resources are available to resource modeling. I need to provision then allocate the resources in resource requirement mapping, then map the resources in different parts of the different time.

Runtime management and allocation of IaaS resources considering several criteria in heterogeneous distribution of resources, cloud users exchange, incomplete information for dynamic successive allocation in Nash equilibrium approach. So the resource provisioning approaches to perform the different techniques; network queuing model, prototype provisioning, VM provisioning and SLA oriented methods. So that all the approaches are used for resource management techniques in cloud computing environment, this computation to perform the resources to elaborate computation and manage the energy by server consumption, to use for conserve energy methodology. These techniques to perform by schedule VMs to conserve energy, both underlying infrastructure & VMs, minimize operating inefficiency and optimize data design.

Open Stack – it's used for IAS type of cloud infrastructure as a service, very popular open source cloud; you can download and install in a particular hardware configuration,

see the performance of IAS type of cloud. The resource of storage and networking systems to be managed entirely for all systems through dashboard its gives administrators control while empowering their users to provisioning resources through a wave interface. So administrator to control these resources and the user can access the VM. It access a cloud in IAS systems to be specified in open source, you can download and install give it provision of the things. It has a capability of all services through primarily use more as the infrastructure as a service, compute the network for service provision in infrastructure at the pass level on top of IAS cloud foundry and over as SaaS level.

Service Level Agreement (SLA) - A formal contract between a service provider and a service consumer, sometimes how the providers wants to have this consumer, define a formal basis for performance and availability of service provider guarantees to deliver. It contains service level objectives then objectively measurable conditions for the service and basis of selection of cloud provider.

4. SECURITY COMPONENTS AND RISKS IN CLOUD

Different types of services are performed in the cloud computing environments (IaaS, SaaS, PaaS or anything as a service), we are relying on third party service provider, the application data processes running on some third party, so its run on security with third party systems, its specified with issues on cloud components and place the data is stored, whether its seen or intercepted by some other parties. The basic components of security are confidentiality (keeping the data and resources are hidden), integrity (data integrity maintains like or origin or the source integrity, suppose we send the data from A to B, A having authentication of the source) and availability (enabling access to the data and resources), we say CIA components. Most of the attacks are denial of service systems, the resources are not having the dos attacks or ddos type of attacks. Different components looks at different way of things, I need to bring with different goals then meet its constraints on security systems, the security systems can be specified in the form of some goals, the goals are prevention, detection and recovery, one of the major security goal is prevention, prevent attackers from violating security policy, so attacker have the security policies restricts the violating security then attackers, attackers violation of security policy and recovery attack if compromised down to some extent fully or partially, then its appliance the reestablishment of assessing, repair damage continue to function correctly even if the attack succeeds, have critical systems as redundancy systems logging improvements of systems and goals comes with a cost. In security stack specify three different prominent service model IaaS, PaaS and SaaS, the IaaS infrastructure is the provider from facilities to hardware, whenever use for IaaS, PaaS and SaaS the provider has the more responsibility or to increase consumer responsibility

Security Issues; Customer use cloud services to serve their clients, running the applications on those cloud services need to establish trust relationships to the customer and service provider. Fig.6. represents that Security Responsibilities in IaaS, SaaS and PaaS provider.

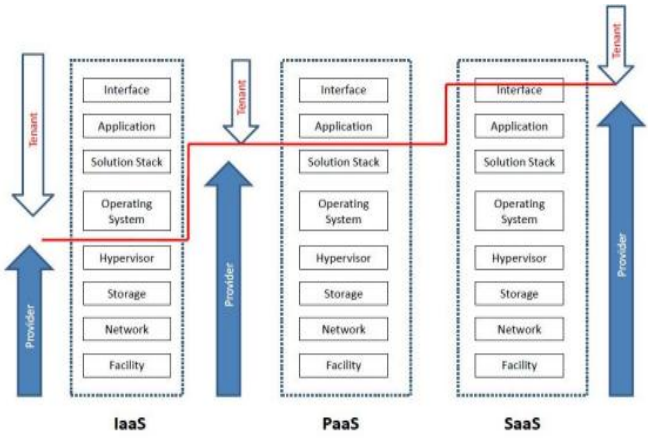

Fig.5. Security Responsibilities in Service Provider

The Infrastructure provides the facility, network, storage and hypervisor components, these components are interact with the cloud in IaaS provider, other than operating system, solution stack, application and interface are interact with ternant, its accessible on the network. The IaaS responsibility up to the hypervisor ends that it having the operating system. So the providers' responsibility up to hypervisor, PaaS responsibility is up to that platform or that were the solution stack. A SaaS responsibility goes up to the interface of consumer specification up to that application level; the services of this security are handled by the provider. In service providers provides the IaaS, PaaS and SaaS responsibilities of security systems.

5. CONCLUSION

In this paper overviewed the cloud computing environments for data storage, resource management and security issues. Then do clearly specify that trends and services in computing for applying different resources, the different resources used in resource management techniques and its different provisioning approaches with provider. Virtualization, SLA and cloud services are vulnerable in cloud computing environments.

concluded the paper with clear representation different storage techniques are available in cloud with different trending technology of name node with data node, then the resource management techniques perform that energy consumption with IaaS provider, and security methods perform with SaaS cloud, will motivate that new development of activities need to be addressed in cloud computing environments.

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An Overview of Data Management in Cloud Computing

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Abstract: ***As we all familiar with cloud computing, it's not a latest technology, rather we can mention it as an emerging technology where most of the industry is trying to store not only its crucial data for redundancy but also looking for the service management. In that scenario first thing comes in mind is management of data in most efficient way possible. So here we tried to showcase two technologies of cloud data management namely Cloud BigTable and Cloud DataStore which they have their own way of working environments. It makes so much importance to choose the right technology for the right nature of work.***

Keywords: Cloud Storage, Data Management, Virtualization, Google File Systems, Data Store

1. INTRODUCTION

Cloud computing referred as delivery of computing services such as networking, servers, databases, storage, virtualization, storage, software, business analytics and so on over the Internet as a utility just like using telephone/mobile services. It offers product innovations and flexible resources for the business like Pay per Use services from The Cloud. The advantages of cloud computing are: Flexible resources - On-demand services gives user a quick scale up or down of the resources. Metered service gives the liability to pay for what you use. Self service you can access all the IT resources without any assistance.

A. Deployment Models of Cloud Computing

Deployment models of cloud computing represents that public cloud, private cloud, hybrid cloud, community cloud and different services. The Fig.1. Shows the representation of cloud architecture in various models and its services.

Public Cloud: This infrastructure will be used by public cloud user in which some of the services will be unavailable. These resources will be provided and organized by a cloud service provider, academics or other organizations. The cloud server exists on the premises of the cloud provider. Eg: Google App Engine, Windows Azure etc.,

Private Cloud: This infrastructure is for exclusive use of a single organization with various services, it can be managed by the organization, a third party or sometimes both. It exists on or off the premises. Eg: VMWare, RedHat etc.,

Community Cloud: It can be managed, operated and owned by one or more organizations in the community, or a third party or combination of both. It may exists on/off premises. Eg: Salesforce community cloud etc.,

Hybrid Cloud: It is the combination of two or more types of infrastructure services that works under proprietary rules and standards. Eg: VMWare vCloud etc.,

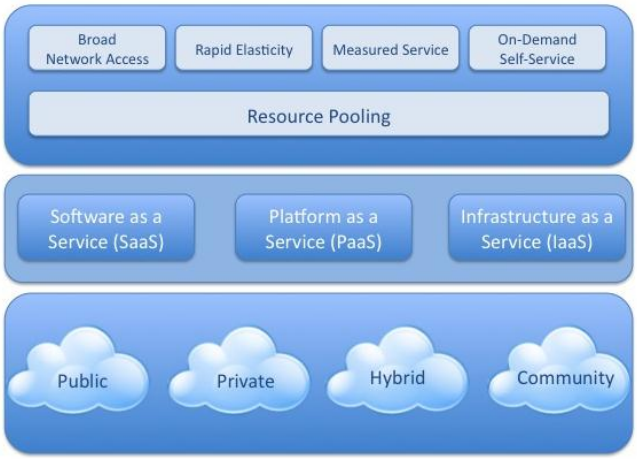

Fig.1. Cloud Architecture

2. THE ROLE OF VIRTUALIZATION IN CLOUD ENVIRONMENT

Virtualization is a multi-tenancy user infrastructure which is located at remote site and can perform function of multiple systems in one physical system by means of high speed internet. In cloud environment it comes under IaaS (Infrastructure as a Service), where the cloud consumer gets the service to use cloud based ready to access virtual storage and also some built in services. The pricing of these services depends on data storage no. of GB used per hour, network infrastructure used per hour etc., Fig.2. Represents the components stack of virtualization in hypervisor and hardware parts.

Virtualization Component Stack consists of Hardware, Operating Systems, Middleware and application layer. Operating Systems layer split into two parts:

a) Hypervisor is also called as virtual machine manager which allow user to have multiple OS in single hardware

b) Guest OS is a running Operating system within the Virtual machine.

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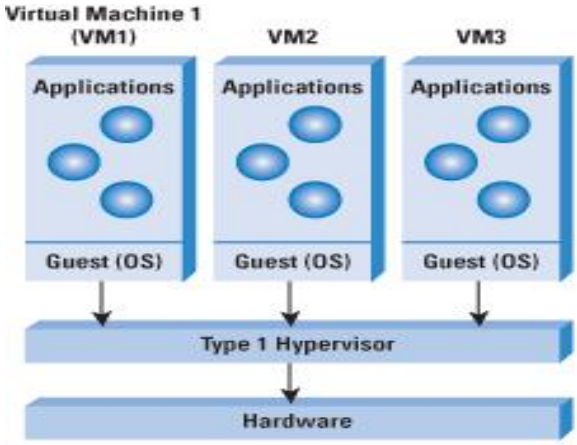

Fig.2. Virtualization Component Stack

The three goals of virtual machine are;

Equivalence: To poses unbiased hardware performance among all the VM's(Virtual Machine)

Resource Control: The VM's should be in complete control of any virtualized resources

Efficiency: The VM's instructions should be executed from its CPU rather than involving hypervisor.

3. TYPES OF VIRTUALIZATION

There are mainly three types of virtualizations namely Server virtualization, Client Virtualization and Storage Virtualization. The Fig.3. Shows the different categories of virtualizations.

Server Virtualization: It is the most common type of virtualization in cloud computing, where it gives optimum usage of server by running multiple applications on multiple operation systems at the same time on single server with the use of hypervisor by controlling CPU, Memory and other components without need of source code.

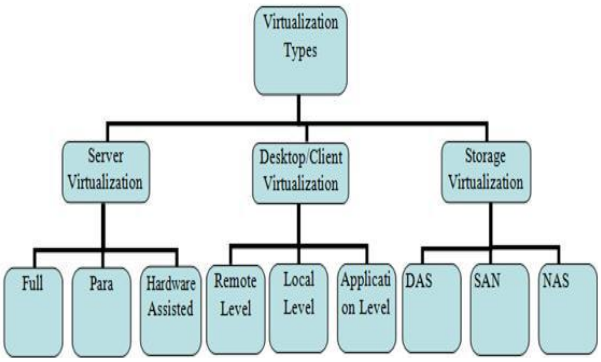

Fig.3. Types of Virtualization

Client Virtualization: In client virtualization, the administrator can manage and control the operations of client machine like personal devices. Here we need to have glance at three types of client virtualizations. First is remote level, where consumers can able to access cloud server which is located remotely anywhere and anytime across a network. Second, local level which runs on local server for the purpose of security. Third, application level virtualization which allows applications to run on isolated or private environment which is accessible by providing authentication.

Storage Virtualization: In Storage virtualization, a single storage device manages multiple network storage resources. It provides efficient storage management in large IT sector and reduces downtime. Three types of storage virtualizations are DAS(Direct Attached Storage), SAN(Storage Area Network), NAS(Network Attached Storage). DAS is a primary way of data storage, where the storage drivers are directly connected to the server. NAS follows a method of storage called sharded method which connects through the networks and it is used for file sharing, device sharing and scheduled/ Ad-hoc backup of the server. SAN is a technique of storing data in a device that is shared among different servers over a high speed network.

4. DATA MANAGEMENT IN CLOUD COMPUTING

In cloud computing data management itself is a big challenge in processing large quantity of data for the purpose of data storage, parallel processing of data execution, analytical processing and online query execution all by ensuring consistency and durability under peak loads.

Some of the cloud based analytical data management systems are: BigTable, HBase, HyperTable, Hive and HadoopDB. PNUTS and Cassandra are the web based data management systems. Here, in this paper the working nature of BigTable and Dynamo will be discussed

A.GFS (Google File System)

It is designed to manage large files in distributed networks of servers which is connected by a high speed internet. It provides atomicity during read/ writes operations of individual files. Supports read/ write and update operations simultaneously by multiple client programs.

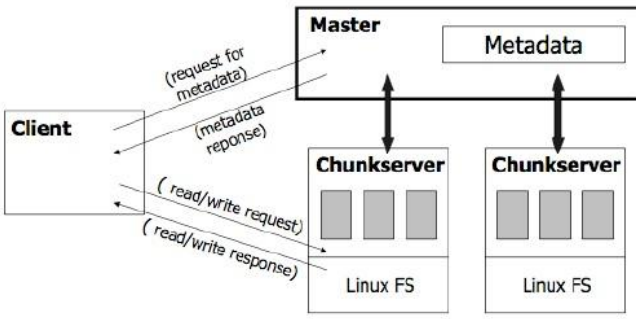

Fig.4. GFS Architecture

A single Master controls the namespace. A large file will be cut down to chunks or blocks with the size of 64MB. These Chunks (GFS) or Name nodes(HDFS) are stored on a servers called Chunk Server. The main functionality of this server is to replicate these chunks three times on different physical racks and network segments.

Read Operations in GFS: a) Client program request for metadata by sending its full path and offset of a file to MASTER or NAMENODE. b) MASTER replies back with metadata from one of its replica chunk where the data is found.

Write/Append Operations in GFS: For initiating write/append operation the process is same as read operation along with some extra steps. a) Client sends its data to be

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appended to all its chunk servers b) Chunk server acknowledge the receipt of this data. c) Among all its chunk server replicas, MASTER chooses a PRIMARY Chunk server which is responsible to append the client data to its secondary chunk servers.

Fault Tolerance in GFS: MASTER bind its synchronization with its replicas by sending regular Heart-Beat messages. In case of failure, chunk server meta-data will be sent to MASTER and it will choose a new Primary Chunk server.

5. MANAGING DATA IN CLOUD ENVIRONMENT

Managing data in cloud environments can be provided different storage techniques in google platforms. Its specify features of Google Cloud BigTable and Google Cloud Datastore.

A.Google Cloud BigTable

BigTable is a distributed storage system that store large amount of data such as petabytes in NoSQL cloumn-oriented way of data store developed by Google Inc. to manage its internet search and web service functions. It works on powerful database servers which gives the benefits of scalability, easy administration and maintain elasticity of cluster without any down time.

BigTable is used to store and query the following types of data:

Time Series Data
Marketing Data
Financial Data
Internet of things Data
Graph Data

The Fig.5. Represents the BigTable Storage Model of rows and columns specifications. Each column store arbitrary value as name-value pair in form of column family. At the time of table creation initial value of no.of column families will be fixed. Labels of column families can be created at any point of time. Each BigTable cell can contain multiple versions of data in decreasing order of timestamp.

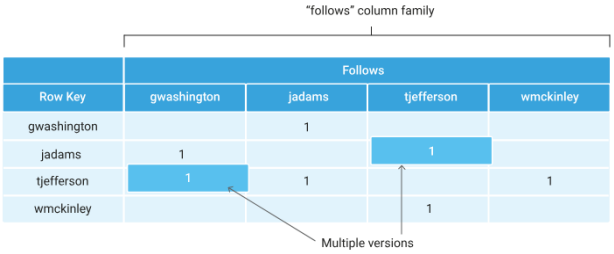

Fig.5. BigTable storage Model

Each table in BigTable will be divided into different row ranges called tablets. These Tablets will be maintained by a server called tablet server. It stores each column family in an allocated row range inside a distributed file called SSTable. BigTable maintains its meta-data table in a single meta-data server which is used to locate the user tablets in response to their read/write operations. The meta-data table itself will be divided into no.of tablets to support its large amount of data in most effective way . Root Table will help point out other meta-data tablets. It supports large parallel reads and inserts operations simultaneously on the same table.

B.Google Cloud DataStore

Google cloud Datastore is a NoSQL document database developed for incredible scalability, high performance and to support application development. The most appreciated feature in cloud datastore is to provide high performance to its subscriber even in the high incoming data traffic situation. It Maintain ACID properties and also it give high availability.

Cloud DataStore is used for applications like:

Product Catalog where it provides real-time inventory

User Profiles where the retailer can view the preferences of the user based on past interests.

Bank Transactions where ACID property will guarantee the transaction of transferred funds.

All the data in Datastore stores in one bigtable called as Entity Table. It stores data horizontally across its disks in which it is called as shared and key values are sorted lexicographically.

It can handle multiple queries at a time by various users with the help of multiple index tables. For every data set they have entity sets from where user gets the results back. for example a query will have a defined set of results say 100 entities, because of this scenarios some queries would not get support in cloud datastore. Like in traditional RDBMS cloud datastore doesn't support schema and it is a schemaless database. Cloud Datastore do not support join operations, it won't filter data from a table with multiple keyed properties or by the result of a subquery. Cloud Datastore doesn't do justice for analysis of data but it can provide assurance for a transactional data.

6. CONCLUSION

In cloud computing environment, without the virtualization technique it would not be possible to use single hardware device among the users. It is the basic service of any development in cloud computing. Data management in cloud computing shows the rapid growth of deployment in remote servers for the purpose of storage and cloud services. Cloud BigTable is mainly used for the non-transactional data where it does not give any redundancy for the data. It can be used for data analytics where you can get the results by querying historical data. Cloud DataStore is built on BigTable but they are completely different from each other, where it supports ACID properties of the transaction and it is used on transactional data. It features are similar to SQL but it cannot perform some operations.

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A Study of Health Care in Context to Machine Learning with Logistic Regression Model

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Abstract- *Healthcare big data refers to the vast quantities of data that is now available to healthcare providers. As a response to the digitization of healthcare information and the rise of value-based care, the industry has taken advantage of big data and analytics to make strategic business decisions. Faced with the challenges of healthcare data volume, velocity, variety, and veracity, health systems need to adopt technology capable of collecting, storing, and analyzing this information to produce actionable insight. A stochastic prediction model is designed to foresee the future health condition of the most correlated patients based on their current health status. In healthcare communities, a large volume of multi structured patient data is generated from the clinical reports, doctor's notes and wearable body sensors. The analysis of healthcare parameters and the prediction of the subsequent future health conditions are still in the informative stage.*

Keywords:- *Machine Learning, Disease Prediction, Linear Regression, Logistic Regression..*

I INTRODUCTION

Healthcare big data refers to the vast quantities of data that is now available to healthcare providers. As a response to the digitization of healthcare information and the rise of value-based care, the industry has taken advantage of big data and analytics to make strategic business decisions. Faced with the challenges of healthcare data volume, velocity, variety, and veracity, health systems need to adopt technology capable of collecting, storing, and analyzing this information to produce actionable insight.

Benefits of Healthcare Big Data:

- Create holistic, 360-degree views of consumers, patients, and physicians.
- Improve care personalization and efficiency with comprehensive patient profiles.
- Inform physician relationship management efforts by tracking physician preferences, referrals, and clinical appointment data.
- Boost healthcare marketing efforts with information about consumer, patient, and physician needs and preferences.
- Analyze trends within a single hospital or greater a healthcare network to benefit research and care procedures for enhanced population health outcomes.
- Identify patterns in health outcomes, patient satisfaction, and hospital organization.
- Predict health outcomes and create preventive care strategies with data analysis.
- Optimize growth by improving care efficiency, effectiveness, and personalization.

What is driving the Adoption of Big Data in Healthcare?

The adoption of big data is in response to three major shifts in the healthcare industry:

The huge and vast amount of dataset available, government regulations, and a focus on personalized care.

Volume of Healthcare Data: When health records went digital, the amount of virtual data health systems had to handle rose steeply. In addition to EHRs, vast amounts of data come from other sources, such as wearable technology, mobile applications, digital marketing efforts, social media, and more. Data of all of this makes and adds up to an incredible amount of information, spurring health systems to adopt big data techniques and technologies to effectively bare to collect, analyze, and in order to take advantage of this information.

Government Regulations: The past 20 years have seen rapid growth in healthcare costs. Today, healthcare expenses account for around 18 percent of GDP, totaling about $600 billion. Such high costs were straining patients and led to government acts aimed at lessening this burden, most notably the Affordable Care Act (ACA). As a result, more health systems are collecting and analyzing big data in the hopes of improving performance and efficiency.

Desire for Personalized Care: Consumers in all industries expect exceptional, personalized service, also known as "The Amazon Experience". Healthcare is no different – customers want valuable, personalized care, making it the new standard to which health systems must rise. This type of care focuses on quality, engagement, and retention. Health systems are turning to healthcare big data set to provide and hold the insight necessary for providing this type of care.

What Challenges Arise with Healthcare Big Data?

A major challenge with healthcare big data is the sorting and prioritizing of information. Data capacities are so vast that oftentimes it can be difficult to determine which data points and insights are useful and which are not.

Another major challenge is setting ensuring this and that the right access to big data insights and analysis is given to the right people, so they can do their jobs smarter. Even though healthcare data is pulled from many different systems, organizations need to make sure critical personnel across the industry have easy access to the information.

There are few and also very huge number of challenges to effective data analysis resulting from heterogeneous or missing claims data. Each healthcare institution files claims, with the data coming from their other Hospital Information Systems (HIS) or input by hospital personnel at the time of the encounter or shortly thereafter. The data becomes super and even with more and great complex when we have a you factor in all the ambulatory places of service types. As a result, there are five challenges to overcome in order to obtain accurate claims data:

Billing systems are fragmented and dated: Data is often very "noisy"…practices, groups, and even practicing specialties can be inconsistent. The key is to consider directional data in combination with your local market knowledge; in other words, data should augment interactions and focused outreach to physicians, not replace it. Patients do not have unique patient identifiers: If every patient had a unique identifier, data matching would not be required. Until, and if, that happens, data matching mechanisms are required to claims together.

Diagnosis and procedure codes can be unclear: Even industry-standard grouper tools can obscure, or just plain mis-map, physician activity. Perfect data and perfect insights are very hard to achieve, so you have to advocate for, and learn to work with, directional data.

Claims data is highly inconsistent: With claims data, any field data that is not required for payment has a low probability of being filled in or completed accurately. In fact, among the few required fields for payment, along with patient, diagnosis, and procedure information, is the "rendering physician" via the NPI1 for that provider.

It's difficult to identify the referring physician: The "referring physician" field on available third-party claims is often

inconsistent, incorrect, or, most often, not filled. In fact, some clearinghouses

What is the Future of Healthcare Big Data?

In the future, healthcare organizations will adopt big data in greater numbers as it becomes more crucial for success. Healthcare big data will also continue to help make marketing touchpoints smarter and more integrated. Data available will grow as wearable technology and the Internet of Things (IoT) gains popularity. Constant patient monitoring via wearable technology and the IoT will become standard and will add enormous amounts of information to big data stores.

II RELATED WORK

Linear-Regression

Linear-regression analysis sets which is used to forecast and predict the values of different variable based on the value of another variable. The variable you want to predict variable. The variable you are using to predict the other variable's value is called the independent variable.

This form of analysis estimates the coefficients of the linear equation, involving one or more independent variables that best dependent variable. Linear-regression fits a best straight line or surface that minimizes the discrepancies between predicted and actual output values. There are simple linear regression calculators that use a “least squares” method to discover the best-fit line for a set of paired data. You then estimate the value of X (dependent variable) from Y (independent variable).

Linear-regression models are relatively simple and provide an easy-to-interpret mathematical formula that can generate predictions. Linear regression can be applied to various areas in business and academic study.

You’ll find that linear regression is used in everything from biological, behavioral, environmental and social sciences to business. Linear-regression models have become a proven way to scientifically and reliably predict the future. Because linear regression is a long-established statistical procedure, the properties of linear-regression models are well understood and can be trained very quickly.

Assumptions to be considered for success with linear-regression analysis:

For each variable: Consider the number of valid cases, mean and standard deviation.

For each model: Consider regression coefficients, correlation matrix, part and partial correlations, multiple R, R2, adjusted R2, change in R2, standard error of the estimate, analysis-of-variance table, predicted values and residuals. Also, consider 95-percent-confidence intervals for each regression coefficient, variance-covariance matrix, variance inflation factor, tolerance, Durbin-Watson test, distance measures (Mahalanobis, Cook and leverage values), DfBeta, DfFit, prediction intervals and case-wise diagnostic information.

Plots: Consider scatterplots, partial plots, histograms and normal probability plots.

Data: Dependent and independent variables should be quantitative. Categorical variables, such residence, need to be recoded to binary (dummy) variables or other types of contrast variables.

Title: Disease Prediction by Machine Learning Over Big Data From Healthcare Communities:

Authors : MIN CHEN1, (Senior Member, IEEE), YIXUE HAO1, KAI HWANG2, (Life Fellow, IEEE), LU WANG1, AND LIN WANG3,4

Publishing Year: 2017

Method: Streamline machine learning algorithms for effective prediction of chronic disease outbreak in disease-frequent communities

New convolutional neural network(CNN)-based multimodal disease risk prediction algorithm using structured and unstructured data from hospital.

Dis advanatage:

Analysis accuracy is reduced when the quality of medical.

Different regions exhibit unique characteristics of certain regional diseases, which may weaken the prediction of disease outbreaks

Advantage:

Modified prediction models over real-life hospital data.

Work efficiency is better in results

Title: The'Big Data 'Revolution in Healthcare: Accelerating Value and Innovation.USA: Center for US-Health System Reform Business Technology Office:

Authors : P. Groves, B. Kayyali, D. Knott, and S. van Kuiken

Publishing Year: 2016

Method: Technical advances have made it easier to collect and analyze information from multiple sources—a major benefit in health care, since data for a single patient may come from various payors, hospitals, laboratories, and physician offices.

Dis advanatage:

Satistical analysis have been applied been not successfully applied

Advantage:

Clear statistic are applied in classification of the data and visualization the data

Title: Mining electronic health records: Towards better research applications and clinical care :

Authors :P. B. Jensen, L. J. Jensen, and S. Brunak

Publishing Year: 2014

Method: Clinical data describing the phenotypes and treatment of patients represents an underused data source that has much greater research potential than is currently realized. Mining of electronic health records (EHRs) has the potential for establishing new patient-stratification principles and for revealing unknown disease correlations.

Dis advanatage:

A broad range of ethical, legal and technical reasons-currently-hinder-the-systematic deposition-of these-data in EHRs and their mining.

Advantage:

Integrating EHR data with genetic data will also give a finer understanding of genotype-phenotype relationships.

Title: Informational and energetic masking effects in the perception of two simultaneous talkers:

Authors :M. Chen, Y. Ma, J. Song, C. Lai, and B. Hu.

Publishing Year: 2016

Method: Traditional wearable devices have various shortcomings, such as uncomfortableness for long-term wearing, and insufficient accuracy, etc. Thus, health monitoring through traditional wearable devices is hard to be sustainable.Smart Clothing used for data aquasisation..

Dis advanatage:

Loss of data when digitally not connected to servers.

No prediction on loss of data

Advantage:

provide pervasive intelligence for smart clothing system, mobile healthcare cloud platform is constructed by the use of mobile internet, cloud computing and big data analytics.

HEART ATTACK PREDICTION USING DATAMINING TECHNIQUE:

Genetic algorithms are computing methodologies constructed in analogy with the process of evolution [4] .It closely resembles the natural process of

regeneration, reproduction, inheritance evolution. Genetic algorithms are typically used for problems that cannot be solved efficiently with traditional techniques. Genetic algorithms seem to be useful for searching very general spaces and optimization problems. Each solution generated in Genetic chromosome (individual).Each chromosome is made up of genes, which are the individual elements (alleles) that represents the problem. The chromosomes is known as its genotype. This can be hexadecimal codes. The external manifestation of the genotype or the real world representation of the genotype is known as the phenotype [5].Basically there are three genetic operators are used for generating new strings. The functions of genetic operators are as follows:

1) Selection: selection Various types of crossover operators are a) single point.

2) Crossover: selecting a random gene along the length of the chromosomes and swapping all the genes after that point. Various types of crossover operators are a) single point b) two point c) uniform f) shuffle crossover g) segmented crossover [6].

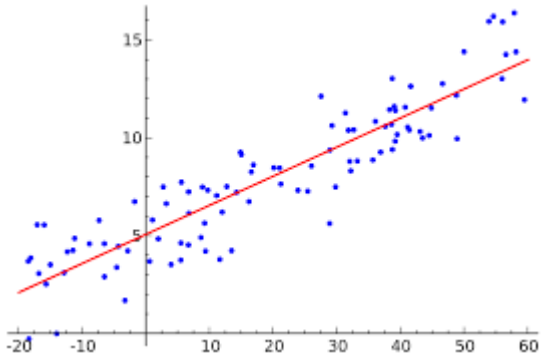
3) Mutation: mutation alters the new solutions so as to add stochasticity in the search for better solution. The most common method way of implementing mutations is to select a bit at random and flip (change) its value.

There are network programming 1) mutating the judgment node

2) mutating the value of the judgment node. In associative classification attributes and values as processing nodes.

Fitness function: Ideally the discoved rules should have a) high predictive accuracy b) be comprehensible c) be interesting.

The accomplishment of a genetic algorithm is directly linked to the accuracy of the fitness function.



Linear Regression Model

These models comprise a linear combination of input features.

The variable is related to the linear combination of input features via a link function.

The response variable is of exponential distributions such as binomial distribution, Poisson distribution, or Gaussian distribution. Practically, when the response variable is binary. When the response variable represents count. And, Gaussian distribution is used when the response variable is continuous.

The response variable must follow a binomial distribution.

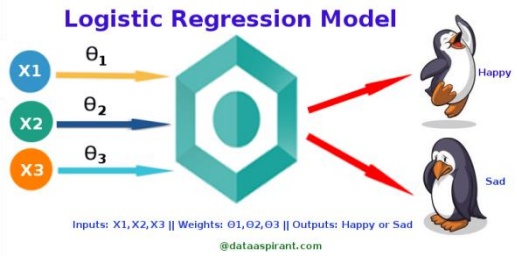
Logistic Regression assumes a linear relationship between the independent variables and the link function (logit).

The dependent variable should have mutually exclusive and exhaustive categories.

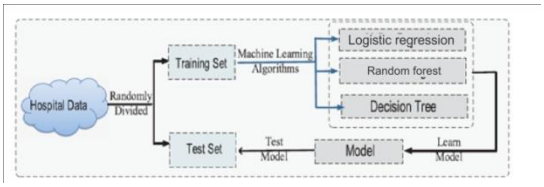
In R, we use glm() function to apply Logistic Regression. In Python, we use sklearn.linear_model function to import and use Logistic Regression.

Note: We don't use Linear Regression for binary classification because its linear function results in probabilities outside [0,1] interval, thereby making them invalid predictions.

III Proposed Work:



Logistic Regression Model



Analytical Console: Data is loaded to the console and organized, cleaning of the data is simplifiedif necessary.

Heart disease prediction: Machine learning algorithms to predict heart disease (Angiographic disease status)

The platform required for us to work is Rconsole where in all the required libraries are loaded to the console. The libraries used are

"e1071" - Used for the linear regression model for assuming the required values from the dataset.

"pROC" - Assuming the statistical behaviour of the data in terms of compering the gender and age wise distribution of the data

"caret" - Holds the methods for the usage of the algorithms such as Linear Regression, logistic Regression

"randomForest" - Method of random forest are applied with this library, implementation on the data.

Dataset:


Data preparation

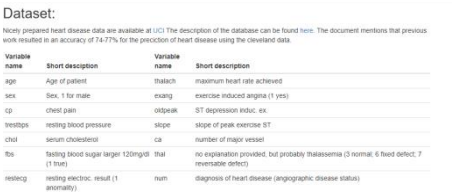
Load heart disease data and give columns names from the table above

```
heart.data <- read.csv("https://archive.ics.uci.edu/ml/machine-learning-databases/heart-disease/processed.cleveland.data",he
ader=FALSE,sep=",",na.strings = "?")
names(heart.data) <- c( "age", "sex", "cp", "trestbps", "chol","fbs", "restecg",
                        "thalach","exang", "oldpeak","slope", "ca", "thal", "num")
```

The diagram explains the procedural of analysis the data, by classifying the dataset to testing data and training data. First we extract the data, then we apply linear regression model on the data to acquire the important and find the combination of the columns of the data. Later on the logistic regression model is applied on the data so that the is again applied with help of us with comparison model and accuracy model for the prediction.

IV IMPLEMENTATION

Data Description:


Dataset:

Nicely prepared heart disease data are available at UCI The description of the database can be found here. The document mentions that previous work resulted in an accuracy of 74-77% for the prediction of heart disease using the cleveland data.

Variable name	Short description	Variable name	Short description
age	Age of patient	thalach	maximum heart rate achieved
sex	Sex, 1 for male	exang	exercise induced angina (1 yes)
cp	chest pain	oldpeak	ST depression induc. ex.
trestbps	resting blood pressure	slope	slope of peak exercise ST
chol	serum cholesterol	ca	number of major vessel
fbs	fasting blood sugar larger 120mg/dl (1 true)	thal	no explanation provided, but probably thalassemia (3 normal; 6 fixed defect; 7 reversable defect)
restecg	resting electroc. result (1 anomality)	num	diagnosis of heart disease (angiographic disease status)

Statistical Observation: Based on the data sets, a statistical approach is framed from the data. (Linear Regression).

Training Dataset: From all the results, we apply the random forest algorithm in finding all the possible decision trees and predict the results.

Reports: Form the above results generate the reports in terms of behavior of the data.

ALGORITHM STEPS:

Linear Regression:

1) Load the data to console

2) Check for any missing values

If any missing values:

Replace them with #999

then step 1

else:

continue

3) Sort the combination columns

4) Correlation over the columns

5) Test the data

Logistic Regression:

6) Train the data on minimum dataset

7) Check the results

8) Apply on the complete dataset

9) Generate the results from the model.

Algorithms for Logistic regression and random forest:

Step 1: Train the data on minimum dataset.

Step 2: Check the results.

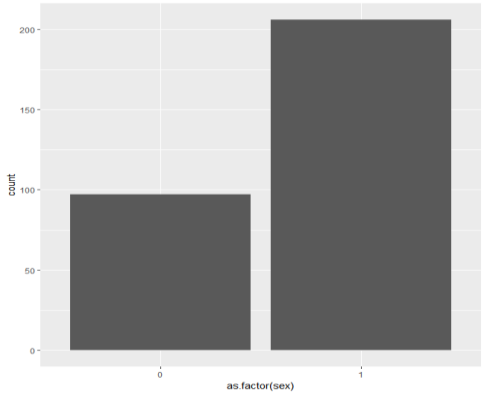
Step 3: Apply on the complete dataset.

Step 4: Generate the results from the model.

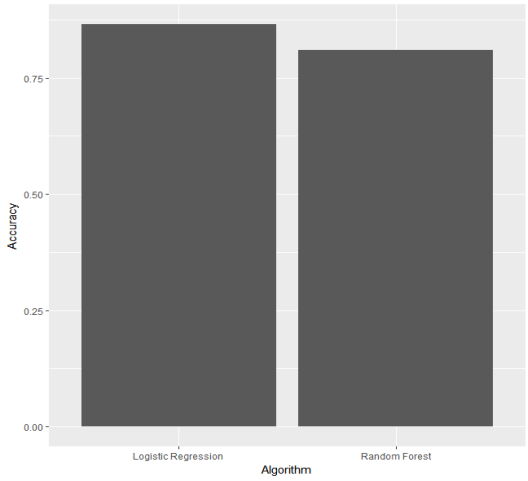
Form the above results generate the reports in terms of behavior of the data. Missing values problem can be resolved using machine learning algorithms.

V EXPERIMENT AND RESULTS

The implementation is executed with the sample data available from a local website . The data is first categorized and then the core parameters are been identified from the dataset. The the statistical analysis of the data is executed. Once the parameters are identifiable later we have implemented with logistic regression model for the prediction of the heart diseases and compared our model with the Random forest model for the accuracy calculation. In this process the data is been categorized into testing data and training data and found out the results to be accurate and found that the logistic model provided better results compared with random forest.



The barplot describes most effected gender for the given dataset. As shown in the above barplot mostly male is effecting the disease.



Representing the accuracy barplot for training and testing dataset As shown in the above figure ,it describes about the prediction accuracy for training and testing datasets

	Logistic Regression	Random Forest
Accuracy 70	0.86516	0.80898
Accuracy 60	0.86440	0.84747
Accuracy 50	0.72729	0.80405

It represents the prediction accuracy for the dataset with different algorithms which are performed at various intervals of the dataset with training and testing data.

VI CONCLUSION

A random forest model based multimodal disease risk prediction algorithm using

structured data from hospital. To the best of our knowledge, none of the existing work focused on both data types in the area of medical big data analytics. Analysing the disease factors based on the health care data. Missing values problem can be resolved using machine learning algorithms. Disease prediction can be done based on type of the disease and type of disease, region and risk level of the patient's disease by the availability of the data.

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Implementation of Competent and Scalable High Performance Computing With Quality of Service Policies in Grid Computing

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ABSTACT:

Cloud computing is quickly becoming as an option in contrast to ordinary computing. Be that as it may, it depends on models like bunch computing, disseminated computing, utility computing and grid computing when all is said in done. Grid computing vows to turn into the future computing worldview for big business application in the wake of having demonstrated to be a very successful computing worldview for asset escalated logical applications. Enormous scale grids are intricate frameworks, made out of countless segments having a place with disjoint spaces. Existing High Performance Computing (HPC) frameworks don't give appropriate nature of service (QoS) controls and unwavering quality highlights on account of two confinements: first, standard middleware libraries, for example, Message Passing Interface (MPI) and Parallel Virtual Machine (PVM) don't give intends to applications to indicate service quality for calculation and correspondence. Second, present day fast interconnects, for example, Infiniband, Myrinet and Quadrics are enhanced for execution as opposed to adaptation to non-critical failure and QoS control. The Data-Centric Publish-Subscribe (DCPS) model — the center of Data Distribution Service (DDS) frameworks — characterizes principles that empower applications running on heterogeneous stages to control different QoS approaches in a netcentric framework. In this paper, we present our novel model of joining DDS QoS and unwavering quality controls into HPC frameworks. Our outcomes show that DDS combination into HPC includes extensive caught as far as execution and system use, when the application is for the most part correspondence.

KEYWORDS:

HPC, QoS, Middleware, Mpi, Grid Computing, Data-Centric Publish-Subscribe, Data Distribution Service.

I. INTRODUCTION

Grid computing isn't just a standard computing worldview for asset serious logical applications yet it likewise vows to turn into the future computing worldview for big business applications. An ongoing review by Forrester Research demonstrates that 37% of the organizations overviewed are in some phase of guiding or execution of grid; 41% use it for money related examination and displaying, 41% use it for run of the mill business applications, and 26% use it for logical or building counts [32].

The grid empowers asset sharing and dynamic distribution of computational conditions made out of segments from various spaces, consequently expanding access to data, advancing operational adaptability and coordinated effort, and permitting service suppliers to long ago scale to fulfill variable needs. Every one of these components add to build the expert ductivity and the use of an endeavor's foundation. Enormous scale grids are mind boggling frameworks, made out of huge quantities of segments having a place with disjoint spaces. Arranging the ability to ensure nature of service (QoS) in these conditions is a test on the grounds that worldwide Service Level Agreements (SLA) relies upon neighborhood SLAs, i.e., SLAs built up with parts that make up the grid. These segments are commonly independent and join the grid as a component of a free organization. Just if all these halfway SLAs are fulfilled, will the worldwide SLA be fulfilled. To under-stand how this can be accomplished and how the worldwide and halfway SLAs can be indicated and afterward met, it is fundamental to comprehend the design of the grid, the effect of grid asset distribution on SLAs, the conditions

among grid QoS measurements, the connections between the QoS and SLAs components, and the primary system to accomplish great QoS.

The drive behind the enthusiasm for appropriated computing when all is said in done, and elite computing (HPC) specifically, is the way that they offer a few focal points over the customary, firmly coupled supercomputers and Symmetric Multiprocessing (SMP) machines. In the first place, High Performance Clusters are proposed to be a less expensive trade for the more unpredictable/costly supercomputers to run normal logical applications, for example, recreations, biotechnology, money related market displaying, data mining and stream handling [5]. Second, group computing can scale to exceptionally enormous frameworks; hundreds or even a great many machines can be organized to suit the application needs. Actually, the whole Internet can be seen as one enormous bunch [3]. The third bit of leeway is accessibility, as in supplanting a "flawed hub" inside a group is inconsequential contrasted with fixing a broken SMP part, bringing about a lower mean-time-to-fix (MTTR) for painstakingly planned bunch setups [4].

In spite of the upsides of these disseminated computing frameworks, they present new difficulties not found in commonplace homogeneous conditions. One key test is the consistently expanding number of equipment parts in the present HPC frameworks. This expansion in the equipment parts is radically influencing the likelihood of equipment disappointments in such frameworks — and along these lines the efficiency of the end clients — since any single disappointment on such HPC groups would make the entire running activity prematurely end, bringing about several hours of calculations to be squandered.

In spite of the fact that this test is known, existing circulated memory HPC bunches can't give broad QoS-based correspondence and dependability controls due to two confinements: first, standard correspondence libraries, for example, Message Passing Interface (MPI) and Parallel Virtual Machine (PVM), don't give options in contrast to applications to control the nature of service for calculation and correspondence. Second, current fast interconnects, for example, Infiniband, Myrinet and Quadrics give high-throughput and low-idleness correspondence. Low-level informing interconnects is advanced for execution as opposed to adaptation to non-critical failure and QoS control. One of the endeavors to address the absence of broad QoS-based and solid correspondence in nonexclusive disseminated frameworks is the establishment of the Data Distribution Service (DDS) [6], which is the primary open universal middleware standard legitimately tending to heterogeneous correspondence for constant frameworks, using the publish/subscribe correspondence worldview. While the publish/subscribe model can be the answer for the conventional heterogeneous computing, one research intrigue is to help DDS particulars and its predefined QoS unwavering quality controls in the more-specific HPC conditions and fuse its most significant QoS polices, which is one of the fundamental points of this work.

II. RELATED WORK

The tr The pattern of the present High Performance Clusters and other inexactly coupled disseminated frameworks is that they are expanding regarding hubs and equipment parts. To show, taking a gander at the top500 overall supercomputers [7], we see that what used to be the #1 HPC group (i.e., The Jaguar Cluster) in June 2010 had 224,162 centers, while in November 2013, the #1 Tianhe-2 bunch had 3,120,000 centers. Strikingly, this expansion in the quantity of centers would definitely expand the likelihood of equipment disappointments in such frameworks.

A few investigations were led to investigate the connection between's adaptability in HPCs and disappointment rates [8, 9, and 10]. B. Schroeder and G. Gibson [8] supported that the accomplishment of Petascale computing will rely upon the capacity to give unwavering quality and accessibility at scale. In their exploration, the creators gathered and investigated various enormous data sets of disappointments from genuine huge scale HPC frameworks for a time of ten years. In particular, they gathered data about: (a) total hub blackouts in HPC bunches, and (b) plate stockpiling disappointments in HPC frameworks. Regarding total hub blackouts, the creators recognized that equipment is the single biggest part liable for these blackouts, with over half of disappointments appointed to this class, while programming is the second biggest classification with 20%. The rest of the rate is identified with human, condition and system blackouts. Further, the hub disappointment rate for enormous scale frameworks can be as high as 1,100 disappointments for every year. Given this extraordinary rate, an application running on such frameworks will be hindered and constrained into recuperation multiple times each day [8].

As far as capacity and hard drive disappointments, the creators found that the normal yearly disappointment and substitution rate (ARR) for hard drives in HPC frameworks is somewhere in the range of 3% and 5%. This implies in a bunch of 512 hubs, the normal disappointment rate for hard drives is around 1-2 drives at regular intervals, which coordinates our discoveries in [11]. The creators closed their examination by expressing that "the disappointment pace of a framework develops relative to the quantity of processor contributes the framework." Furthermore, as the quantity of attachments in future frameworks increment to accomplish higher Petascale and even Exascale frameworks, it is normal that the framework wide disappointment rate will increment [12].

On the other hand, these days there is little consideration on QoS-put together correspondence and unwavering quality control with respect to HPC. The explanation is that clients have seen a sensational increment in execution in the course of the most recent 10 years with respect to the HPC frameworks. What used to take one month of calculation time in 2000, is taking just a couple of hours to run today. Along these lines the most straightforward solution for this disappointment rate is to resubmit the client work subsequent to offlining (i.e., fencing) the tricky hub/center, rendering the squandered hours of the smashed activity to be disregarded. In this way, the requirement for broad QoS controls and dependable HPC situations is unavoidable when HPC employments would keep going for a few days or even a long time to run. The objective of this examination is to concentrate on the HPC QoS and unwavering quality controls — and in various HPC layers — to profit these long clients' occupations that require huge scale groups to run.

Grid computing: -

Grid Computing depends on the way of thinking of data and power sharing, enabling us to access to another sort of heterogeneous and geologically isolated assets Grid gives the sharing of computational assets, stockpiling components, explicit applications, hardware. Grid depends on web conventions and thoughts of parallel and dispersed computing. [3]



Fig 1: Grid Computing

Today grid computing offers numerous arrangements that as of now address and resolve the above issues. Grid computing arrangements are led utilizing a verity of advancements and open measures. Grid computing is turn; give exceptionally versatile, profoundly secure, and amazingly superior instruments for finding and arranging access to remote computing assets in consistent way. [4]

The Enterprise Grid Alliance (EGA) is an open, autonomous, and merchant nonpartisan network tending to approach term prerequisites for conveying business applications in a grid domain. By concentrating solely on the necessities of big business clients, EGA will empower organizations to understand the numerous advantages of grid computing, for example, quicker reaction to changing business needs, better use and service level execution, and lower IT working expenses.

QoS Metrics in a Grid Environment

In this area we address gives that include the under-remaining of QoS measurements with regards to grid conditions. We utilize the IC situation to delineate the ideas talked about here.

We think about three kinds of measurements:

- **Latency:** this sort of metric is identified with the time it takes to execute an undertaking and is estimated in time units. Inertness measurements can be characterized at various granularities. For instance, in the IC case, one might be keen on the normal time it takes to finish prompt statement demands or in the 95-th percentile of an opportunity to react to non-quick demands. These two models are illustrative of QoS measurements at the application layer. Another case of dormancy metric is the slipped by time to restore a postponed statement to the client. Refined RAMs are regularly perplexing parallel occupations that are deteriorated into undertakings apportioned to various computing assets in the grid. A case of a QoS metric at the aggregate layer is the assert age time to perform co-reservation and co-assignment of computing assets so as to run a RAM. At the asset layer, one might be keen on estimating the time it takes to get to a particular computing asset through the GRAM convention. A case of inertness metric at the availability layer is the time it takes to play out a verification in the interest of a client to a monetary association utilizing the GSI. At the texture layer, one might be keen on estimating the time taken by a database server at a medical coverage association to answer to an inquiry.

- **Throughput**: is estimated in units of work achieved per unit time. There are numerous conceivable through-put measurements relying upon the meaning of unit of work. At the application layer one might be keen on the quantity of postponed quote demands handled every second. At the aggregate layer one might be keen on the quantity of inquiries every subsequent that can be taken care of by registry services used to find assets crosswise over various VOs. Instances of throughput measurements at the asset layer incorporate I) the compelling exchange rate in Kbytes/sec under the Grid-FTP convention used to move documents from various registers hubs associated with running RAMs and ii) the quantity of questions/sec that can be prepared by the database server of a law requirement organization required by the RAM application. At the network layer, one might be keen on estimating the throughput, in Kbytes/sec, of a protected association between an occurrence of a RAM model and a database Service that gives budgetary data about a client. At last, a case of a throughput metric at the texture layer could be the quantity of CPU cycles every second got from a machine engaged with handling an undertaking that is a piece of a parallel RAM assessment work.

- **Availability:** is characterized as the division of time that an asset/application is accessible for use. In a multi-layer setting, for example, the one portrayed for the grid engineering, the thought of accessibility varies for each layer. At the application layer, one may characterize profit capacity as per the sort of solicitation. For instance, the accessibility of the quick statement demand application is the portion of time that this application is profit capable. At the aggregate layer, one may characterize accessibility as far as the services, for example, indexes and facilitating services, expected to find computing assets to run a RAM occasion. Accessibility at the asset layer might be estimated for instance as the division of time that a particular computing hub is accessible for portion to a RAM case. At the network layer, one may characterize accessibility as the level of time that an intermediary validation demand prevails with regards to verifying a client demand with a law authorization organization. At last, a case of accessibility metric at the texture layer would be the division of time that a computing hub is accessible during the execution of a RAM occurrence.

It ought to be noticed that QoS measurements at higher layers can regularly be communicated regarding QoS measurements of a similar kind at lower layers of the grid engineering. For example, the passed time to process a deferred statement demand relies upon a wide range of dormancy measurements including (I) the time expected to hold register cycles for the term of the assessment of a RAM, (ii) the opportunity to co-assign these assets, (iii) an opportunity to verify with database servers outside the insurance agency, (iv) an opportunity to acquire contributions from outer databases, (v) an opportunity to move data records to various hubs of a parallel activity that will run the RAM, and (vi) an opportunity to execute the RAM.

It is likewise imperative to consider the way that various sorts of QoS measurements communicate with each other [40]. For ex-adequate, as the heap expands, it might be more difficult to designate assets to assess a RAM and a few solicitations may must be dismissed, accordingly diminishing the accessibility of the application.

Difficulties of grid computing:- A ton of heterogeneous equipment is utilized so as to make the Grid and, what's more, these gadgets are not overseen by just a single individual however by various framework heads in each of the companies.[7] Grid pursues the moves that should be set out to tackle the full intensity of grid:-

- **No clear standard:-** Grid computing utilizes different models, yet all grids are not utilize same benchmarks. Model all grid working framework, for example, Linux, Apache and My SQL are utilizing WSRF, UDDI, WWW, SOAP and XML principles. Prophet 10g venture actualize without WSRF. IBM builds up the

Grid middleware dependent on J2EE. We can't utilize distinctive OS at a similar machine in a similar time in grid computing.

 Distributed computing Vs Grid computing: - Grid computing includes dynamic virtual association, asset sharing and distributed computing. The Grid expects to make access to computing power, logical data storehouses and test offices as simple as the Web makes access to data. Same all offices give the grid computing. So it is a test for grid computing.

 Lack of grid empowered programming: - The product, which are empowered the grid computing are less, It has restricted programming on Grid. Much programming has not copyright issues and source code of permit. It is requirement for more organization creating grid-empowered adaptation, need more engineers on grid improvement and need to create open source programming.

 Sharing Resources between Various Types of Services: - Grid utilized for sharing asset from different locales and grid has. It handles a huge measure of data as a grid stage. A great deal of locales and various servers accumulated there it is so unpredictable foundation. It gives trouble to equipment asset sharing inside virtual association.

 difficult to create: - Grid programming utilized java, XML, use web services WSDD, WSDL, UDDI, WSRF, and GT3developing rules. It is an issue who building up the grid Applications. Fundamentally that is accessible for senior software engineering designers and endeavor designers.

 Limited Area and Applications:- Grid computing is utilized to take care of for huge and complex issues. Its zone is restricted, for example, researchers, designer, investigation and specialists. Grid computing is utilized in Hollywood gleams, modern research, and biometric research and designing exploration. Grid can't use for regular issues by normal people.

 Management and Administration: - Many foundations and associations utilized grid computing. It conveys the assets on enormous topographically appropriated situations and gets to the heterogeneous gadgets and machines. So it is a significant test to deal with the organization of the grid computing.

In this paper, we present our work of embracing DDS principles into HPC, to bypass the MPI deficiencies and give QoS and unwavering quality controls in the middleware layer. It is likewise some portion of this exploration to look at the impact of embracing DDS QoS on HPC, as far as versatility, execution and adaptation to internal failure, by testing three diverse computational models. The entirety of our tests were led utilizing condition of-craftsmanship HPC advances, for example, the Quad Data Rate Infiniband interconnect and multi-center processors.

III. PROPOSAL WORK

THE HPC-DDS INTEGRATION MODEL

DDS QoS executions utilization has been restricted to the nonexclusive heterogeneous computing conditions. As far as we could possibly know, none of these endeavors were done explicitly to join DDS QoS arrangements into HPC clump occupations, and supplant the true standard MPI middleware. Therefore, one of the principle points of this examination is to inquire about the achievability of joining DDS QoS arrangements into HPC situations and exploit the settled dependability and adaptation to internal failure includes in DDS.

When looking at the properties of the two DDS and HPC, various DDS guidelines and prerequisites are like those for HPC structures, as appeared in Figure 2. Specifically, the two DDS and HPC manage intercommunication models, middleware layers, equipment foundation, and timing-related and QoS issues.

Additionally, figure hubs are spoken to as Subscribers/Data Readers and they go about as the specialist hubs. The relationship of a Data Writer with Data Reader articles (or Master to register hubs in HPC terms) is finished by methods for Topics, which go about as the informing interface "or channels" between every one of the substances, like the message passing interface (MPI) in customary HPC frameworks. Tests in the Topics are moved by using the correspondence medium, which is spoken to by the fast interconnect in the HPC frameworks.

To control the QoS strategies and include the Persistence Service in our DDS-HPC model, we devote an extra hub to have the Persistence Service libraries. In our mix, we use the standard HPC the executive's hub for this undertaking

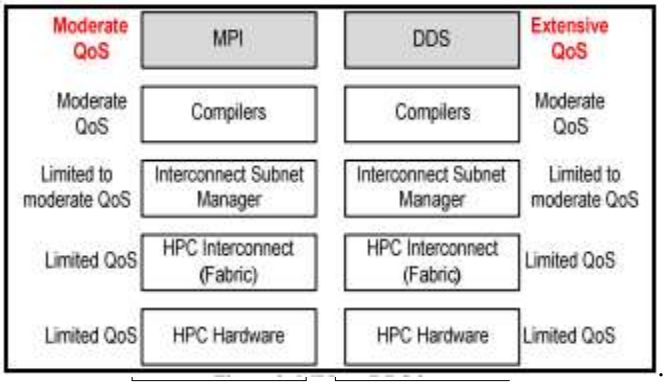

Fig 2: MPI vs. DDS layers

In DDS fundamental model, recompense between members is accomplished by having six basic substances, these are [15]: Domain Participant, Data Writer, Data Reader, Publisher, Subscriber, and Topic. Taking a shot at these substances, our mapping of the DDS standard into HPC is shown in Figure 3 and can be depicted as pursues: the HPC ace hub is spoken to by the DDS Publisher/Data Writer element, since its principal obligation in traditional HPC frameworks is perusing data from input sources, sending the halfway data to process hubs (Subscribers/Data Readers in DDS), and afterward gathering the outcomes back. Ordinarily, HPC conditions utilize one ace.

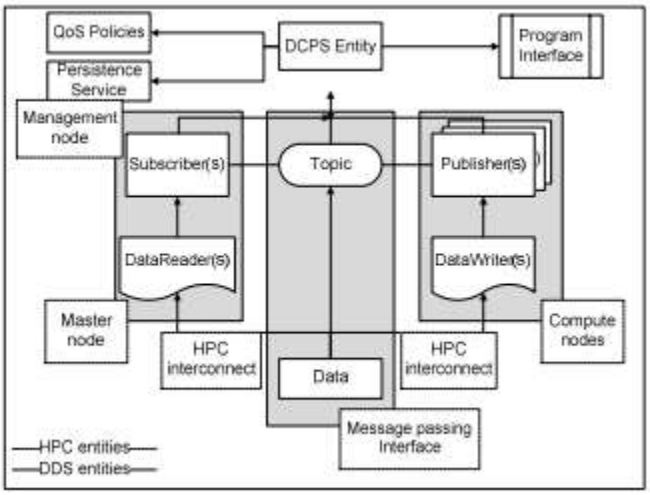

Fig 3: HPC-DDS integration model

Most hub collaborations in the essential DDS usage are single direction correspondence, that is, from the publishers to subscribers. These publishers and subscribers need to turn around their jobs to set up a two-way correspondence. To mirror the two - route association between the ace and register hubs, and have it like the ordinary MPI-based frameworks, we generate two strings in the Publisher/Data Writer (i.e., ace hub), where string 0 goes about as the publisher for sending data, while string 1 goes about as a Subscriber/Data Reader for accepting the last data from the processes. Moreover, all figure hubs have a similar structure for their two-way correspondence.

A. Executed Quality of Service Policies

As depicted before, having power over Quality of Service (QoS) is one of the most significant highlights of the DDS standard. Each gathering of senders and beneficiaries in the framework can characterize free QoS arrangements, though the middleware guarantees if the QoS understanding can be fulfilled, along these lines building up the correspondence or showing an incongruence mistake. Some data about some significant QoS strategies are featured underneath, and more arrangements can be found in the Object Management Group Specification Document [6]. To empower the DDS dependability QoS on our DDS-HPC plan, we received three fundamental QoS arrangements in our usage; these are strength, unwavering quality, and history.

During the execution of our DDS - HPC usage, the autonomous "perseverance service" is run on a different physical server (i.e., the administration hub) to help the "solidness" QoS approach. This tirelessness service spares the published data tests with the goal that they can be conveyed to buying in beneficiaries that join the framework some time in the not too distant future, regardless of whether the publishing application has just ended.The ingenuity service can utilize a record framework or a social database to spare the status of the framework. In the event of a disappointment in the tirelessness service, the framework executive may instate another case of the service (or reboot the down service if conceivable) to continue the usefulness of the framework without losing the present status. The recently instated tirelessness service would peruse the composed checkpointed status as characterized in the strategy document.

The second QoS approach, which is unwavering quality, shows the degree of dependability mentioned by a Data Reader or offered by a Data Writer. Data senders may set various settings of dependability, shown by the number of past issues they can keep in their stockpiling (or memory) to retry transmissions. Subscribers may then request varying degrees of dependable conveyance, going from a quick however problematic "best exertion" to an exceptionally solid all together conveyance. This gives per-data stream unwavering quality control. On the off chance that the unwavering quality sort is set to "Solid," the compose activity on the Data Writer may be blocked if there is a likelihood that the data can be lost, or if as far as possible, determined in the RESOURCE_LIMITS QoS, will be expended. In these cases, the RELIABILITY choice "max_blocking_time" designs the greatest span the compose activity may square.

Further, if the unwavering quality sort is set to "Dependable," data-tests produced from a solitary Data Writer can't be made accessible to the getting hubs if there are more established data-tests that have not been conveyed at this point because of a correspondence issue. I.e., the DDS middleware will endeavor to discover different ways and retransmit data - tests to remake a right depiction of the Data Writer history before it is available by the beneficiaries.On the off chance that the dependability type is set to "BEST_EFFORT," the service won't resend the missing data-tests, however, will guarantee that the dataset will be put away in the Data Reader(s) history, in a similar request they were made by the Data Writer. Thusly, the beneficiary hub may lose a few data-tests however it will never observe the estimation of a data-object change from a more up to date an incentive to a more established worth.

The third strategy, history, controls the response of the middleware when the estimation of an occasion changes before it is at long last imparted to a portion of its current Data Reader substances. In the event that the sort is set to "KEEP_LAST," at that point, the middleware will just endeavor to keep track of the most recent estimations of the data and dispose of the more seasoned ones. For this situation, the worth controls the greatest number of qualities the middleware will keep up and convey. The default (and most as often as possible utilized setting) for this QoS is "1," demonstrating that solitary the latest worth ought to be conveyed.

In the event that the history type is set to "KEEP_ ALL," at that point the middleware will endeavor to keep and convey every one of the estimations of the sent data to existing beneficiaries. Like the RELIABILITY QoS, the assets that the middleware can use to hold the various qualities are constrained by the settings of the RESOURCE_LIMITS QoS. On the off chance that the point of confinement is come to, at that point the response of the middleware will rely upon the RELIABILITY QoS. That is, on the off chance that the unwavering quality is set to "BEST_EFFORT," at that point, the old qualities will be dropped, while in the event that dependability is set to "Solid," at that point the middleware will hinder the sender until it can send the progressing old qualities first to all beneficiaries.

IV. RESULT ANALYSIS

Performance Evaluation and Results

This segment exhibits our trial results for testing the Node-to-Node gushing application. In the trials, we tried the two DDS and MPI executions by spilling 5GB and 10GB of data, while every single detailed estimation is the normal readings of three runs.

Figure 4 shows our benchmark to assess the versatility and runtime of MPI and DDS, utilizing 10GB and 50GB of gushed data. Unmistakably, the MPI supplanted the DDS execution with the utilization of the low-level MPI _Send and MPI_Recv capacities, where it was fit for accomplishing the greatest one - path throughput of 1,519MB/s with the 50GB test, contrasted with a most extreme throughput of 1,323MB/s for the DDS usage.

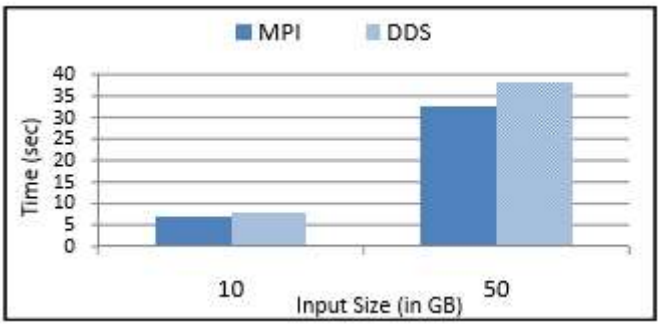

Fig 4: Node-to-Node Throughput

The QoS approach DDS_SYNCHRONOUS_PUBLISH_MODEhad to be set to empower sending huge data and train the middleware to utilize its very own string to send data, rather than the client string. The synchronous correspondence includes extra overhead as shown in the test.

Figure 5 shows the slipped by time for connecting with another hub in the DDS area, supplanting a smashed hub, and resending the data once more. By setting the DURABILITY QoS to TRANSIENT, the Data Writer stores all the sent examples in memory and resends them to the new hub once it joins the area. This setting was just relevant to the 10GB info size since the 50GB information must be put away in the Data Writer's perpetual stockpiling (by setting the DURABILITY QoS to PERSISTENT). Utilizing the PERSISTENT setting brought about ridiculous readings because of the exorbitant stockpiling access overhead. This test is additionally not appropriate to the MPI execution.

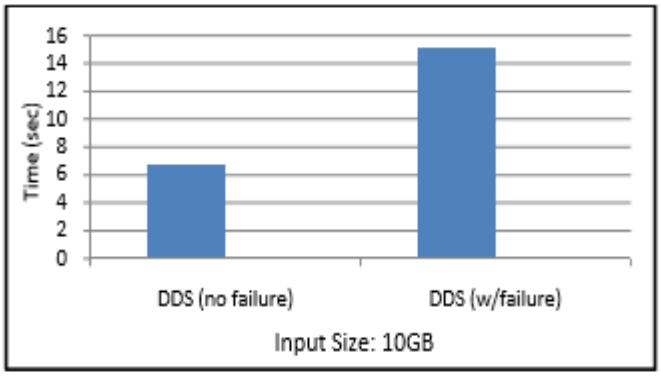

Fig 5: Failing the receiver in DDS while running the Node-to-Node application

Conclusion:

In this paper Grid models give a fascinating service-situated stage for logical and business applications. These stages give dynamic asset sharing utilizing open guidelines giving a nature of service that couldn't be accomplished generally. This paper researched a portion of the important issues that must be considered in planning grid applications that convey suitable QoS for business applications: the meaning of measurements, connections between asset assignment and SLAs, and QoS-related instruments. This component is significant for some pragmatic cloud stages since top asset requests frequently drive cloud suppliers outfitted their IT-framework with an ever-increasing number of servers, which thus expands the structure and operational expenses of cloud foundations. We distinguish difficulties and openings in grid computing. However, the fundamental goal of our paper is that to discover the issues and difficulties of grid condition, if these difficulties are expelled by specialists the grid computing can turn out to be progressively full of feeling and incredible. We exhibited our work of receiving the DDS standard into HPC to evade the MPI inadequacies and give QoS to HPC applications. As exhibited in our tests, DDS incorporation into HPC includes extensive caught as far as execution and system used when the application is for the most part correspondence bound, while the presentation is practically identical to those MPI - based applications when the program is calculation bound. In the two cases, the arrangement is a reasonable choice for those applications in which QoS is viewed as a need,

or for those HPC clump occupations that would run on product equipment, where the probability of disappointment isn't unimportant.

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IRIS DETECTION AND REFORMATION SYSTEM USING NOVEL ALGORITHMS IN MACHINE LEARNING THROUGH SVM CLASSIFIERS

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ABSTRACT- Biometric systems will be systems that empower people to be recognized in the electronic condition utilizing some physical and social attributes. Iris recognition framework is one of the viable biometric recognition systems. The primary objective of this investigation is one that Machine Learning recognition of the human from the iris images according to the nearby surface structures. The advanced iris images were gotten from the CASIA database. The surface highlights were removed from the four neighborhood iris locales of the portioned image by utilizing Gray Level Co-Occurrence Matrix. The element extraction of the iris was finished by biometrics GSCM (Gray Scale Co-occurrence Matrix), Gray Level Run Length Matrix, and Hausdorff Dimension. The Biometric Graph Matching calculation is utilized, which is utilized to coordinate the graph between the preparation image and the test image of the iris biometric. The BGM calculation utilizes graph topology to characterize distinctive element estimations of the iris layouts. A SVM -Support Vector Machine classifier is utilized to recognize certifiable and deception. The outcomes give preferred execution and validation over the current technique. These outcomes gave an improved execution against present strategies.

Keywords: *Iris Recognition, Image Processing; Classification; K-NN; GLCM, GLRLM*, SVM , BGM

I. INTRODUCTION

The significance of security in numerous zones has empowered the advancement of various systems identified with this subject. There are a few kinds of systems that people can use to advance themselves. The most commonly utilized techniques are ID cards, uncommon passwords, and so on. Be that as it may, there are a few drawbacks to these strategies on the off chance that ID cards can't be found or the passwords are overlooked. That is the reason; expanding security question has uncovered different security systems as of late. One of these systems is biometrics systems that can distinguish character in an electronic domain [1]. Biometrics is the study of checking character by examining organic information. It is utilized for mechanized systems that are created to identify the personality by recognizing the person's quantifiable physical and social attributes. In rundown, biometrics communicates quantifiable natural hints of the individual and it very well may be physical, for example, fingerprints, retinal vessels, face, eyes, and hands, or conduct, for example, mark and composing mood.

Among all these physiological properties, iris designs have a structure of great and complex tissues. The iris surface is all around saved all things considered and the copying, recording, and copying of the iris tissue is troublesome. These surface properties differ from individual to individual. Every iris has its own one of a kind structure and it gives a complex framework that is steady and doesn't change over its lifetime [3].

These days, the compositional structure of iris recognition systems is commonly comparable. Acquiring the surface highlights from preprocessed images and the assessment of the outcomes by utilizing diverse classification strategies are a common way in thinks about. The utilization of different element extraction and classification strategies makes the uses of iris recognition systems extraordinary.

II. RELATED WORK

Considering iris recognition systems; broad research has been conducted in this field and different methodologies have been displayed.

The greater part of these examinations depend on the most recent fifteen years [4-5]. The principal fruitful iris recognition framework was proposed by J.Daughman in 1993 [4]. In spite of the fact that this work was distributed numerous years back, despite everything it keeps up its logical incentive as it gives answers for all aspects of the iris recognition framework.During the time spent removing highlight vectors from iris images, distinctive element extraction techniques, for example, Laws Texture Energy Measurements (TEM) [5], Gabor Wavelet Transform (GWT) [6], Wavelet Packet Transformation (WPT) [7], Discrete Wavelet Transform (DWT) [8], Principal Component Analysis (PCA) [6], Independent Component Analysis (ICA) and Gray Level Co-Occurrence Matrices (GLCM) [9] were utilized. Moreover, classifiers, for example, k-Nearest Neighbor (k-NN) technique [5], Artificial Neural Networks (ANN) [8] and Support Vector Machines SVM [2] were utilized for the classification of iris images.

There are various methodologies for include extraction dependent on GLCM and GLRM are displayed by an alternate creator. In this segment, some examination papers have been investigated. S. B. Kulkarni et al. [1], proposed an iris recognition framework in which highlights are separated by utilizing GLCM and GLRLM systems. The extricated highlight vectors are ordered by utilizing a SVM classifier. This framework gives 75% exactness for GLCM, 57.14% for GLRLM and 88.89% for a combination of GLCM [9] and GLRLM procedures. Asim Ali Khan et al. [2], proposed iris recognition for individual verification utilizing SVM and NN procedures. The framework utilizes the CASIA V.1 database for assessment. Hough change used to portion out the iris from the eye image. Gabor channel separates the highlights from the fragmented image. ANN and SVM classifier is utilized to order the component of iris. From the outcome, it is discovered that the SVM classifier gives higher precision than the ANN. ANN gives 83.65% and SVM gives 90.25% precision.

Amol M. Patil et al. [3] present a surface component extraction system dependent on GLCM and Hausdorff Dimension procedure. The matching of the iris is finished by the BGM calculation. It utilizes graph topology to characterize the element vector of the iris. The separated element vectors are then characterized by the SVM classifier.

Upasana Tiwari et al. [4] utilize the CASIA and MMU database for an individual recognizable proof framework utilizing iris. In this framework, the highlights are extricated utilizing a Gabor channel and diminished its dimensionality by the PCA calculation. SVM classifier groups the iris into approved and unapproved classifications.

S B Kulkarni et al. [5] proposed a mixture include extraction procedure by the combination of GLCM and GLRLM method. This framework doesn't variation to the iris turn. The SVM classifier gives 75% precision for GLCM, 57.14% for GLRLM and 88.89% for a combination of GLCM and GLRLM strategy for a standardized image while it gives 82.35% exactness for GLCM, 57.14% for GLRLM and 94.73% for a combination of GLCM and GLRLM for standardized iris information.

III. PROPOSED WORK

In this paper, we present a decent approach for individual recognition utilizing iris crisscross example. This framework incorporates image obtaining, preprocessing to dispense with clamor, iris confinement, and iris standardization, image honing, include extraction, and classification. The Block graph of the proposed framework is appeared in fig.1.

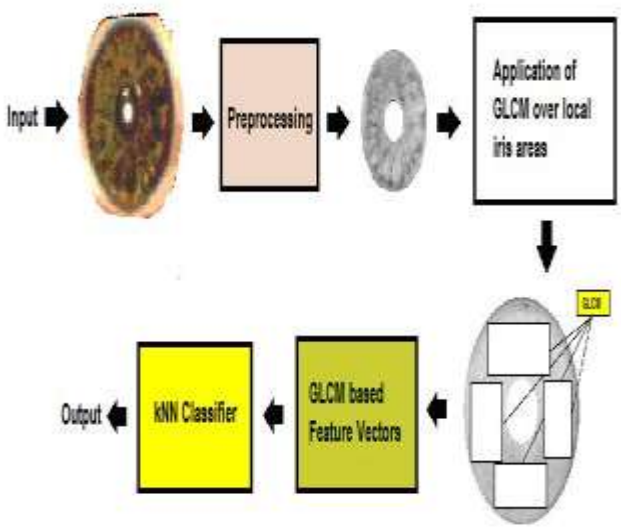


Fig 1. Block diagram of the proposed system

a) Pre-Processing

Before the component extraction process, all images were-handled in this stage. The size of the images utilized in the application is 576x768 pixels. Since the images utilized in this investigation are in 3D PNG organization, they were converted to 2-D grayscale position by utilizing the MATLAB 2011a program. The student and sclera zone of each image were then forgotten about by the division procedure with the goal that lone iris tissue stayed in all images.

b) Segmentation

Since the inner and external limit of an iris can be almost displayed as a circle, the inside coordinates (xc, yc) with inner span ri and external range ro of the circle can be determined for every iris image. Accept all the iris images have roughly a

similar institutionalization and confinement, at that point the region among inner and external limits (ri<area<ro) can be sectioned by utilizing MATLAB 2011a. A portion of the divided iris images utilized in the examination are appeared in Fig. 2.

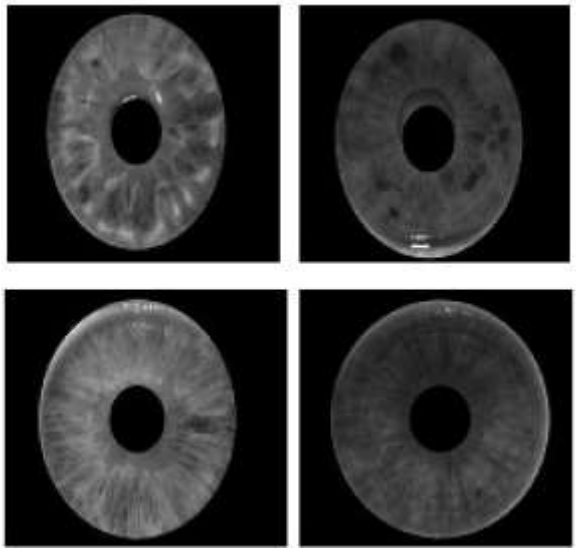


Fig 2. Sample segmented images

c) Feature Extraction

GLCM was applied to the distinctive neighborhood iris areas of the divided image as appeared in Fig. 3. The surface highlights acquired from the four diverse nearby iris zones were watched most reasonable parameters by checking intra correlation among the neighborhood iris locales. Accordingly, the parameters were included consecutively and an element vector with a length of 4x22= 88 highlights (22 highlights for every nearby iris zone) was constructed for each image. Computation subtleties were clarified in a thirty segment.

3.1 Gray Level Co-Occurence Matrix (GLCM)

GLCM is a component extraction strategy proposed by M. Haralick and it characterizes the connection between two neighboring pixels in a grayscale image [1]. The first of these pixels is known as the reference pixel and the second as the neighboring pixel. The conveyance in the matrix is balanced according to the separation between the pixels and the edge. This matrix is a square matrix of N size what's more, it predicts a capacity that speaks to the joint likelihood dispersion of gray level matches in an image [2].

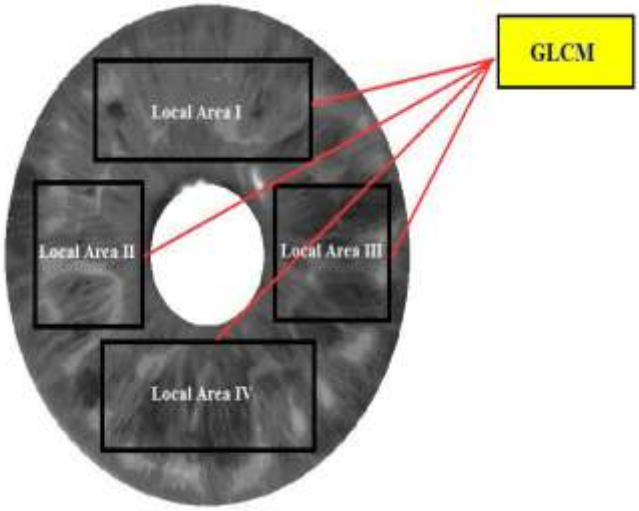


Fig 3. Extraction of the texture features from iris local areas.

Notwithstanding the separation between pixels, it is additionally important to know the bearings of the pixel sets. The most common known bearings are 135, 90, 45, 0 and the even likenesses of these edges [2]. A case of a co-occurrence matrix is given in Fig. 4. Here, the quantity of gray levels, the separation (d) between the pixels and the bearing point (theta) were picked 8, 1 and 0, separately. Since the (1,1) pixel pair at the coordinates I (1,1) and I (1,2) in the image matrix (I) is rehashed once, the estimation of the pixel pair in the co-occurrence matrix (f) becomes f (1,1) = 1. So also, since the (6,2) pixel pair is rehashed multiple times in the matrix I, the estimation of the pixel pair (6,2) in the matrix f can't avoid being f (6,2) = 3. These means are rehashed for the other pixel matches in the image matrix and the co-occurrence matrix of the whole image is determined along these lines [3].

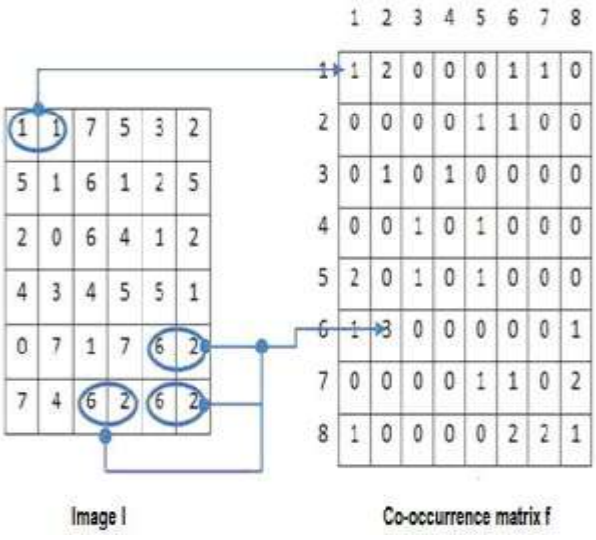


Fig 4: GLCM MATRIX

3.2 Grey-Level Run Length Matrix Algorithm

The gray-level run-length matrix (GLRLM) gives the size of homogeneous runs for each gray level. This matrix is computed for the 13 distinct headings in 3D (4 in 2D) and for every one of the 11 surface lists got from this matrix, the 3D esteem is the normal over the 13 bearings in 3D (4 in 2D). The component (i,j) of GLRLM corresponds to the quantity of homogeneous runs of j voxels with force I in an image and is called GLRLM(i,j) from that point. We should feature that comparisons of results with other programming supporting surface investigation ought to be performed with extraordinary consideration. The figuring of the surface lists coming about because of the matrix GLRLM can vary between programming. For example, in pyRadiomics (v1.1.1), after the estimation of the matrix GLRLM and before the extraction of the textural records, the matrix is edited (gray-level hub of GLRLMs trimmed among least and most extreme watched gray-levels and a run-length hub of GLRLMs trimmed to a greatest watched run-length). This moves lists (i,j) of the matrix and consequently the estimations of the subsequent textural lists.

GLRLM_SRE,GLRLM_LRE, Short-Run Emphasis or Long-Run Emphasis is the distribution of the short or the long homogeneous runs in an image.

GLRLM_SRE=Average over 13 *directions*(1*H*∑*i*∑*jG LRLM*(*i*,*j*)*j*2)

GLRLM_LRE=Average over 13 *directions*(1*H*∑*i*∑*jG LRLM*(*i*,*j*)·*j*2)

Where *H* corresponds to the number of homogeneous runs in the Volume of Interest.

GLRLM_LGRE, GLRLM_HGRE, Low Gray-level Run Emphasis or High Gray-level Run Emphasis is the distribution of the low or high grey-level runs.

GLRLM_LGRE=Average over 13 *directions*(1/*H*∑*i*∑ *jGLRLM*(*i*,*j*)*i*2)

GLRLM_HGRE=Average over 13 *directions*(1/*H*∑*i*∑ *jGLRLM*(*i*,*j*)·*i*2)

GLRLM_SRLGE, GLRLM_SRHGE, Short-Run Low Gray-level Emphasis or Short-Run High Gray-level Emphasis is the distribution of the short homogeneous runs with low or high grey-levels.

GLRLM_SRLGE=Average over 13 *directions*(1/*H*∑*i* ∑*jGLRLM*(*i*,*j*)*i*2·*j*2)

GLRLM_SRHGE=Average over 13 *directions*(1/*H*∑*i* ∑*jGLRLM*(*i*,*j*)·*i*2*j*2)

GLRLM_LRLGE, GLRLM_LRHGE, Long-Run Low Gray-level Emphasis or Long-Run High Gray-level Emphasis is the distribution of the long homogeneous runs with low or high grey-levels.

GLRLM_LRLGE=Average over 13 *directions*(1/*H*∑*i* ∑*jGLRLM*(*i*,*j*)·*j*2*j*2)

GLRLM_LRHGE=Average over 13 *directions*(1/*H*∑*i* ∑*jGLRLM*(*i*,*j*)·*i*2·*j*2)

GLRLM_GLNUr, GLRLM_RLNU, Gray-Level Non-Uniformity for a run or Run Length Non-Uniformity is the non-uniformity of the grey-levels or the length of the homogeneous runs.

GLRLM_GLNUr=Average over 13 *directions*(1/*H*∑*i*(∑*jGLRLM*(*i*,*j*))2)

GLRLM_RLNU=Average over 13 *directions*(1/*H*∑*j*(∑*iGLRLM*(*i*,*j*))2)

GLRLM_RP, Run Percentage, measures the homogeneity of the homogeneous runs.

GLRLM_RP=Average over 13 *directions*(*H*∑*i*∑*j*(*j*·*G LRLM*(*i*,*j*))).

3.3 Hausdorff Dimension by Box Counting Method Algorithm

A quantitative investigation of edge unpleasantness is completed to represent the level of harshness of information images. Commonly known as the Hausdorff Dimension (H.D.), the calculation appeared in figure 3 gives the total border unpleasantness as a fractal measurement. The fractal measurement depicts the complexity of an article; on account of gadgets introduced here, this calculation gives edge harshness which infers parasitic emanation locales for incredibly unpleasant borders [1]. On Hausdorff Dimension scale, an element of 1 likens to a smooth line, while 2 infers fractal complexity like that of a Julia set, and in light of the fact that the gadgets displayed here are considered truncated fractals, the fractal measurement determined is bound by as far as possible, for example 1 < H.D. < 2. The calculation to accomplish this beginnings with an information electron micrograph image transferred inside Matlab (figure 3), at that point the Canny calculation [2] is utilized to discover the edge inside the image and superimposes a lattice of N squares over the edge while counting the involved squares that the edge goes through (upper right, N(s)). This is continued for an expanding number of squares and the fractal measurement (H.D) is given by the inclination of the logarithm of the quantity of squares log N, over the quantity of squares involved by the edge log N(s), as showed by figure 3 (base) and condition (1)

$$H.D = \frac{\log N}{\log N(s)} \ldots\ldots$$

3.4 Classification

In the classification step, it is meant to coordinate the examples to the closest classes according to their element spaces with insignificant blunder. The exhibition of the classifier relies upon well-characterized properties.

Classifiers can be analyzed in two gatherings, conventional and smart. Conventional classifiers are based on Bayesian choice hypothesis which is a measurable technique. K closest neighbors (kNN), Fisher's straight classifiers, greatest likelihood, paired tree strategy, and multivariate Gaussian models are for instance of conventional classifiers. In this investigation, the kNN strategy was utilized for the iris recognition framework.

3.4.1 K- Nearest Neighbor (k-NN) Algorithm

KNN is a nonparametric calculation and it very well may be utilized for both classification and relapse in the example recognition applications. Non-parametric implies that no presumption has been made about the fundamental information or its circulation. K-NN is perhaps the least complex calculation in machine learning. It is less complex and takes less time when compared to different classifiers (ANN, SVM, and so on.) [6].

In this technique, information classification is made according to a dominant part vote of its neighbors and the information is selected to the most common class among its k closest neighbors. For instance, on the off chance that k equivalent to 1, at that point the information will be allocated to the class of that 1-closest neighbor. Interestingly, before characterizing, the properties of each class are unmistakably determined ahead of time. What's more, the presentation of the framework is influenced by variables, for example, the similitude measure, the quantity of adequate practices in the example set, and the edge esteem. In any case, the most significant control parameter is the quantity of closest neighbors (k). The given example is grouped by looking at the separations to the closest neighbor k [7].

The capacity learned in the k-NN calculation can be discrete and genuine esteemed. In discrete-esteemed capacities, xr is the example point to be characterized and xs is the learning point. Loads equivalent to 1 at a common Euclidean separation (ci=1, i=1, 2, … , p) [8].

3.4.2 Support Vector Machine (SVM)

SVM is applied for the classification of information individuals. Information individuals or in information focuses there are two things that might be certifiable or faker. The careful strategy is to arrange the two information focuses is hyperplanes. The edge indicates the greatest width in the hyperplanes. The support vector is the informational index used to characterize the vectors [11]. To separate among objects of different class enrollments are known as hyperplanes classifiers. Support Vector Machines are explicitly to play out this kind of activity. In the event that the informational collections are not took into account isolating the hyperplanes, all things considered, utilize a delicate edge. It implies hyperplanes that different a considerable lot of the information focuses yet not all information focuses. To construct ideal hyperplanes, SVM applies an iterative preparing calculation that is utilized to decrease issue acknowledgment. SVM supports classification, relapse and furthermore it can deal with unmitigated factors and different continuous. For all out factors, different sham factors are made with 0 and 1.

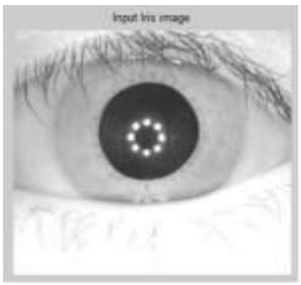
4 RESULTS AND DISCUSSIONS

The proposed framework is actualized in MATLAB 2013(b). To play out the examination, the images from the CASIA and UPOL database have been used. The subjective and quantitative examination of the framework is appeared in the underneath subsections.

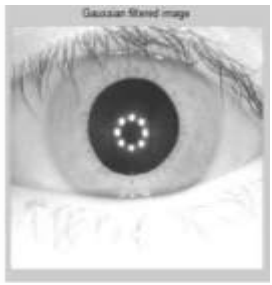
4.1 Qualitative analysis

The qualitative analysis of the proposed iris recognition system is as shown below

CASIA database:



(a)



(b)



(c)



(d)

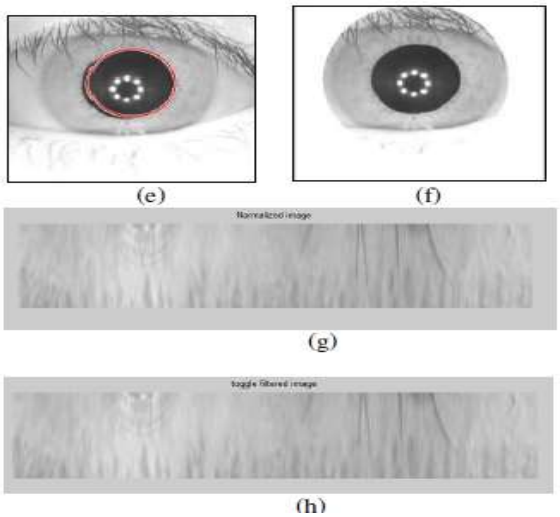


Fig 5 Qualitative analysis CASIA database:(a) Input Image from CASIA database (b) Gaussian filter output (c) Gradient image (d) Canny Edge detection output (e) Pupil detection (f) Iris detection (g) Normalized image of **Daugman's** rubber sheet Model output (h) Toggle filter output

4.2 Quantitative analysis

The statistical analysis of the proposed system is evaluated by the accuracy parameter.

Table1. *Quantitative analysis* Combined GLCM and GLRLM approach Indicates 50 person data feature

Feature extraction technique / Classifier	GLCM+GLRLM (UPOL database)	GLCM+GLRLM (CASIA database)
SVM	92.00%	68.00%*
KNN	75.8%	93.33%

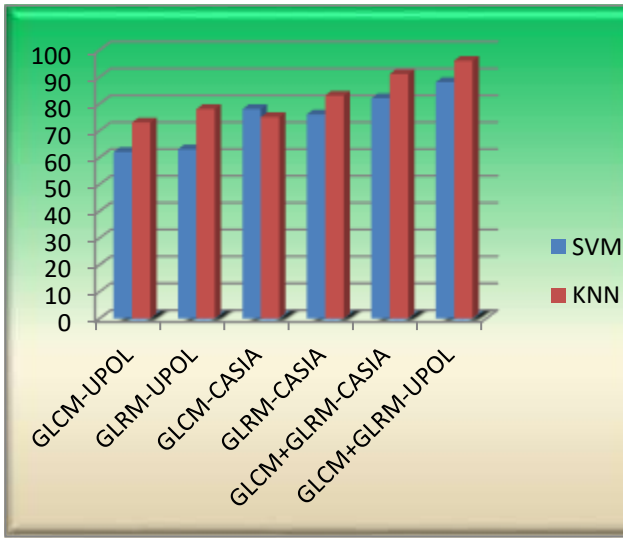


Fig 6 Comparative analysis of different Classifier

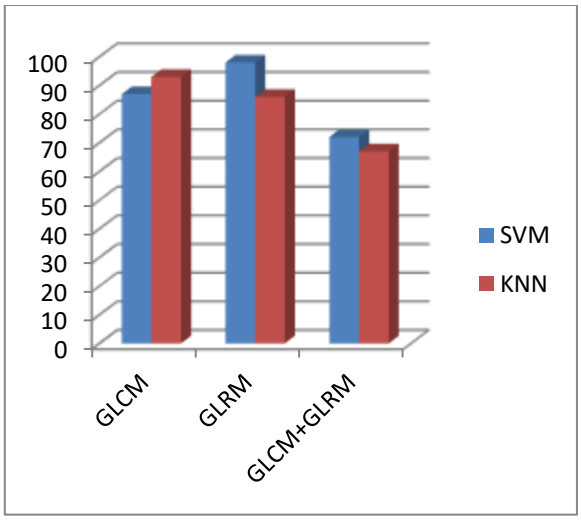


Fig 7 Execution time analyses

5 CONCLUSION

The proposed strategy includes the biometrics subtleties is separated by utilizing two systems, for example, GLCM (Gray Scale Co-occurrence Matrix) and Hausdorff Dimension (HD). From GLCM surface highlights like vitality, contrast, entropy, Correlation Coefficient, homogeneity is removed. Shape highlights like standard deviation, mean and shape highlights like region, border minor pivot length, significant hub length, robustness, whimsy are determined from Hausdorff Dimension (HD). Precision for CASIA database with combined GLCM+GLRLM approach which is most noteworthy among all other proposed approaches. The computation time required for GLRLM highlights is comparatively less. It is discovered that when various names for the SVM classifier get builds, at that point memory required playing out the classifier get an expansion. Later on, the exactness of the framework will increment by utilizing distinctive component extraction systems and classification methods. From the aftereffects of the proposed framework, it is concluded that KNN classifier gives 93.33%.

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An Examination Of Big Data And Blockchain Technology

S. Dhanalakshmi, G.Charles Babu

Abstract-: ***Blockchain technology is the process of development of bitcoin, the blockchain technology as a distributed ledger of cryptocurrency transactions for digitized, decentralized, trusted and secured manner. The mainstream of blockchain technology is bitcoin, bitcoin concept made with ledger of every single transaction, transactions allows for hashing mechanism to verify the large amounts of data. Big data task requires that large amount of computational space, to generate the terabytes of data for ensuring the successful data processing techniques. The major impact on big data analytics requires more number of data and generated data can be depending upon different sectors from different organizations. This paper presents a state of definition, characteristics, transaction process, and applications, along with discussion of big data analytics are introduced. In blockchain technology covers the flaws of big data in fruitful relationship, with the factors of security, transparency, decentralization and flexibility, so that data to be analyze in different and efficient way for organizations all sizes in data analytics form.***

Keywords: Big Data, Blockchain, Bitcoin, Cryptocurrency, Classification, Components, Use Cases

I. INTRODUCTION

Big data is used for large data volumes, these data volumes are generated from heterogeneous sources. Its generally refers to massive volumes of complex, high velocity, variable data, diverse types of data, to enable the different technique, and analyze the data, then the data to be managed in effective manner. The scales of big datas; memory capacity of the human brain about 2.5 peta bytes, within two minutes 13 peta bytes amount of data that could be downloaded from the internet. Some examples of big data are social networks, web logs, video and audio archives, military surveillance, astronomy, atmospheric science, genomics, commercial, sensor networks, RFID, biogeochemical and etc. Blockchain technology is a ledger of transaction, the ledger of transactions are shared in trusted environment, then the transactions and records are maintained and growing continuously in distributed manner, the transaction can be inspect with everyone but no single user control. The data are stored in blocks, and blocks are chained together, then block is sealed by hash function, these types of systems are centralized systems. Blockchain work like public ledger, a ledger has different entries of transactions, new entries of transactions are added to the end of the block, if you make change in any blocks the hash of all subsequent blocks also change. If the transactions are done in the same order in their ledgers, any reflection is their, also done with all nodes. The ledgers are distributed and synchronized, need for consensus mechanisms, this consensus mechanisms a protocol which makes all the nodes agree on the transactions and their order. Another kind of blockchain is distributed ledger, distributed ledger and blockchain are often used interchangeably. Hyperledger Fabric and R3 Corda is an example of distributed ledger technology.

II. BLOCKCHAIN

Blockchain technology is sequence of blocks, essentially a trustless, peer-to-peer and continuously growing database of records. All the blocks are ordered and recorded in public ledger, no parent in first block of blockchain; this block is named as genesis block, and the next block points to the hash of the previous block with one parent block. Each block of transactions points to Merkle root. The components of blockchain are block header and transactions; block header is called metadata about a block; the metadata consists of a) previous block hash, b) mining statistics used to construct the block and c) merkle tree root. All the blocks are connected in linked list format, each block having some header, the header connects to the transactions in block, if any transaction to be changed the header of block also changed. Figure 1 shows that sequence of blockchain diagram, and the list of records to be connected in sequence.

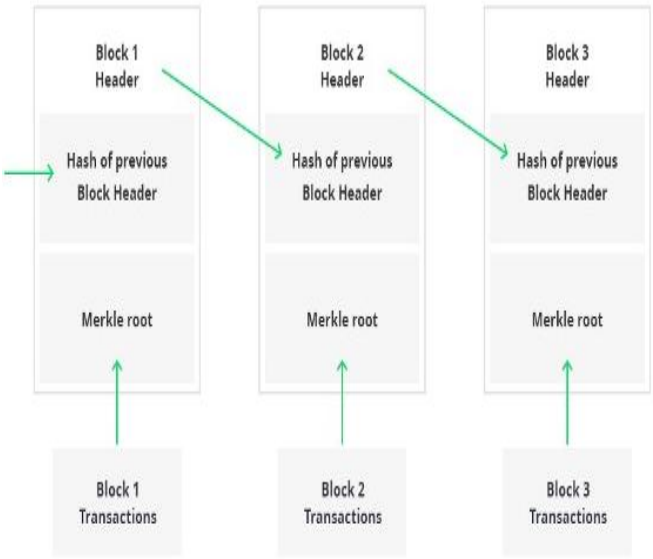

Figure.1. Blockchain Sequence

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A. Bitcoin

The first application of blockchain is bitcoin systems, the system form that peer to peer network (software that runs on machines of all stakeholders to form the system), permissionless (no identity - no need to sign up anywhere to use; no access control – anyone can participate in any role) and completely decentralized systems (no central party for ordering or recording anything). Bitcoin system releases the token is called BTC, bitcoin is the first cryptocurrency created in 2009, the bitcoin system implements the combination of public transactions & PoW Consensus functions. It's a decentralized system with no central authority for transaction, no one can involved in to the system for direct transactions. Bitcoin systems, its performs two broad operations; transaction management (transfer of bitcoins from one user to another) and Money Issuance (regulate the monetary base). Types of nodes in bitcoin are; Users with wallets - wallets carry user's key pairs, track ownership and authenticate transactions, Miners - compete with each other to add new block of transactions on the blockchain by solving puzzles in PoW system, and Exchanges - portals where users can buy or sell Bitcoin tokens (BTC) in exchange for fiat or other cryptocurrencies.

Table 1. Cryptocurrency Applications on Blockchain

Currency Name	Features	Consensus
Bitcoin(BTC)	First decentralized ledger currency – 2009	PoW
Bytecoin (BCN)	Focused on user privacy through impassive and anonymous transactions - 2012	PoS
Litecoin (LTC)	Uses scrypt as a hashing algorithm in cryptocurrency concept - 2011	PoW (Scrypt)
Peercoin (PPC)	Uses PoW and PoS functions - 2012	PoS with Hybrid
Emercoin (EMC)	Trusted storage for any small data (DNS, PKI, SSL infrastructure etc.) – 2013	PoW
Ripple (XRP)	Designed for P2P debt transfer - 2013	PoS
Waves	An open blockchain platform to develop applications for high volume transactions - 2016	PoS
Omni (MSC)	Both a digital coin and a communication platform built on top of bitcoin blockchain - 2013	PoS
Gridcoin (GRC)	The first cryptocurrency linked to citizen science through Berkley Open Infrastructure for Network Computing - 2013	PoS
Namecoin (NMC)	Used for creating a censor-resistant - 2011	PoW (SHA-256)
Dogecoin (DOGE)	First "Joke Currency" based on internet meme - 2013	PoW (Scrypt)
Myriad	Multiple mining algorithms - 2014	Multi-algorithm PoW
Blackcoin	A type of mining pool - 2014	PoS
Vericoin	Autoexchange to bitcoin for payment - 2014	PoS
Fericoin	Implements a monetary policy - 2012	PoS (SHA2256)

B. Cryptocurrency

Cryptocurrency is the application on blockchain; it's the decentralized currency replacement that acts as to traditional fiat currency (government and central financial institutions). It can have two roles; the currency to represent values of goods and services, other as an investment instrument to the market stock. Cryptocurrency can be classified into two types; altcoins and tokens. Altcoins run their own blockchains, can be divided into, based on bitcoin blockchain (such as Litecoin and Dogecoin) and not based on bitcoin blockchain (ripple or ethereum), and other types are Tokens; its usually represent any asset that is tradable, resides on top of another blockchain; such as non-fungible (used to create verifiable digital scarcity), the examples are cryptokitties, decentralized and fungible tokens (true digital cash), in fungible most tokens are act as a currency, ex., Bitcoin, ether, Zcash. The various cryptocurrency domains are healthcare, mining, eCommerce, Identity, Storage, Gambling, Privacy, Entertainment, Computing, stable, virtual reality, financial, Crowd Funding and etc., The crypto assets can be classified into infrastructure (other systems can be built upon very easily), currency (stores the value in user currency replacement) and services.

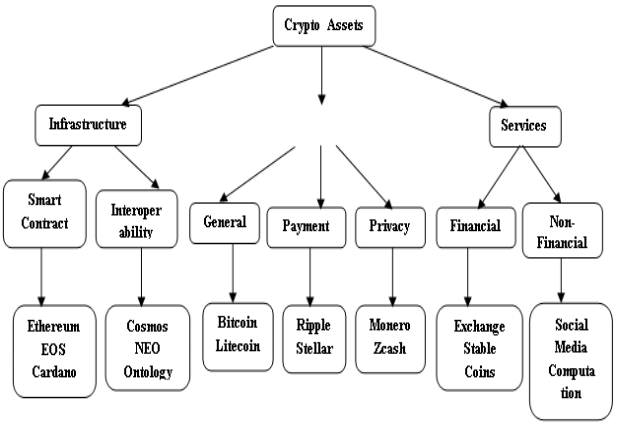

Figure.2. Crypto Assets Classification

C. Building Blocks of Crytpocurrency

Cryptocurrency system is a encryption technique, to generate and verify the units of currency & transfer of funds. It has three main features of cryptocurrency, a secure blockchain, wallets, and mining. Cryptocurrency having three main building blocks; the building blocks are distributed ledger, consensus algorithms, and currency.

a) In distributed ledger – it's a fundamentally asset databases, it has two types unpermissioned (its for public blockchain, everyone has a copy. Ex. Bitcoin, IOTA) and permissioned (private and only accessible to certain parties. Eg. Hyperledger fabric, Quorum)

b) Consensus Algorithms – it's defining that; nodes reflect the same state of ledger, certain set of rules, and remove third party. The variants are Proof-of-Work, Proof-of-Stake, DPoS, PoA, PoT, PoC, PoB, PoR, BFT , PoI, Delayed PoW and etc.,

c) Currency – Currency is define that; representation for values of goods and services. The properties of currency; unforgeable, limited supply, computationally infeasible to duplicate and not be double spent

D. Blockchain Components

The blockchain components can be categorized in to several parts; the components are cryptographic hash function, transactions, asymmetric-key cryptography, addresses, ledgers, blocks, consensus models, forks and smart contracts.

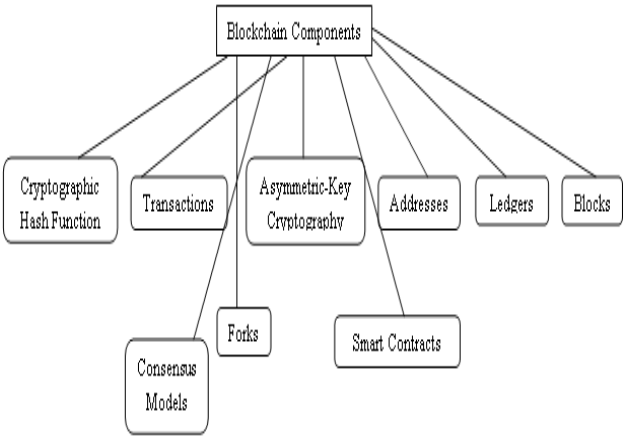

Figure.3. Blockchain Components

The cryptographic hash functions - data can be any size, text, image and file, most common hash function secure hash algorithm (SHA256), the output of SHA256 is 32 bytes (256bits), if every hash computation takes 1 Millisecond.

- Transactions - it represents interaction between parties that is transfer the currency between two users. Each block in a blockchain can contain zero or more transactions; it consists of inputs and outputs, the inputs – assets that are to be 'transferred', and outputs – where the assets 'go'.

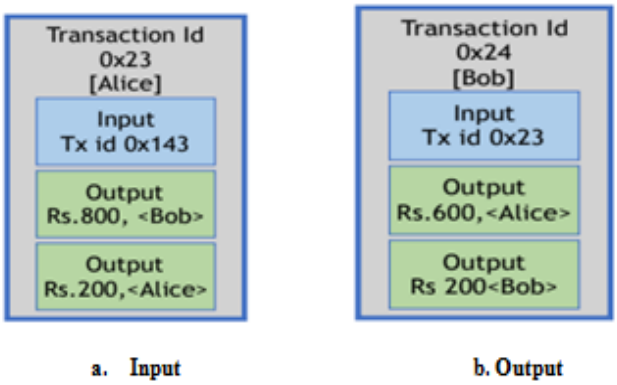

Figure.4. Transactions of Input and Output

Asymmetric-key - Asymmetric key consists of public key and private key of two pairs of key systems. In Blockchain network used for asymmetric-key cryptography in secured systems, the systems serves as bitcoin addresses, and used to digitally sign the transactions systems. The encryption key is public and decryption key is private key (anyone can encrypt the data, but decryption only done for intended receiver).

Addresses – In blockchain network, the addresses are used only once, using cryptographic hash function.

Ledgers – It's a collection of transactions, every user maintains their own copy of the ledger

Blocks – A block contains block header (metadata) and block data (list of validated and authentic transactions)

Consensus Models – Determining the next block in the systems, verify and construct a valid block and add to chain, by computing a cryptographic block hash then generating new currency.

Forks – software changes periodically

Smart Contracts – code and data deployed in the blockchain network

E. Types of Blockchain

The blockchain are categorized into public blockchain, private blockchain and consortium blockchain.

1. Public Blockchain – this type of network systems everyone can read and see, & open to all in the platform, and can validate the transactions. Other name of public blockchain is permissionless blockchain; it's a entirely decentralized and peer-to-peer network, very slow compared to private blockchain. Example: Bitcoin
2. Private Blockchain – access permission is limited, and writes access for the private blockchain is controlled by one organization; private blockchain network is shared by encrypted database. Its otherwise called permissioned blockchain, private blockchain also dencentralized and peer-to-peer network. Network members are known, but transactions process are secret for Verifying and validation process, then the transaction systems provide higher level efficiency. Example: Hyperledger Fabric
3. Consortium Blockchain – This system is combination of both public and private blockchain, its partly decentralized network, consortium blockchain network allow for registered participant or everyone to access, and controlled by preset of nodes, then its provides the efficiency and transactional privacy.

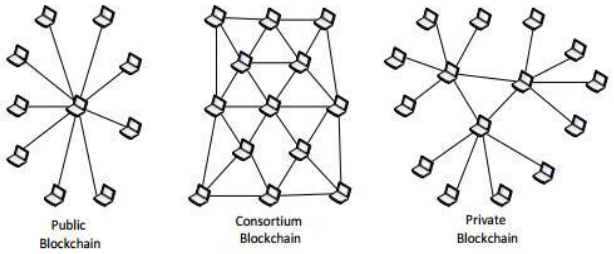

Figure.5. Public vs Consortium vs Private Blockchain

III. BIG DATA TECHNIQUES

Big data techniques, can be classified or identified by 3 parameters (3v's); volume, velocity and variety. The first parameter volume denotes data size, amount of data. The amount of data generated from facebook, the typical data centre like Google, Amazon, the data are generated in the form of trillion of bytes. The second perspective type of parameter in big data technology is velocity, like the speed of change of data in social networking website, and the third important aspect of analytics in big data; it's a kind of geospatial applications, also variety of data applying blockchain for big data applications.

Big Data Enabling Technologies

It's a collection of data and process using different open source tools. The open source tools are; Apache Hadoop, Hadoop Hdfs, Hadoop Yarn, Hadoop Map Reduce, Hive, Cassandra, Apache Zookeeper, Apache Hbase, Apache Spark, No SQL, Kafka, Spark Streaming Ecosystem, Spark MLib, Spark GraphX.

a) Apache Hadoop – Apache hadoop systems are open source framework in big data. It has different basic parts:

• Hadoop Distributed File System (HDFS) – this type of systems in hadoop are, performing storage process, and split into different data & distribute the nodes in cluster; Scaling out of H/W resources and Fault Tolerant

• MapReduce - Programming model that simplifies parallel programming. (Map-> apply (), Reduce-> summarize () and Google used MapReduce for Indexing websites, and other parts of Hadoop systems are;

• YARN – A Programming model for processing big data. Flexible scheduling & resource management over HDFS. Yahoo uses YARN to schedule jobs over 40,000 servers

b) MapReduce function, In MapReduce function, hadoop distributed file system move to the map function with the input of (key,value) pairs, the pairs are shuffle & sort ; its produce the intermediate values, the values merged into reduce function, after reduce function final key and value can be produced.

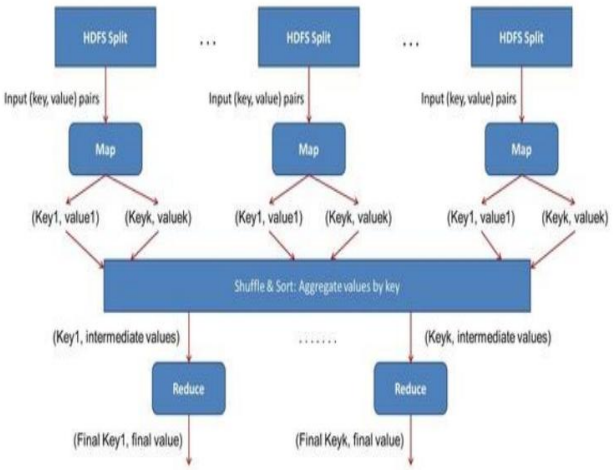

Figure.6. MapReduce Function

c) YARN – YARN is a Yet Another Resource Manager. The resources can be allocated and executed on different cluster nodes.

d) Hive – To access big data, Hive systems support for HSQL.

e) Apache Spark – its otherwise big data analytics framework, academic & industry gained lot off attraction in apache spark, its designed for fast computation

f) ZooKeeper - ZooKeeper is a highly reliable distributed coordination kernel, which can be used for distributed locking, configuration management, leadership election, work queues,...

Zookeeper is a replicated service that holds the metadata of distributed applications. Key attributed of such data; small size, performance sensitive, dynamic and critical.

g) NoSQL - NoSQL technology is new and with wide variety of databases that can stored unstructured data.

h) Cassandra – Data is placed on different machines with more than one replication factor that provides high availability and no single point of failure.

IV. BLOCKCHAIN USECASES IN BIG DATA & RESULTS

Big data analytics process provided in the form of both industry and academia. It operating and managing with own data in Blockchain technology. The blockchain systems ensure that privacy and integrity of data, it predicts large amount of data in big data techniques but focus on validating data, the data to be brought together in decentralized manner and the origin of the data linked in chained manner. The use cases of blockchain technology in big data can be specified that, a) Ensuring trust (data integrity) – verification process ensures its quality, the blockchain record verify authenticity of the documents, b) preventing malicious activities – consensus algorithms to verify transactions and generate the computational power, c) Making Predictions (Predictive Analysis) – predict large sets of data to predict future outcomes and gathered structured data from individual devices, d) real-time data analysis – analysis the data in large scale of organizations to achieve blockchain enabled system, after analyzing observe changes in the data, make possible to change quickly in real time manner, and e) manage data sharing – data can be stored in blockchain network and monertize it, outcome of the network . Stored on the blockchain platform.

V. CONCLUSION

The paper summarizes the overview of blockchain technology and big data systems. In blockchain systems provide the immutable, distributed, decentralized data & also highlight the cryptocurrency and bitcoin systems. Big data systems highlight the importance different enabling techniques revolutionize the way to process and analyze data. Further research to incorporate the different applications and use cases of blockchain technology and Big Data techniques

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An Efficient and Secured Framework for Mobile Cloud Computing

A.Sai Hanuman, P.S.V.Srinivasa Rao, J.Sasi Kiran, G.Charles Babu, B.Sankara Babu

Abstract*: By and by days the market of PDA is creating at a quick. Everyone has a versatile, tablet, fablet (tablet with calling office). Flexible customer will accomplish 6.5 billion preceding the completion of 2012,6.9 billion preceding the completion of 2013.Together with a perilous improvement of the convenient applications and ascending of appropriated figuring thought, compact disseminated registering (MCC) has been familiar with be a potential development for adaptable organizations. MCC consolidates the disseminated figuring into the flexible condition and beats obstacles related to the execution (e.g., battery life, amassing, and information transmission), condition (e.g., heterogeneity, flexibility, and openness), and security (e.g., steadfastness and insurance) discussed in compact enlisting. This paper gives an information about adaptable disseminated figuring application security, issues . The issues, existing plans and procedures are discussed.

***Index Terms*: About four key words or phrases in alphabetical order, separated by commas.**

I. SCOPE OF THE WORK

Compact disseminated registering is one of flexible advancement floats later on since it solidifies the upsides of both convenient figuring and circulated processing, thusly giving perfect organizations to versatile customers. The essential of movability in appropriated registering delivered Mobile disseminated figuring. MCC gives increasingly potential results to get to organizations in accommodating manner. It is typical that after specific years different adaptable customers will going to use dispersed processing on their mobile phones. As shown by a progressing report by ABI Research, a New York-based firm, more than 240 million businesses will utilize cloud benefits through mobile phones by 2015.That traction will drive pay of flexible disseminated processing to $5.2 billion. With this prominence, this manuscript has given a framework of adaptable appropriated processing in which its definitions, security, problems and inclinations are displayed. Prevalently it deliberated dataset security away in cloud and hugeness of data security. This manuscript has researched different parts for giving data security so Mobile Cloud Computing might be comprehensively recognized by different customers in future. It moreover suggested an instrument to give arrangement, get the opportunity to control similarly as uprightness to versatile customers. The handling capacity of convenient structures is improved by Cloud enlisting. Mobile phones can rely upon conveyed processing to perform computationally genuine exercises, for instance, looking data mining, etc. The use of flexible circulated registering vanquishes execution related tangles for instance exchange speed, amassing point of confinement and battery life, similarly as condition related issues for instance openness, flexibility and heterogeneity. Dispersed registering is changing the Internet handling establishment. Since by far many organizations are access from cloud over Internet, MCC has been introduced. The security hazard has pushed toward getting to be obstruction in the brisk improvement and generous usage of flexible conveyed processing perspective. The security perils have advanced toward getting to be catches in the quick flexibility of the versatile appropriated figuring perspective. Basic undertakings have been submitted in research affiliations and the insightful network to build secure versatile appropriated processing circumstances and systems. This paper reviews the possibility of adaptable conveyed figuring similarly as problems of security normal inside the setting of convenient application & disseminated registering. The standard vulnerabilities in structures with possible game plans are discussion about here.

Mobile phone contraptions are commonly used in our step by step lives. Regardless, these devices show obstructions, for instance, short battery lifetime, confined computation control, little memory gauge and unordinary framework arrange. As such, different courses of action have been proposed to alleviate these obstructions and widen the battery lifetime with the usage of the offloading system. In this manuscript, a new framework is suggested to offload genuine count endeavors from the mobile phone to the cloud. This framework uses a headway model to choose the offloading decision logically subject to four essential parameters, to be explicit, essentialness use, CPU use, execution time, and memory use. Additionally, another security layer is given to guarantee the moved data in the cloud from any attack. The preliminary outcomes showed that the structure can pick a sensible offloading decision for different sorts of adaptable application assignments while achieving colossal execution improvement. Also, not exactly equivalent to past methodologies, the structure can shield application data from any peril.

Objectives of the work

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• To plan Mobile Cloud Computing: Issues, Security, Advantages, and Trends
• To ponder Privacy and Security of Mobile Cloud Computing (MCC)
• To structure Mobile Cloud Computing Issues and Solution Framework
• To look at An Efficient and Secured Framework for Mobile Cloud Computing
• To ponder secure data planning framework for versatile appropriated processing

II. LITERATURE REVIEW

C. Erway, A. Kupcu, C. Papamanthou, and R. Tamassia (2009) In versatile conveyed processing, phones can rely upon appropriated figuring and information storing resource for perform computationally thought exercises, for instance, looking, data mining, and media dealing with. Despite giving ordinary estimation organizations, compact cloud moreover improves the assignment of standard uniquely delegated framework by seeing mobile phones as organization center points, e.g., identifying organizations. The identified information, for instance, territory encourages, prosperity related information, should be arranged and set away in a sheltered style to guarantee customer's security in the cloud. To this end, we present another adaptable cloud data taking care of framework through trust the board and private data separation. Finally, a use pilot for improving youngsters' driving prosperity, which is called FocusDrive, is acquainted with demonstrate the game plan.

A. Fiat and M. Naor (1994) Cloud preparing is another and promising advancement that is changing the perspective of ordinary Internet enrolling and no doubts the whole IT industry. Dispersed figuring is foreseen to stretch out in the versatile condition using on the fast advances in remote access developments. These adaptable applications are worked around compact circulated registering frameworks and models. In the Mobile Cloud condition, customers might remotely store their data similarly as acknowledge high gauge on-demand cloud applications without the hindrances of getting and keep up their own one of a kind neighborhood hardware and programming. In any case, data security is up 'til now a vital concern and is the standard block shielding circulated figuring from being even for the most part grasped. This stress begins from the manner in which that sensitive data set away in the open fogs is administered by business expert centers that most likely won't be totally dependable. In that limit, there are a couple of security and assurance issues that ought to be tended to. This segment gives an outline on the appropriated processing thought sought after by a portrayal on convenient dispersed registering and the various security issues important to the flexible circulated figuring condition.

L. Cheung, J. Cooley, R. Khazan, and C. Newport (2007) Mobile gadgets (e.g., tablet, wireless, pcs, etc) are dynamically transforming into a fundamental bit of human life. These Mobile devices still need in resources diverged from a standard information taking care of contraption, for instance, PCs and workstations. The response for thrashing of these challenges is Mobile Cloud Computing. We propose another adaptable framework that enables direct use of cloud resources for increment the capacity of advantage obliged PDAs. The basic features of this model join the package of a singular application into different fragments. Compact applications can be executed in the PDA or offloaded to the cloud clone for execution. The results exhibits that the execution of execute application on adaptable or cloud the extent that memory exhausted using unmistakable detachment and number of centers are shut. Most of benefits ate up on convenient mobile phone will decrease around to the half of memory used for running application on the adaptable so to speak. On the contrary side, Although Cloud Computing is an unprecedented headway in the domain of preparing, there moreover exist disadvantages of dispersed registering, for instance, security of data. As such, there is a remarkable need of encryption procedure with a lot of security and with immaterial key size. There for, the principal center for ensuring security is to developed new cross breed cryptography show. Along these lines, new cross breed cryptography show is created for achieving security in Mobile Cloud Computing. The results exhibit the power of new computation. The rule duty of our investigation is to develop a safe flexible cloud establishment that will enable wireless applications that are passed on both with respect to data and figuring.

D. Boneh, X. Boyen, and E.J. Goh (2005) Smartphone devices are commonly used in our step by step lives. Regardless, these contraptions show confinements, for instance, short battery lifetime, compelled estimation control, little memory measure and surprising framework organize. Thusly, different courses of action have been proposed to direct these confinements and expand the battery lifetime with the usage of the offloading technique. In this paper, a novel structure is proposed to offload genuine figuring endeavors from the phone to the cloud. This framework uses a streamlining model to choose the offloading decision logically subject to four central parameters, to be explicit, imperativeness use, CPU use, execution time, and memory use. In addition, another security layer is given to guarantee the moved data in the cloud from any strike. The test outcomes showed that the framework can pick a fitting offloading decision for different sorts of adaptable application assignments while achieving basic execution improvement. Additionally, not exactly equivalent to past strategies, the structure can shield application data from any risk.

J. Bethencourt, A. Sahai, and B. Waters (2007) In this manuscript, we introduce a far reaching security system to check the data accumulating in open fogs with outstanding concentration on lightweight remote gadget store & recuperate information without revealing data substance to the cloud expert associations. I order to reach this aim, our answer revolves around the going with 2 research course: Initially, we introduce a novel Privacy Preserving Cipher Policy Attribute-Based Encryption (PP-CP-ABE) to guarantee the data of customer. Using PP-CP-ABE, light-weight contraptions might securely redistribute overpowering encryption & unscrambling exercises to cloud authority communities, without revealing data &utilized security keys. Secondly,

we suggest an Attribute Based Data Storage (ABDS) structure as a cryptographic access control system. The ABDS reaches the data theoretical optimality to the extent restricting estimation, accumulating & correspondence overheads. Especially, ABDS bounds cloud organization charges by reducing correspondence overhead for data organizations. Our implementation assessments display the quality of security & efficiency of the showed course of action similar to computation, correspondence, and limit.

G. Ateniese, R. Expends, R. Curtmola, J. Herring, L. Kissner, Z. Peterson, and D. Tune (2007) Cloud enlisting is a promising development that is changing regular Internet figuring perspective and industry of IT. With progression of remote access developments, appropriated processing is depended upon to develop to flexible circumstances, where PDAs and sensors are utilized as data gathering center points for cloud. In any case, customers' stresses over data security are the essential preventions that hinder appropriated processing from being comprehensively gotten. These stresses are begun from the manner in which that sensitive data lives in open fogs, which are worked by business pro associations that are not trusted by owner of data. Therefore, new secure organization structures are relied upon to address security stresses of customers for utilizing disseminated registering methods.

III. METHODOLOGY

The MCC will be essentially the interconnection of appropriated registering, flexible handling and remote frameworks to influence mind blowing computational resources for versatile customers, to orchestrate directors, similarly as conveyed processing providers. This openness enables adaptable customers to utilize cloud structure to vanquish the confines of compact development. A complete aim of MCC is to empower execution of rich convenient applications on phase of PDAs, with a rich customer experience. The MCC gives business chances to versatile framework managers similarly as the providers of cloud. Even more thoroughly, MCC might be described as a rich adaptable figuring development that keep up uprightness among resources of contrasted fogs and framework propels toward that give, indefinable limit, and transportability to get countless telephones wherever. The central designing is produced using the sections: adaptable customers, compact managers, organize get to providers (lSP), and cloud expert communities, independently. The building is showed up in Figure. Flexible customers, convenient customers are the end customers that send diverse organizations through accommodating cell phones, tablets that are in developments.

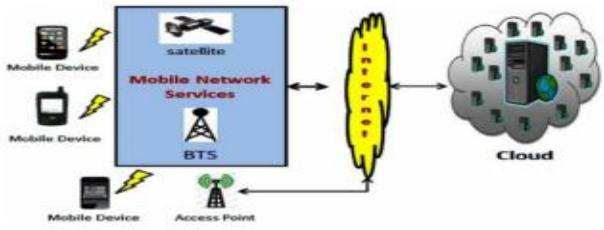

Figure: Mobile Cloud Computing Architecture

MOBILE OPERATOR

The adaptable director are remote authority association that has the rights to offer access to customer to organizations like radio range, billings, remote system, retail ,customer care & giving spine organizations. A basic typical for a convenient framework head is that it should guarantee or control access to a radio range license from an authoritative or government component. A second most portraying typical for a MNO is control the parts of the framework establishment imperative to offer organizations to endorsers over the approved range.

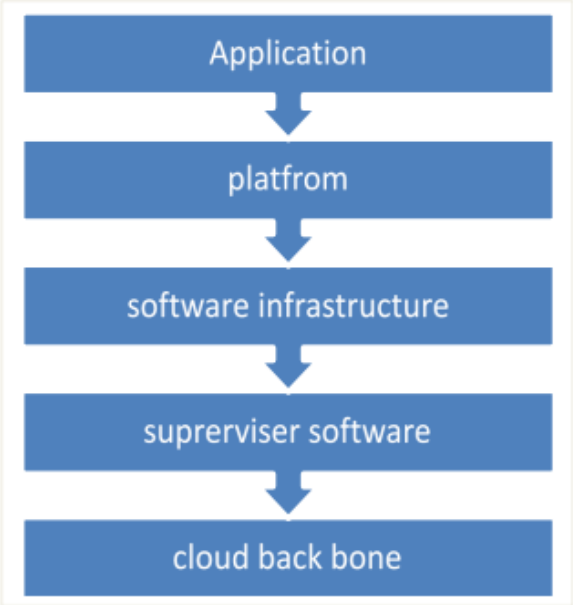

Figure 1:Layered architecture of MCC

The layer configuration is showed up in Figure 1. The spine layer builds up security perception on the physical structures of cloud. These helpers in checking the machines &servers in cloud establishment. The structure layer screens VMs in cloud. Distinctive activities, for instance, Storage check, VM isolation, VM development, audits Cloud Service Monitoring&Risk Evaluation are done in this layer to confirm cloud have organizations. Application layer executes works out, for instance, customer the officials, key organization, approval, endorsement, encryption and data blend. To pull in clients, the cloud authority center (CSP) wants to concentrate on all the security problems to provide an exceedingly secure condition.

Security risks

1. Protection as cloud condition incorporates immense no. of customer to give organization, constructs far reaching no. of ways of adaptable customers and applications. Each customer's data should be secure and covertly directed. Simply affirmed customer has rights to get to endorsed data.
2. Security Privacy is need of a person to control customer's near and dear information. In cloud various potential results like insider customer threats, outside attacker risks, data spillage, etc can hurt security of cloud customer.
3 .Multi-inhabitance in multi-residency of cloud, social affair of customer shared organization given by single programming or application.
In such a circumstance,

each convenient customer's data is separated and remains imperceptible to other flexible customer.

4. Thing reusability-A model prepared for making cloud based applications with reusability by recouping the parts from the cloud section vault by using configuration organizing counts and distinctive recuperation procedures.

5. Data remanence-It is the remaining depiction of data that have been some way or another or another apparently annihilated or ousted. Data protection could be broken inadvertently, in light of data remanence.

6. Programming Confidentiality-It is suggests trusting that particular application or strategies will keep up and handle the customer's near and dear data in secure manner.

7. Genuineness Integrity in cloud insinuates protected from unapproved abrogation, change, theft. The data genuineness in direct terms is upkeep of soundness of any data in the midst of trades like trade, recuperation or storage. The deletion, alteration might be accidentally or intentionally.

8. Endorsement: It is the segment by which a system makes sense of what measurement of access a certain affirmed customer must need to confirm resources compelled by structure.

IV. RESULTS

Performance Evaluation

Computation Performance of PP-CP-ABE:

To estimate the execution of showed PP-CP-ABE plan, we survey the count overhead of master associations &customers subject to both speculative examination and preliminary outcomes. Directly off the bat, we examination the amount of expensive cryptographic exercises over G0 and G1, i.e., coordinating, exponentiation, duplication, performed by master centers and customers' contraptions. In our examination we acknowledge that the passage course of action TESP has a1 characteristics related by an AND reasonable entryway and TDO simply has 1 property. Additionally, the root center point is an AND gateway.

In the going with table, we considered the amount of exponentiations, increments and hash to G0 exercises realized on customer side& ESP side in encryption re-appropriating, where a1 is the amount of properties in TESP :

	Exp G0/G1	Mul G1	Hash to G0
ESP	2a1/0	0	a1
User	3/1	1	1

We additionally give an examination of the quantity of exponentiations, duplications, reversal, and matching activities caused by decoding redistributing on client side &DSP side as appeared in the accompanying table, where a1 is the quantity of characteristics in TESP.

	Exp G1	Mul G1	Inv G1	Pairing
ESP	a1	2a1	a1	2a1+1
User	1	2	1	0

From above examination, we might observe that count overhead is immediate for pro associations (DSP& ESP) and consistent for the customer. Among all exercises, mixing will be more computationally focused.

Beside the speculative examination, we in like manner performed exploratory estimations. In perspective on CP-ABE open source adventure, we completed &surveyed the PP-CP-ABE on PC with 1.6GHz Intel Atom processor running Linux2.6.32. The calculation time is evaluated with the use of clock ticks returned by clock_t clock(void) work in standard C library. To depict that a substantial part of estimation overhead will be re-appropriated to authority associations, we run server &customer on a comparative stage and recorded the amount of clock ticks.

In Figure 2, we took a gander at count overhead achieved on authority associations and customers in encryption and unscrambling re-appropriating. The computation overhead is resolved similar to 10 based logarithms, i.e., log10, of thousands (K) timekeepers ticks. As ought to be clear from figure, over 90% of encryption &over 99% of unscrambling estimation are executed by expert associations.

Storage Performance of ABDS:

We examine limit execution of ABDS and differentiation it and a couple of related cryptographic access control game plans: impart encryption plans (Subset-Diff), BGW broadcasting encryption, get the chance to control polynomial (ACP) plot. The execution is assessed the extent that figure content accumulating overhead, key amassing overhead (structure parameters and open/private keys set away on the customers & TA). We mean full scale number of customers in framework with N and a customer needs to share a record to some irregular plan of beneficiaries in the structure. The close outcomes are shown in Table 2. The Ciphertext Storage Overhead in Subset-Diff scheme, the degree of ciphertext is O(t 2 • log2 t • log N), with t as most prominent no. of interesting customers to deal the cipher text. For BGW plot, the cipher text gauge is O(1) or O(N 1 2) as uncovered. In ACP plot, degree of message relies upon the dimension of access control polynomial, those reciprocals to the amount of present recipients. Consequently, the message measure is O(N). To control a great deal of recipients S utilizing ABDS, the range of cipher text relies upon the amount of thing terms in f min S. In the makers construed lower bound& upper bound on typical no. of thing terms in a constrained SOPE. Likely, the typical no. of message required is ≈ log(N).

V. CONCLUSION

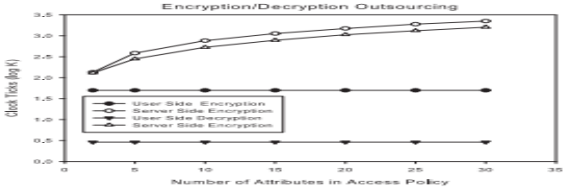

Figure 2: Graph Performance evaluation of the encryption and decryption outsourcing

Considering, we proposed an exhaustive security system for the cloud data

storing organizations to check data board in open fogs. Particularly, our answer engages lightweight remote gadgets to securely store and recuperate their data in open cloud with unimportant cost. To this end, we suggested a novel Privacy Preserving Cipher Policy Attribute-Based Encryption (PP-CP-ABE) to verifyencoded data customer. Using PP-CP-ABE, light-weight gadgets might be securely redistribute heightened encryption &unraveling exercises to cloud authority communities, without revealing data & utilized keys. Furthermore, we suggested an Attribute Based Data Storage (ABDS) structure as a cryptographic access control framework. ABDS achieve information theoretically perfect the extent that constraining figuring, storing and correspondence overheads. Especially, ABDS limit the costs o cloud charged by cloud pro communities similarly as correspondence overhead for data organizations. Our execution assessments determine the security quality &profitability of our answer in regards to figuring, correspondence and limit.

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A Systematic Approach Toward Description And Classification Of Cyber Crime Incidents

G.Charles Babu, A.Sai Hanuman, J.Sasi Kiran, B.Sankara Babu

Abstract: ***The headways in PC frameworks and systems have made another condition for criminal acts, generally known as cybercrime. The cybercrime episodes are events of specific criminal offenses that represent a genuine danger to the worldwide economy, security, and society's prosperity. This paper presents a far reaching comprehension of cybercrime occurrences and their relating offenses consolidating a progression of methodologies announced in applicable writing. At first, this paper audits and recognizes the highlights of cybercrime episodes, their separate components and suggests a combinatorial occurrence portrayal diagram. The diagram gives the chance to efficiently join different components or cybercrime attributes. Furthermore, a complete rundown of cybercrime-related offenses is advanced. The offenses are requested in a two-level order framework dependent on explicit criteria to aid better characterization and connection of their separate episodes. This empowers an intensive comprehension of the rehashing and fundamental criminal exercises. The proposed framework can fill in as a typical reference surpassing deterrents getting from confusions for cybercrimes with cross-fringe exercises. The proposed diagram can be stretched out with a rundown of suggest edactions, relating measures and successful approaches that coordinate with the offense type and in this way with a specific occurrence. This coordinating will empower better observing, dealing with and moderate cybercrime episode events. A definitive goal is to fuse the blueprint based portrayal of cybercrime components to a total occurrence the executives framework with standard working methods and conventions.***

Index Terms**: *PC frameworks, cybercrime, portrayal diagram, worldwide economy.***

I. SCOPE OF THE WORKT

The headways in PC frameworks and systems have made another condition for criminal acts, broadly represented as cybercrime. The cybercrime episodes are events of specific criminal offenses that represent a genuine risk to the worldwide economy, security, and prosperity of society. This paper presents a thorough comprehension of cybercrime occurrences and their relating offenses joining a progression of methodologies revealed in applicable writing. At first, paper surveys and recognizes the highlights of cybercrime occurrences, their separate components and proposes the combinatorial episode portrayal outline. The mapping gives the chance to deliberately consolidate different components - or cybercrime attributes. Moreover, an exhaustive rundown of cybercrime-related offenses is advanced.

The offenses are requested in a two-level characterization framework dependent on explicit criteria to aid better arrangement and connection of their separate episodes. This empowers an intensive comprehension of the rehashing and fundamental criminal exercises. The proposed framework fills typical reference overwhelming hindrances getting from misunderstanding with cross-fringe exercises for cybercrimes. The proposed diagram can be reached out with a rundown of prescribed activities, relating measures and powerful strategies that coordinate with the offense type and in this manner with a specific episode. This coordinating will empower better observing, taking care of and moderate cybercrime episode events. A definitive goal is to consolidate the pattern based depiction of cybercrime components to a total episode the board framework with standard working strategies and conventions.

Late advancements in the correspondences and Information Technology (IT) unlocked the entryway on recent applications that empower transmitting data precisely and rapidly. The advancements have obviously negative angles, for example, empower the digital predators to direct their online assaults against the people in question. Besides, this paper relies upon the correlation between the KSA and UK enactments to battle the digital provocations. Where, the KSA and UK enactments were ordered by explicit cybercrime types. Besides, the target of this examination is to enhance KSA enactments as far as fighting the new kinds of cybercrimes seemed dependent on the UK battling activities.

II. OBJECTIVE OF THE STUDY

- To plan A Systematic Approach towards Classification and Description of Cyber Crime Incidents
- To examine Legal Aspects of Cyber security
- To ponder Cybercrimes-based Legislations Classifications, a Comparative Research between KSA and UK
- To think about Cyber-wrongdoing: An audit of the proof
- To consider Cyber Crime in the Society: Problems and Preventions

III. LITERATURE REVIEW

Wow Essay (2009) The offices of PC innovation have not turned out without downsides. Despite of the fact that the life is so rapid and quick, yet flung under the shroud of danger from the deadliest kind of culpability named as 'Digital wrongdoing' without PCs, government and organizations activities would nearly stop to

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work. The multiplication of incredible, shoddy, easy to understand PCs has empowered an ever expanding the number of individuals to apply them and more vitally, depend as a feature of their ordinary lifestyle. As the government offices, organizations and people keep on depending on developing extent, so the crooks restriction of digital wrongdoings is dependent on appropriate investigation of their comprehension and conduct on different dimensions of society. Thusly, at present original copy an efficient awareness of digital violations and its effects on zones like Soci-eco-political, adolescent and customer trust, with the upcoming patterns are clarified.

Shantosh Rout (2008) Eventual fate of Internet is available for anyone among typical clients. Fears of a digital world still proliferate, while the potential harm degree can be brought by scale misrepresentation is almost absolute. These nerves are essential to be reasonably moderate with learning the issues are being tended to, although not quick enough. The Internet's value has substantiated in various ways that are sufficient to guarantee it does not curving into a no man's area of criminal movement and a support for the malevolent. The administration has an imperative task to carry out; nevertheless a large portion of counteractive action should be refined by business elements bear programming and with the capacity to halt the extortion. Depending on the customer instruction the projects influences a level of conceivable accepted people. The other users should be secured through the measures that do not pressure and requires the impressive interest. The security issues should be simple and successful in the working environment. Regardless of either cybercrime is as yet an suitable issue, however, due to the elevate of development over Internet, is its essential to illuminate with the goal that cybercrime substance will relate to certifiable violations, if worse.

Prasun Sonwalkar (2009) The authentic copy not only discusses digital violation's comprehension yet furthermore clarifies the effects over unique dimensions of the public. This helps the network to verify the online data fundamental associations that are not protected due to digital wrongdoings. The awareness of conduct of digital offenders and digital violation's effects on society will identify the suitable way to breakdown the circumstances. The finest method to beat the wrongdoings are comprehensively grouped into three classes, namely, (1) Cyber Laws (alluded as Cyber laws), (2) Policy making and (3) Education. These approaches deal with digital wrongdoings either exceptionally inferior critical work or having nothing in considerable lot of the nations. This work requires either embellishing the current work or setting updated standards for regulating the digital assaults.

D. L. Shinder and M. Cross (2008) Over the most recent two decades, organizations, customers, and governments around the world have moved into the internet and cloud condition so as to direct their organizations. Numerous individuals spend a critical piece of their every day life in the internet, making and getting a charge out of new sorts of social connections which were impractical or fiscally reasonable 20 years prior. In any case, offenders have recognized prizes from online fakes in this manner, the dangers and dangers have expanded too. Securing the internet will be an empowering agent and will result in better utilization of the computerized condition. Along these lines, verifying it requires a joint exertion by all partners which incorporates the law authorization offices, governments, the innovation ventures, and the people in the general public.

PricewaterhouseCoopers. (2014) Cyber wrongdoings are another class of violations to India quickly growing because of broad utilization of Internet. Unscrupulous and avaricious individuals exploit simple and free access to Internet and play out any demonstrations to fulfill their necessities. The need could be physiological or mental in nature.2 Online shopping and wide utilization of "internet based life" are main driver of digital wrongdoings. Much mindfulness made for digital violations and clients were taught. Yet at the same time individuals don't grumble it to specialists. Indeed, even someone do it at that point additionally police or wrongdoing branch powerless to clear such gripes in sensible timeframe. Deferral in equity will prompt NO enlistment of whine. This isn't sound circumstance in free just INDIA.

IV. METHODOLOGY

Data Prepossessing Module

Data Ingestion Module along with Sqoop

Data Analytic Module along with Hive

Data Analytic Module along with Pig

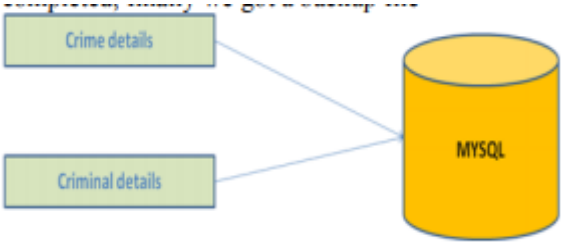
Data Analytic Module along with Map Reduce

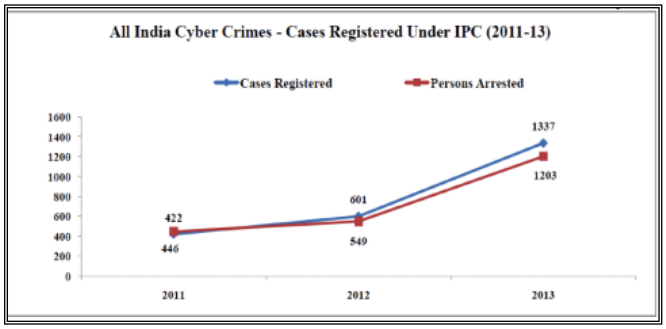
Data Analytic Module with R

Data Analytic Module With java age

Gather necessity dataset and Backup the document on mysql

We need to make another table by right tapping on the database and choosing make new table, first section will be the Id which will be a whole number, at that point all procedure will be finished, at long last we got a reinforcement document.





Data ingestion using Sqoop

Information ingestion Module with Sqoop: The motive of this module is to deed the dataset into Hadoop (HDFS). Sqoop is an interface application responsible for exchanging the information between Hadoop

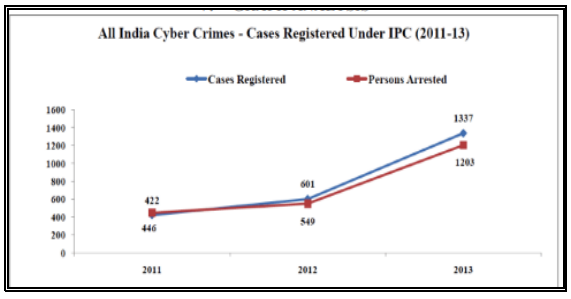
and social databases. In this module, the dataset is pushed into Hadoop (HDFS) through the Sqoop tool. Utilizing the Sqoop features, perform the parcel capacity, to some extent that, the event needs to accompany the distinguishing segment or in the event needs to accompany the dataset with explicit scenarios supported by Sqoop and data is placed in Hadoop (HDFS).



Data processing Module with Hive

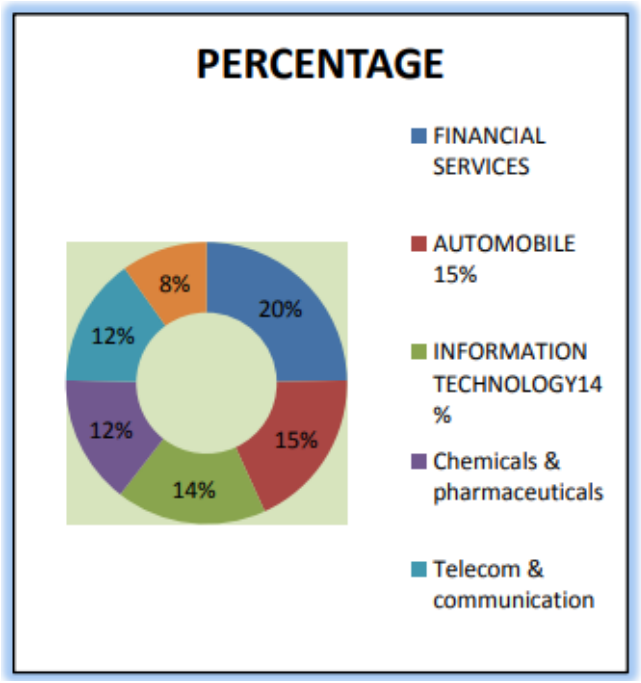
Hive is an framework house for Hadoop. It runs SQL queries through Hive inquiry language (HQL). Hive, is an initiative by Facebook. The Hive underpins Data Manipulation Language (DML), Data definition Language (DDL), and client characterized capacities. This module deals with dataset investigation by HIVE through Hadoop (HDFS). For examination, dataset HIVE utilizes the HQL Language. The utilization process in Hive was performed using tables' manifestations, bucketing idea, partition, and join operations. Later, the Hive deals with the examination of main Structure Language.

V. RESULTS



VI. CONCLUSION

This paper showed the wrongdoing information examination utilizing Hadoop. The capacity of huge information will change the way the present cybercrime to get criminal record. In the adjacent future we will see execution of enormous information examination in wrongdoing information investigation. Huge information gives security and protection. This paper proposes a structure which is pointing that it will enhance the execution of Map Reduce remaining tasks at hand and in the meantime will keep up the decency. The cybercrime frames test to the Islamic enactments, on the grounds that there is no unmistakable proof just as the cybercrime occurs in virtual condition. Subsequently, the enactment in KSA relies upon Islamic Law, in this manner the principle issue is non-consciousness of laws, and the Saudi youth have almost no learning about cybercrimes and their threat on the general public.



Likewise, nonappearance of the proof structures another test to the KSA courts to give equity goals in regards to the cybercrime, where an absence of specialized foundation to comprehend the idea of the wrongdoing in fact is viewed as a primary test for Department of contending wrongdoing in (CPVPV) - KSA. Other than the way of life of Saudi individuals keep the vast majority of unfortunate casualties from revealing their cases particularly when they presentation to sexual dangers. Besides, grouping cybercrimes in UK as indicated by enactments utilized in the courts can be abused to build up new enactments in KSA against cybercrimes, with taking into contemplations the social and religion contrasts. Applying new enactments in KSA against cybercrimes ought to enhance battling the new kinds of cybercrimes as needs be.

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Secure and Verifiable Policy Update Method on Big Data Access in Cloud Storage

G.Charles Babu, A.Sai Hanuman, J.Sasi Kiran, B.Sankara Babu

Abstract*: Disseminated figuring would be one of advancements which will expect a fundamental occupation in the best in class time of PC structuring field. As a result of the high volume and speed of immense data, it is a fruitful decision to store huge data in the cloud, as the cloud has capacities of securing tremendous data and dealing with high volume of customer get to requests. Trademark Based Encryption (ABE) is a promising system to ensure the end to-end security of huge data in the cloud. In this paper, we propose a novel arrangement that enabling gainful access control with dynamic methodology invigorating for gigantic data in the cloud. We fixate on working up a re-appropriated approach reviving method for ABE structures. Our system can avoid the transmission of mixed data and cutoff the figuring work of data proprietors, by making usage of the as of now encoded data with old access approaches. Also, we in like manner propose approach invigorating computations for different sorts of access courses of action. Finally, we propose a beneficial and secure methodology that empowers data proprietor to check whether the cloud server has revived the figure messages precisely. The examination shows that our course of action invigorating redistributing plan is correct, whole, secure and profitable.

***Index Terms*: Big Data, Cloud, Attribute Based Encryption (ABE), Policy Updating.**

I. INTRODUCTION

Disseminated figuring would be one of advancements which will expect a fundamental occupation in the best in class time of PC structuring field. As a result of the high volume and speed of immense data, it is a fruitful decision to store huge data in the cloud, as the cloud has capacities of securing tremendous data and dealing with high volume of customer get to requests. Trademark Based Encryption (ABE) is a promising system to ensure the end to-end security of huge data in the cloud. In this paper, we propose a novel arrangement that enabling gainful access control with dynamic methodology invigorating for gigantic data in the cloud. We fixate on working up a re-appropriated approach reviving method for ABE structures. Our system can avoid the transmission of mixed data and cutoff the figuring work of data proprietors, by making usage of the as of now encoded data with old access approaches. Also, we in like manner propose approach invigorating computations for different sorts of access courses of action. Finally, we propose a beneficial and secure methodology that empowers data proprietor to check whether the cloud server has revived the figure messages precisely. The examination shows that our course of action invigorating redistributing plan is correct, whole, secure and profitable.

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II. LITERATURE REVIEW

Prayla, S et al (2018) Our course of action engages the cloud server to feasibly stimulate the figure content when another entry approach is controlled by the information proprietor, who is besides arranged to help the resuscitate to counter against cheating practices of the cloud. It in addition draws in (I) the information proprietor and qualified clients to adequately confirm the validness of a client for getting to the information, and (ii) a client to help the data gave by different clients to rethink plaintext recuperation

Taniya Jain (2017) As the term shows the Big data it suggests we are work for the something huge or can state something broad in the Amount, Data the high volume is known as the gigantic data. Directly a Day for securing the data archive in the Computer Science Engineering we are used the Hard circle, a part of the limit put, these limit contraptions may store the data in a Giga byte capacity and Terabyte capacity or some more, now every day we are used the some new development call the cloud condition. So in this work I am ponder the gigantic data securing process in the Cloud condition, colossal data bringing from the cloud securerly.

Vishnu R. Lembhe et al (2016) in enlisting condition, the limit of tremendous data is main problem. So to vanquish this store the gigantic data in cloud since it has capacities of securing enormous proportion of data and taking care of a high volume of customer get to requests. Appropriated figuring use the Attribute Based Encryption (ABE) for giving the end to end security for enormous data in a cloud. Using this ABE technique, reviving has been a trying issue in the past executions, immediately data proprietors need to recuperate the data and after that re-encode the new access approach and send back to the cloud .Due to this, high correspondence and computational weight was on the data proprietors. So to vanquish this issue of existing structure here proposed another system that intensely revives a technique for gigantic data in the cloud. Data proprietors need to just check whether figure content has been invigorated precisely or not.

Kalpana, V et al (2014) the course of action invigorating has reliably been a trying issue when ABE is used to construct get the chance to control contrives and develop another procedure to redistribute the technique reviving to the server. Attribute Based Access Control technique is used to avoid the transmission of encoded data and breaking point the computation work of data proprietors, by making use of the in advance mixed data with old access courses of action. A methodology invigorating count called LSSS is used for gainful and secure procedure empowers data proprietor to check whether the cloud server has revived the figure messages precisely.

III. PROPOSED SYSTEM & OBJECTIVES

The proposed structure revolves around adopting care of the strategy invigorating issue in ABE structures, and proposes an ensured and certain procedure revive redistributing method. As opposed to recuperating and re-encoding the data, data proprietors simply send game plan reviving request to cloud server, and let cloud server invigorate the methodologies of mixed data particularly, which infers that cloud server does not need to unscramble the data beforehand/in the midst of the methodology invigorating. This arrangement can satisfy all the above necessities, and keep up a vital separation from the trading of mixed data forward and in reverse and farthest point the computation work of data proprietors by making full use of the in advance encoded data under old access courses of action in the cloud.

Objectives:

1. To examination the course of action invigorating issue in ABE systems and develop another procedure to redistribute the methodology reviving to the server
2. To find the expressive and profitable data get the opportunity to control plot for enormous data, which engages compelling intense plan reviving
3. To examination the successful and secure methodology for checking, paying little heed to whether the figure works are invigorated precisely by the cloud server

The methodology invigorating is a troublesome thing in trademark based access since when data proprietor stores data into the cloud, it doesn't have a copy of it in neighborhood structures. If a particular data proprietor needs to change the data he needs to trade data back to his neighborhood site from the cloud, encode it again and move back to the server. Consequently, it achieves a high correspondence overhead and generous count inconvenience on data proprietors. This motivates us to develop another procedure to re-fitting the task of methodology reviving to cloud server.

The remarkable trial of re-appropriating approach reviving to the cloud is to guarantee the going with requirements:

1) Correctness: Users who have sufficient qualities ought to at present have the ability to unscramble the data mixed under new access game plan by running the main deciphering estimation.

2) Completeness: The course of action reviving procedure should have the ability to invigorate any sort of access approach.

3) Security: The system invigorating should not break the security of the passageway control structure or present any new security issues

Features of Attribute-based Access Control: In colossal data time, the volume of data is high and it is extending in a fast. The proposed trademark based access control (ABAC) method is exceptionally sensible for controlling tremendous data than ordinary access control systems due to the going with features:

1) Policy Checking Entity Free: In ABAC, get to approaches are portrayed by data proprietors yet don't require any substance (e.g., the server) to check these procedures. Or maybe, get to game plans in ABAC are maintained certainly by the cryptography. On account of this key component, ABAC is by and large associated with control immense data in cloud conditions, where cloud servers are not trusted to execute get to courses of action.

2) Storage Efficiency: In standard Public Key Cryptography, for each datum, diverse copies of figure works are conveyed whose number is with respect to the amount of customers. Contemplating the high volume of tremendous data, it achieves a massive storing overhead despite when simply increasing the volume of gigantic data. Fortunately, in ABAC, only a solitary copy of figure content is delivered for each datum, which can diminish the limit overhead in a general sense.

3) Dynamic Policies yet Same Keys: Data proprietors can use a comparative open key to encode data under different access methodologies, and customers don't need to change their riddle keys either. Likewise, data proprietors can change get to plans of existing figure messages by simply sending an interest to the cloud server, and let the server do the methodology change without spilling out any unstable information of the data and also the keys.

System Model

We consider a safe conveyed stockpiling structure for different masters, as showed up in Fig.1. The system appears in this paper incorporates five particular components: the overall declaration specialists (CAs), the property experts (AAs), the cloud (server), the information (proprietors) and the information buyers (clients).

CA:

Every CA is an overall trusted in support master in the structure. They recognize the enrollment of the significant number of customers and AAs in this system. What's more, the CAs is accountable for the scattering of overall secret key and overall open key for each genuine customer in the structure. Regardless, they are not locked in with any quality organization and the creation of secret keys that are connected with properties.

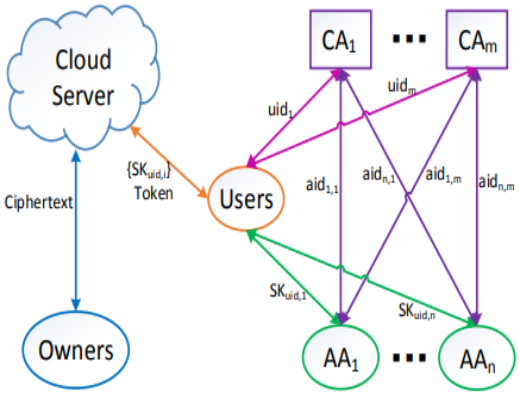

Figure 1: System Model of our Scheme

AA:

Every AA is a self-ruling property expert. Every AA is accountable for issuing, revoking and invigorating customer's credits as shown by their own one of a kind employment or identity in its space. Every attribute is connected with one single AA. In any case, each AA can manage an abstract number of characteristics. It is responsible for making an open quality key for every trademark it directs and a secret key for each customer accomplices with their properties. Every AA has positive direction over the structure and semantics of its properties.

Cloud server:

The cloud server stores the proprietors' data and gives data get to organization to customers. In this paper, the cloud server creates the unscrambling token of a figure content for the customer by using the customer secret keys issued by the AAs. Furthermore, the server also does the invigorate undertaking of the figure content when a property refusal happens.

Information Owner:

The Data Owner in this system portrays the passageway game plans of data. Under the methodologies, the data proprietors encode the data previously re-appropriating them in the cloud. Without relying upon the server to get the data get the chance to control, all the legitimate customers in the system can get to the figure content. In any case, the passageway control happens inside the cryptography. Exactly when the customer's attributes satisfy the passage game plan described in the figure content, can the customer decipher the figure content?

Customer:

A cloud customer could be an undertaking or one single customer. Each customer in the system is doled out with a couple of offers of an identity from the CAs, which can be collected and registered as its remarkable overall customer character. To unscramble a figure message that can be gotten to uninhibitedly from the cloud server, each customer may display their riddle keys issued by a couple of AAs together with its overall open key to the server. By then the system asks for that it make an unscrambling token for some figure works. Subsequent to tolerating the unscrambling token, the customer can translate the figure content using its overall puzzle key. The server can deliver the correct deciphering token, exactly when the customer's characteristics satisfy the passage technique portrayed in the figure content. To store the riddle keys and the overall customer's open key on the server, thusly, if no secret keys are invigorated for the further unraveling token age, the customer require not present any puzzle keys.

Key Generation:

Here Keys are delivering for every last one of a kind reports. At the period of customer recouping any archive key is essential for access the record. In a straight arrangement, the riddle is viewed as a part of a restricted field, and the offers are procured by applying an immediate mapping to the puzzle and a couple of self-governing unpredictable segments.

Course of action invigorates Authority:

The master delivers the key with the objective that proprietor can scramble the data and customer can unscramble the data. It checks the data is shielded moreover offer affirmation to the data. Each customer data is consigned with an overall customer personality and can uninhibitedly get the figure works from the Authority.

IV.METHODOLOGY

Characteristic BASED ENCRYPTION (ABE):

Property Based Encryption (ABE) has ascended as a promising methodology to ensure the end to-end data security in disseminated stockpiling structure. It empowers data proprietors to portray get to techniques and scramble the data under the methodologies, with the ultimate objective that just customers whose qualities satisfying these passage courses of action can unscramble the data. At whatever point more affiliation and tries re-proper their data into the cloud, the methodology reviving transforms into a significant issue as data get to techniques may be changed effectively and as regularly as conceivable by data proprietors. Nevertheless, this procedure invigorating issue has not been considered in existing quality based access control designs. The procedure invigorating is a troublesome issue in quality based access control systems, in light of the way that once the data proprietor re-appropriated data into the cloud, it would not keep a copy in close-by structures. Unscrambling is simply possible when the amount of organizing is something close to an edge regard d. Plan impediment is indispensable security feature of Attribute-Based Encryption .An adversary that holds distinctive keys should simply have the ability to get to data if no short of what one individual key stipends get to. The issue with property based encryption (ABE) plan is that data proprietor needs to use each affirmed customer's open key to scramble data. The utilization of this arrangement is bound in the bona fide condition since it uses the passageway of monotonic credits to control customer's passage in the system.

a) Key Policy Attribute Based Encryption (KP-ABE):

It is the balanced sort of built up model of ABE. Customers are named with a passageway tree structure over the data properties. Point of confinement entryways are the centers of the passageway tree. The properties are connected by leaf center points. To reflect the passageway tree Structure the secret key of the customer is described.

Figure compositions are named with sets of characteristics and private keys are connected with monotonic access structures that control which figure messages a customer can unscramble.

Key Policy Attribute Based Encryption (KP-ABE) plot is intended for one-to-numerous correspondences. KP-ABE conspire comprises of the accompanying four calculations:

Setup: Algorithm takes input K as a security parameter and returns PK as open key and a structure expert riddle key MK.PK is used by message senders for encryption. MK is used to create customer secret keys and is known just to the pro.

Encryption:

Algorithm takes a message M, individuals all in all key PK, and a course of action of characteristics as data. It yields the figure content E.

Translating:

It takes as data the customer's riddle key SK for access structure T and the figure content E, which was encoded under the property set. This figuring yields the message M if and just if the property set satisfies the customer's passage structure T. The KP-ABE plan can achieve fine-grained get the opportunity to control and more versatility to control customers than ABE contrive. The issue with KP-ABE contrive is the encryptor can't pick who can decipher the mixed data. It can simply pick clear attributes for the data; it is inadmissible in some application because a data proprietor needs to trust in the key underwriter.

Quality Based Access Control with Efficient Revocation in Data Outsourcing Systems:

This proposes a passageway control part reliant on figure content methodology attribute based encryption to approve get the chance to control courses of action with compelling characteristic and customer denial technique. The fine-grained get the opportunity to control can be refined by twofold encryption plot. This twofold encryption framework abuses the characteristic based encryption and specific social affair enter scattering in every property gathering. The advantage of this arrangement is securely managing the redistributed data. This arrangement achieves powerful and secure in the data redistributing structures.

Property Based Encryption with Verifiable Outsourced Decryption:

This plan changes the main model of ABE with re-appropriated translating to think about irrefutable status of the progressions in existing system. This new model forms a strong ABE scheme with clear redistributed unscrambling also does not rely upon unpredictable prophets.

Security Issue:

Multi-master CP-ABE tradition empowers the central pro to unscramble all the figure compositions, since it contains the expert key of the system; Revocation Issue: Protocol does not support quality disavowal.

Access Control:

Access control gives the endorsement to the customers which gives the passageway benefits on data and distinctive resources. Access control can be engaged in most of the enlisting condition, for instance, Peer to Peer, Grid and Cloud. Dispersed capacity organizations are gotten to through a circulated stockpiling entry. Access control is generally said to be system or procedure that grants, denies or limits access to a structure. It in like manner perceives when the unapproved customers endeavoring to get to the system. The generally used access control procedures are character based access control models. Access control in cloud depends upon the circulated stockpiling and its data security and the passageway decision ends up being especially essential decision in cloud. Access control is basic part in the server homestead of government and business Access techniques are for each situation irregular state decision that chooses how gets to are controlled and get to decisions are made. The inspiration driving access control in cloud is to keep the passageway on challenge in cloud by unapproved customers of that particular cloud which will redesign security in the cloud condition.

V.TRIAL RESULTS

Around there we have taken a gander at two symmetric figurings to be particular AES and Serpent. The parameters which are considered for examination are time taken for archive encryption and number of records as information. We have exhibited the relative examination of the two computations through graph that shows that Serpent encryption count gives ideal execution over AES encryption estimation.

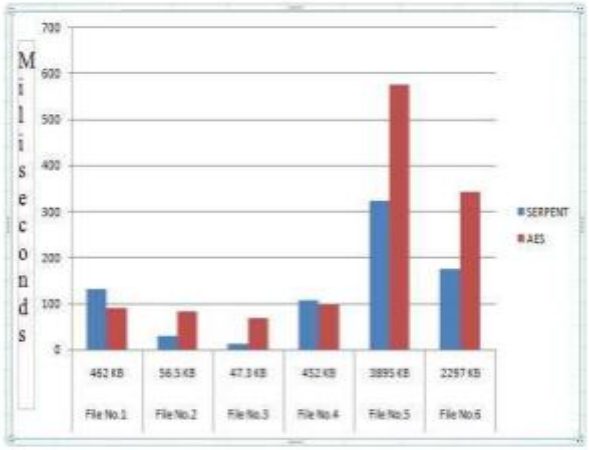

Figure 2: combined graph of AES and Serpent

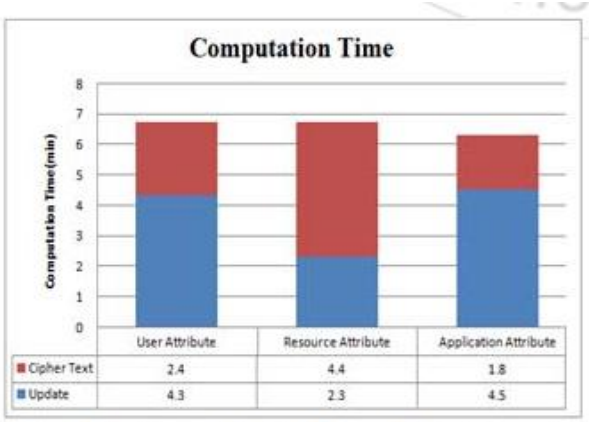

Figure 3: Computation time between Update keys and new cipher text components

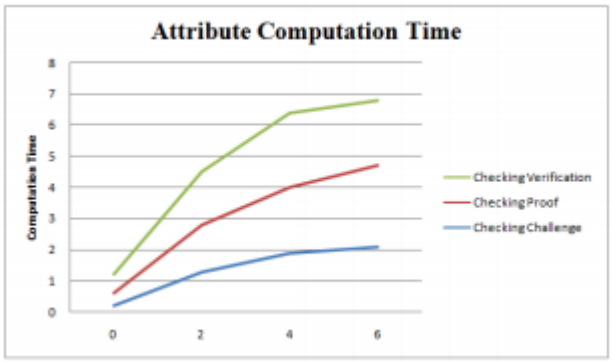

Figure 4: Computation evaluation of policy checking

To change the entrance arrangements of encoded information in the cloud, a minor technique is to give information proprietors a chance to recover the information and re scramble it under the new access strategy, and after that send it back to the cloud server. Be that as it may, this technique will bring about a high correspondence overhead and overwhelming calculation load on information proprietors.

VI. CONCLUSION

The proposed arrangement guarantees that the genuine data proprietor could pass the cloud server's affirmation and legally invigorate the figure content identifying with the proprietor's data, check and execution. A dynamic technique get the opportunity to control plot is secure in the customary bilinear social affair show. We have in like manner proposed an expressive property based access control plot for huge data in the cloud, and organized plan invigorating figurings for different sorts of access approaches. In addition, we proposed a procedure which engages data proprietors to check the rightness of the figure content invigorating. We moreover separated our arrangement to the extent rightness, climax, security and execution. The passageway control plot is based on prime demand get-togethers, in light of the way that the social event exercises on prime demand bundles are altogether faster than the ones on Composite ask for get-togethers. A dynamic game plan get the opportunity to control plot is secure in the regular bilinear social occasion show. Open key encryption moreover called as amiss encryption incorporates a few keys, open key and private key accomplices with a substance. Certification the data security in the cloud.

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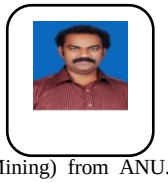

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A Study and Enhancement on Storage and Energy Efficient Using Cloud Computing

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ABSTRACT:--- Cloud computing is the most recent "evolving paradigm" that has transformed the way by which the Information Technology based services and facilities can be offered explicitly. It has renovated the model or technique of storing and managing data for scalable, real time, internet based applications, programs soft wares and resources satisfying end users' needs appropriately. Owing to the requirement of energy savings, several approaches to location sensing based energy-efficient solutions have been explored. The power consumption quantity of these infrastructures have gradually reached 1.5% from 1.1% of the total electricity consumed across the entire globe, and is expected to rise even more than this. Firstly, we state a systematic methodology for exploring the energy efficiency of most significant data center domains, including the utility server and network hardware equipment, as well as cloud management systems and the corresponding appliances consisting of a software package that can be predominantly utilized by end users. Secondly, we utilize the above mentioned approach for analyzing the already available scientific implementation and industrial literature investigations on state-of-the-art practices in the data centers and their equipment. Finally, we extract the existing practical challenges faced during implementation and highlight futuristic advancement directions.

Keywords: Cloud computing, energy efficiency,

I. INTRODUCTION:

Cloud computing is an emerging innovative service mode. It enables the end users and its clients to get roughly unconstrained computing skillset and ample variety of information tasks from the internet resources. This sort of new pattern configuration refers to the permutation and expansion to the IT infrastructure, through the network based technology to the required resources which include hardware platform, and software structures, virtual combination into a trustworthy and high performance and intact computing platform. In cloud computing, all users' facts and specific information are stored in the cloud resources Nodes. Several creative and ingenious trends are opening up the era of Cloud Computing, which is completely an Internet-based expansion and requires the use of computer technology. The ever most economical and added powerful processors, coupled mutually with the (SaaS) software as a service computing architecture, are transforming the available data centers into pools of computing service on a vast scale of the technology. The accumulating tremendous network bandwidth and reliable yet flexible network connections make it even more probable that the users can now subscribe for a very lofty quality services from data to software that is solely inherent on the remotely available data centers located globally. Moving the existing facts and elements into the cloud offers extremely liable convenience to the end users as they need not care about the complications of direct hardware management. The major challenge faced in this sector is utilization of energy efficiently and precisely thereby developing an eco-friendly cloud computing technology which is easily accessible.

II. LITERATURE REVIEW:

Beloglazov et al (2012) proposed the vitality mindful asset distribution calculations using the dynamic solidification of virtual machines. The structural standards for vitality proficient administration of mists, asset assignment strategies and booking calculations were advanced remembering the coveted nature of-benefit parameters and power utilization highlights of changing gadgets. The outcomes uncovered that in contrast with static asset designation systems, the proposed procedure productively lessened vitality utilization in cloud server farms.

Dong et al (2015) acquainted voracious assignment scheduler with examine vitality productive undertaking booking for cloud server farms. The errand task was figured as whole number programming issue to diminish the vitality utilization by cloud information servers by proposing the most-effective server-first undertaking planning plan. Reproduction results demonstrated that the vitality utilization utilizing proposed planning plan was 70 times lesser than the one dependent on arbitrary based assignment booking plan.

Neeraj Kumar Sharma et al (2016) Due to the developing interest of cloud administrations, distribution of vitality proficient assets (CPU, memory, stockpiling, and so forth.) and assets usage are the major testing issues of an extensive cloud server farm. In this paper, we propose an Euclidean separation based multi-target assets assignment as virtual machines (VMs) and outlined the VM movement arrangement at the server farm. Assist the assignment of VMs to Physical Machines (PMs) is done by our proposed half breed approach of Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) alluded to as HGAPSO. The proposed HGAPSO based assets assignment and VM movement not just spares the vitality utilization and limits

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the wastage of assets yet in addition maintains a strategic distance from SLA infringement at the cloud server farm.

Tejaswini K et al (2015) Cloud registering is a rising innovation which gives metering based administrations to customers. Distributed computing technique deals with ITC based administrations and also give the procedure for processing assets through virtualization techniques over web. Server farm is soul of distributed computing as it contains accumulation of various servers on which the entire Business data is put away and applications run solitarily. The fundamental objective of every one of these methodologies is to improve the vitality use in cloud. This paper gives review of writing overview on ways to deal with have vitality productive cloud.

Mueen Uddin et al (2009) have proposed a specific system for huge and complex server manors to have vitality effectiveness with low CO2 discharge to the earth. The system comprises of five stages with the end goal to actualize green server farms for cloud. This paper has segregated the datacenter assets into various pools and implements green measurements like PUE, server farm effectiveness on those assets to quantify the execution of every asset independently and furthermore utilizes virtualization innovation for appropriate usage of green IT server farm.

III. OBJECTIVES:

1. To investigate open research challenges in vitality effective asset administration for virtualized Cloud server farms.
2. To create calculations for vitality productivity
3. To play out a relative investigation of various vitality productivity approaches in distributed computing
4. To examination the Energy Efficiency Techniques In Cloud Computing.

Virtualization: Virtualization is an innovation that permits at least two diverse working frameworks running next to each other on only one PC or installed controller. It is being embraced in the designing scene at a high rate. It helps in better usage and working of more productive frameworks. As multi-center processors are supplanting single-center processors, numerous processor centers are probably going to be underutilized in a run of the mill framework. Most applications will have just a limited measure of parallel asks that can be executed at a given time, leaving numerous processors inactive.

Storage as a Service: By the use of capacity as an administration, consumers can re-appropriate their facts squirrel away requirements to the cloud. Every handling phase is performed on the client's PC which is considered to have a very strong state drive (e.g., streak based strong and state stockpiling), and the client's essential information and facts stockpiling is stored in the cloud. Information records or data management may incorporate archive folder, photos/images, or audio and video recordings. Documents stored astray in the cloud can be acquired to from any PC with the aid of an Internet association whenever and wherever required across the globe. Be that as it may, to make any change or modification to a record, it should initially be downloaded, and then altered utilizing the client's PC and after that the adjusted document with the appropriate modification is transferred back to the cloud. The exclusive cloud specialist co-op guarantees that there is adequate free space presents in the cloud and furthermore is responsible with the reinforcement of information that is modified. At last after a client transfers a document or information or data to the cloud, the client can allow read and change benefits to different clients. One of the best case of capacity as an administration is the Amazon Simple Storage benefit which known worldwide.

Results & Discussions:

Erection of a vitality productive cloud show not only demonstrates just vitality effective host machines. Other existing segments of a total cloud framework ought to likewise be considered for vitality mindful applications. A few research works have been done to construct vitality productive cloud parts exclusively. In this segment we will examine the territories of an ordinary cloud setup that are in charge of significant measure of intensity dissemination and we will combine the conceivable ways to deal with fix the issues considering vitality utilization as a piece of the cost capacities to be connected.

Energy Efficient in Cloud Computing: The Energy – Efficient manages playing out indistinguishable errands from previously while devouring less vitality, bringing about lower costs: It decreases the carbon outflows, to accomplish a greener domain. Vitality productivity isn't vitality protection. Vitality protection is decreasing or abandoning a support of spare vitality. Vitality utilization at various levels like equipment, servers other system gadgets, diverse wired and remote systems. He additionally studied that most extreme vitality is expended for cooling of gadgets as opposed to genuine usage.

Vitality productivity has turned into an inexorably imperative worry in server farms in light of issues related with vitality utilization, for example, investment costs, implementation costs, and natural effect. Although vitality misfortune due to problematic utilization of offices and tending to vitality wastage in IT gear still requires the appropriate plan and timely execution of vitality mindful asset administration frameworks. This proposal centers around the advancement of asset distribution strategies to enhance vitality effectiveness in server farms. It utilizes three ways to deal with enhance productivity for streamlined power and execution: scaling virtual machine (VM) and server handling abilities to decrease vitality utilization; enhancing asset use through remaining burden union; and misusing asset heterogeneity.

Energy efficiency: Vitality effectiveness: Energy productivity can be characterized as a decrease of vitality utilized for a given administration or level of action. In any case, because of scale and multifaceted nature of server farm gear it is to a great degree hard to characterize special administration or action that could be inspected for its vitality proficiency. Thusly, we distinguish four situations inside a framework where vitality isn't utilized in effective route, yet rather it is lost or squandered, as appeared in Figure 1.

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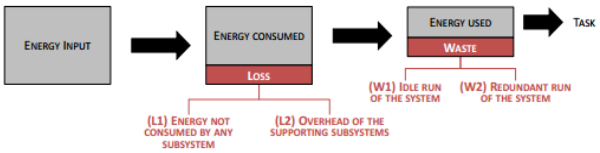

Figure 1: Circumstances where energy is lost within a system.

The two terms characterize wasteful vitality utilization from a rationalist perspective, where vitality misfortune alludes to a vitality conveyed to the framework, however (L1) not devoured by the corresponding subsystems, e.g., vitality lost because of transport or change. This likewise incorporates (L2) vigor overhead of the auxiliary subsystems, for example, cooling or lighting inside a server farm, where Cloud administration segments are provisioned and is considered as its fundamental reason. Vitality squander alludes to a vitality utilized for its principle reason, anyway for the (W2) inactive keep running of the framework, e.g., processor being turned on however running inert. Moreover, (W2) excess keep running of the framework is additionally considered as vitality squander, e.g., keeping a cooling framework at greatest amidst the nights when the temperatures are fluctuating and lower than the normal.

Energy Efficiency Metrics: There is nobody single vitality effectiveness metric that is fitting for all cases and for all datacenters in light of the fact that no two datacenters have a similar scale, capacities, expenses, and outstanding tasks at hand. In addition, a metric may try to evaluate office productivity or IT gear proficiency. Along these lines, activities, for example, Green Grid, vitality star, and SPEC have proposed various diverse measurements. Understanding the measurements may give a superior perspective of how vitality can be advanced. The measurements can be classified as office, IT gear, or a mix of the two.

At the office level, Data Center framework Efficiency (DCiE) is the rate reverence contingent by isolating IT hardware. PUE, the reverse of DCiE, is the proportion of aggregate datacenter vitality use to IT gear vitality utilization. PUE is well known datacenter effectiveness metric since it was among the primary measurements and is straightforward. What's more, not all PUE estimations incorporate similar overheads, same time length, and true estimations. The Corporate Average Datacenter Efficiency (CADE) metric consolidates estimations of vitality effectiveness and usage of office and IT gear. The server PUE (SPUE) metric evaluates the vitality proficiency of the IT hardware itself, and is the proportion of aggregate server input capacity to control devoured by the segments specifically associated with calculation, for example, CPUs, DRAM, and so forth.

Energy Efficiency Techniques in Cloud Computing:

Vitality effectiveness has risen as a standout amongst the most imperative outline prerequisites for current processing frameworks. Distributed computing has brought about the foundation of substantial scale server farms far and wide. Server farms keep on expending tremendous measures of electrical power, adding to high operational expenses and carbon impressions to nature. Different vitality proficiency strategies have been gone for in the server farms under exploratory conditions. The reasonable use of these strategies is still under investigation. These methods are:

Dynamic Voltage and Frequency Scaling (DVFS): Change the voltage dynamically and recurrence of the CPU as a host as per the outstanding task at hand and afterward adjusts the CPU control utilization in like manner, which would modify the execution level also [13]. DVFS empowers processor unit to keep running at various mix of recurrence with voltage to lessen the utilization of power of the processor unit. This procedure watches the vitality use E of an errand running with a specific recurrence f that can be communicated with the accompanying condition E = k .v^2.f.t where k is a gadget subordinate consistent, v is the voltage and t is the execution time.

Dynamic Component De-Activation (DCD): is actuation and deactivation of the segments based on characterized principles prompting better execution. The inert disjoins or segments could be turned off or moved to less power expending state like rest mode and tentatively confirmed that a perfect server expends around 70% of the power used by a completely used server.

Resource Throttling: It is an answer for controlling the clients are permitted to devour the cloud assets. Asset throttling should be possible in different routes at the equipment or at the product level with the end goal to meet the execution prerequisites and limit the vitality utilization. In a cloud domain, there are a few parameters throttled the Network data transfer capacity, stockpiling, CPU use and I/O tasks.

VM Consolidation: In a distributed computing condition, each physical machine has various virtual machines whereupon the applications are run. Outstanding task at hand combination implies better source use and effective vitality putting something aside for cloud information utilizing movement of virtual machinery setup (VM) and re-distribution of remaining burden. VM can be exchanged over the hosts as indicated by the shifting needs and accessible assets. The VM movement technique centers on moving VMs so that the power increment is minimum. The most power proficient hubs are chosen and the VMs are exchanged crosswise over to them. It evacuates the idea of territory in the appropriate virtualized situations.

Datacenters:

A datacenter is an office in which various servers, stockpiling units, and systems administration gear, together with all non-processing equipment, for example, cooling plant and continuous power supplies, are gathered in light of normal natural prerequisites, physical security needs and also for simplicity of support. Datacenters extend in size from server rooms that help little to medium-sized associations to server cultivates that run substantial scale cloud administrations.

The development of vast scale datacenters is likewise determined by the expanded abilities of cloud administrations, quick development of distributed

computing as the accepted worldview by which online administrations are given, and the uncommon measure of information being produced by present day applications. These datacenters generally have a huge number of servers that devour enormous measures of intensity. Hence vitality utilization has turned into an imperative concern on account of its effect on capital costs, working costs, and ecological supportability.

Administration of such heterogeneous framework requires adaptable and far reaching CMS with cutting edge checking capacities. Coordinating direct administration of supporting frameworks, for example, cooling and power supply includes extra layers of multifaceted nature. Nonetheless, even with ICT gear administration alone, CMS requires observing data on advancement, execution, state, information measure, and additionally equipment measurements with the end goal to help savvy booking and equipment coordinating. Encourage enhancements include organization of Clouds through streamlining activities more than a few geologically appropriated server farms. Such methodologies require not just communication among programming and equipment inside a solitary server farm, yet a trade of data, client load and information over the globe also.

Usage of Cloud in Energy Efficient Manner:

Alongside enhancing the vitality proficiency of server farms, the server farms in the Cloud Computing idea can give use to enhancing the vitality productivity on a bigger scale. Rather than utilizing separate processing frameworks, clients can solidify their registering necessities and move to the Cloud Computing condition, or, in other words than the littler figuring frameworks because of its greater scale. Vitality proficiency models, for example, Clear display created by the Lawrence Berkeley National Laboratory give a way to deal with examine vitality investment funds when moving to Cloud. It gauges capability of up to 95% of decrease in vitality utilize contrasted with existent business programming use, incorporating client relationship administration (CRM), efficiency and email programming. Computerized ones can likewise have huge vitality sparing effect. This incorporates video industry that by using Cloud Computing idea can stream video over the web, which decreases vitality utilization by 15% contrasted with delivery it on CDs and DVDs.

But utilizing Cloud Computing idea for its fundamental reason, the Cloud Computing framework and its adaptable nature can likewise be used in a roundabout way for vitality improvement. Methods, for example, DVFS and controlling on/off machines can be utilized for recurrence direction of a power arrange. Utilizing this methodology, server farm's dynamic load can be utilized for managing power request and hence generation, or, in other words keeping ideal recurrence of the power matrix. In addition, power suppliers pay for such an administration of dynamic load, empowering the server farm to procure a half of million dollars every year. Also, rather than just devouring vitality, current server farms are getting to be vitality makers with on location control generators. Not just that this methodology lessens costs for the server farm, it additionally diminishes control misfortunes because of a vitality exchange and the heap on a vitality network.

IV. CONCLUSION:

The most pertinent significance of Cloud Computing is incessantly increasing the reputation of Energy efficiency in Cloud Computing in parallel. This publication confers the various practices and procedures of energy efficiency in Cloud Computing which is considered as the cutting edge of worldwide research in today's scenario. It is also established that Energy Efficiency along with Cloud Security in a cloud computation environment is quite complicated. However, if the major discrepant parameters like CO2 emission security for decrease at data central level can give a solution for both the challenges to some extent.

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A Schematic Approach on Web Data Mining In Online Spread Detection of Terrorism

A.Sai Hanuman, G.Charles Babu , P.Vara Prasad Rao, P.S.V.Srinivasa Rao ,B.Sankara Babu

Abstract: ***Dread based oppressor advancement has extended in explicit bits of the world. Dread based oppressor packs use Facebook, WhatsApp, messages to spread their information on the casual network. It is key to recognize mental fighting and keep its spreading before a particular time. The basic idea of this undertaking is to reduce or stop spreading of mental mistreatment and to clear all of these records. A dread based oppressor is spreading their mental fighting activities using the web by talk, content, accounts. Dread based oppressor clusters are utilizing the web as a medium to convince irreproachable people to share in mental oppressor practices by goading the all inclusive community through webpage pages that move upset individuals to take an interest in the dread monger affiliation. This needs a lot of human effort to execute this endeavor will assemble the information and find the dread monger social affairs. To diminish the human effort, we execute the structure which perceives dread monger groups in online life. Mental persecution has built up its hidden establishments exceptionally some place down in explicit bits of the world. With extending dread based oppressor works out, it has ended up being basic to check mental persecution and stop its spread before a particular time. So as perceived web is an imperative wellspring of spreading dread mongering through talks and accounts. Dread monger affiliations use web to rationally condition individuals and advance mental aggressor practices through provocative site pages that persuade defenseless people to join mental oppressor affiliations. So here we propose a compelling web data mining structure to recognize such web properties and standard them thusly for human review.***

Index Terms: ***web data mining, terrorism, web structure mining, dread monger affiliations.***

I. SCOPE OF WORK

Dread based oppressor affiliations are using the web to spread their exposure and radicalize youth on the web and urge them to submit mental oppressor works out. To decrease the online impression of such dangerous destinations we need to make a

System which perceives unequivocal watchwords in that particular website and if those catchphrases are found, by then that webpage should be boycotted. Data Mining (DM) similarly as Web Mining (WM) is used together from time to time for compelling system progression. WM moreover contains content mining methodologies that empower us to yield and think significant substance from unstructured data. Content mining empowers us to recognize models, catchphrases and imperative information in unstructured compositions. The planning mode in the mental oppressor following system is used to choose the inclinations and interests of an ordinary dread monger gathering. It is performed by site page planning utilized by the dread monger in the correct technique for time. The strategy for disclosure in the dread monger following system is used to perform steady examining the traffic on the web. It is gotten by the social occasion watching the substance that is available on the web. This, along these lines, raises the alert if the information utilized is related to the dread monger lead and it isn't care for the direct and excitement of the typical customer. The adjustment of the mental aggressor following structure tests is executed on the earth of the adjacent framework and it is surveyed. This fast learning based framework is used for following the mental oppressor by analyzing the web traffic data as indicated by the information was given by the survey. This assignment works by learning the fundamental lead and energy of the dread based oppressors by using the web data mining count to remove the printed substance of mental oppressor destinations. The regular lead of the mental activist is gained by the profitable examinations which are utilized to play out the ceaseless recognizable proof of dread based oppressor from the social occasion of commonplace customers. Mental abuse is portrayed as: "An unlawful one-sided use of physical or extrasensory severity (or danger of it) for further political goals went for customary people or non-warriors, etc., to change current game plans their methodologies and structure". WM is the use of information extraction systems and data mining used to discover patterns and gain from the World Wide Web (WWW). By and large, WM has three classes, namely:

• Web Content Mining - exposure of important facts from substance, picture, sound or video content in the WWW.

• Web Structure Mining - examination of the center and affiliation (chart) fundamental single destinations, similarly as greater aggregations of interrelated regions

• Web Usage Mining - normally referred as Web examination incorporates isolating profitable fact from server

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logs and distinctive sources organizing use plans.

Various experts and specialists examined the issue to handle such issue. National security load up in like manner realized best frameworks to think about the fear activities and media in light of the way that those are generally visited by social orders a great part of the time and society are needy for those. Dread mongers suspected that it was definitely not hard to scourge people; they can without quite a bit of a stretch spread the fear among a living thing, Society and some particular country. Security is major point behind this to shield our country from such dangers. Computerized security is one of the streams concentrating on security over net and recognizing the bad behavior scenes. Here we are going to express our proposed technique for distinguishing fear related activities on net. How such activities are to be perceived and told with the objective that one come to consider future threats. Data mining oversees it since huge part to more strengthen the security essentials.

The Internet is a capable correspondence structure that is continuously used by dread monger relationship to safely talk with their accomplices, organize movement plans, spread deliberate exposure messages, raise holds, and bring new supporters into their frameworks. Governments and understanding associations are calling to put noteworthy undertakings being created of new procedures and progressions for recognizing dread monger practices on the web in order to turn away future shows of fear. TDS presents a manual for such an effort.

By strategies for substance checking and examination of pages gotten to by a social affair of web customers, it is possible to prompt their normal regions of premium. It is in like manner possible to perceive customers that get to express, possibly absurd information on the web. Using this strategy, continuous web traffic watching may be per-formed to recognize dread mongers as they get to ordinary fear related substance on the between net. Fear Detection System (TDS) depicted in realized this approach.

II. OBJECTIVES OF THE STUDY

To consider an audit paper on estimate of online spread of mental fighting on twitter

- To Detect Online Spread of Terrorism Using Data Mining
- To structure Unauthorized Terror Attack Tracking Using Web Usage Mining
- To design an approach to identify terror activities
- X Graphics CLUS: Hyperlinks related to Web Mining activities and Terrorism Content destinations for Security issues related to Homeland.
- To structure a collective DM application for Analysis of universal terrorist attacks.
- To consider Multilanguage Semantic Behavioral Algorithms to discover dread based oppressor related online substance.

III. LITERATURE REVIEW

Ghada M. Tolan and Omar S. Soliman (2015) Terrorist bunches utilize the Web as their framework for different purposes. One model is the enclosing of new neighborhood cells that may later finish up exceptional and perform shows of fear. The Terror Tracking utilizing Web Usage Mining (TTUM) is away for finding on the web access to odd substance, which may join fear based oppressor made objectives, by examining the substance of data gotten to by the Web clients. TTUM works in two modes: the arranging mode and the conspicuous confirmation mode. In the arranging mode, TTUM picks the typical interests of a pre indicated get-together of clients by dealing with the Web pages gotten to by these clients after some time. In the affirmation mode, TTUM performs steady checking of the Web traffic made by the watched collecting, dismantles the substance of the got the chance to Web pages, and issues a caution if the got to data isn't inside the standard interests of that get-together and like the fear based oppressor interests. A starter modification of TTUM was finished and assessed in a near to structure condition. An imaginative learning based system for mental oppressor following by exploiting Web traffic substances as the overview data is exhibited. The proposed technique learns the common lead ('profile') of fear mongers by exercising an information mining tally to the printed dread related Web objectives. The subsequent profile is promoted by the framework to execute nonstop divulgence of clients related with fear based oppressor works out. The Receiver-Operator Characteristic (ROC) performance depicts that this framework can beat a heading-based interruption recognizing evidence structure.

F. Bolz (2001) In this paper we are dialog about the Data pre-arranging is an essential undertaking of TTUM application. All things considered web mining framework can be utilized for seeing and staying away from dread dangers accomplished by mental oppressors wherever all through the world. Information Mining (IM) and Web Information Mining (WIM) improvements will in a general sense impact counter-mental mistreatment. As we are seeing, one of the basic worries of our country today is to perceive and anticipate fear monger assaults. This is also changing into the objective of different countries on the planet. We have to look at the various IM and WM headways and perceive how adjusts for counter-fear based oppression.

Kumar., V., Zinovyev., R., Verma., Tiwari., P (2018) Multilanguage Semantic social calculations mapped to AI techniques so as to gather and assess mammoth extent of heterogeneous and complex Multimedia and Multilanguage fear based oppressor related substance from both the Surface and the Deep Web, so as to find (by "landing at an obvious goals"), see, break down, and screen potential mental lobbyist related exercises and individuals. At the social occasion a live demo of to-date got results and some examination starting from EU DANTE experience (a H2020 EU maintained ask about undertaking) will be appeared.

B. Thuraisingham (2003) Data mining has wound up being one of the key highlights of different country security works out.

Reliably utilized as methodologies for seeing extortion, looking into hazard, and thing retailing, information mining fuses the utilization of information examination gadgets to find adequately dim, extensive points of reference and relationship in enormous instructive records. As for country security, IM can be a strategy to see fear-based oppressor works out; for instance, cash correspondences and exchanges, and to perceive and seek after specific mental aggressors themselves, for example, through improvement and development records. While information mining tends to a noteworthy improvement in the sort of illustrative contraptions beginning at now open, there are impediments to its capacity. One basic is that paying little heed to the manner in which that IM can support uncover points of reference and affiliations, it doesn't inform the client regarding the respect or embodiment of these models. These sorts of choices are made by client. A subsequent imprisonment is while IM can see relationship among processes or possibly factors; it doesn't for the most part perceive a innovative accord. Gainful IM demands talented, explicit and enlightening masters for examining the structure and decipher the yield.

A. Sachan and D. Roy (2012) Terrorism has wound up being a boss among the most tedious issues to regulate and a noticeable danger to humanity. To upgrade counter-mental battling, two or three research works are making able and cautious frameworks; information mining is unquestionably not a one of a kind case. Tremendous information is skimming in our lives, in any case the extraordinary accessibility of honest to goodness fear monger strike information in the open space makes it disappointed to battle mental battling. This remarkable copy bases on information mining blueprint structures and reviews the action of United Nations in counter-fear mongering. It isolates the execution of classifiers, for example, Multilayer Perceptron, Lazy Tree, Naïve Bayes classifiers and Multiclass for viewing the precedents for fear based oppressor ambushes the world over. The database for fundamental arrangement is delivered utilizing distinctive open and open access hotspots for a noteworthy long time 1970-2015 including 156,772 pronounced strikes causing gigantic debacles of property and lives. This work counts the mishaps happened, slants in assault rehash and places dynamically inclined by considering the strike commitments as evaluation class.

A. Malathi and Dr. S. SanthoshBaboo (2011) As the examination is client need based system, a few additional models may found. For prospective research work, there are two or three skylines to work upon with this examination. As an issue of first centrality is accomplishing a precision of classifiers up to 99%. This ought to be possible by acquired estimations and noteworthy neural systems near to the classifiers utilized in proposed research work or a mix of the varying classifier. During the examination process, work extended to the tertiary solicitation of a fragment of traits and all things considered till right hand for the improvement of quality. It has focal points and downsides also. Obliging the solicitation of at-12 tributes lessens the figuring multifaceted structure yet for divisions having a scarcely low event that induces biasing nature. One of the destinations is to in like way expand the sub-depiction layers and recognizes both so as to discover persistently pleasing models. So likewise comparatively similarly as with tremendous educational rundown needs Big Data to dispose of propensity and change in want. Moreover, utilizing fear monger information it is conceivable to foresee the affiliations associated with the proclaimed strikes. In any case, further examination should be conceivable to recognize a fear monger bunch utilizing chronicled information. In IM, frameworks may be passed from finding the guides to counter fear based oppression by making Terrorist Association Prediction Model (TAPM). The structure parameters are online substance, works out, easygoing affiliation information, telephone calls, messages, and so on by utilizing the diagram and model mining.

IV. METHODOLOGY

Web burrowing estimations are used for mining the abstract information that is open in the site pages in the wake of social event the printed information the words appropriate to the dread based mistreatment is recognized. Locales that have been made using various stages, particular count and differing programming tongues are pursued. The proposed system can check whether the locales and the substance on the web are progressing and spreading the activities related to mental fighting and the dread based mistreatment related exposure is checked and a short time later recognized. The proposed system is used to recognize and separate the locales and besides orchestrate them as necessities be as the dread based abuse related and the run of the mill genuine customers and sort them as the common customer or the mental aggressor. Data mining and web data mining are the two features that are to be used together for this recognizable proof strategy.

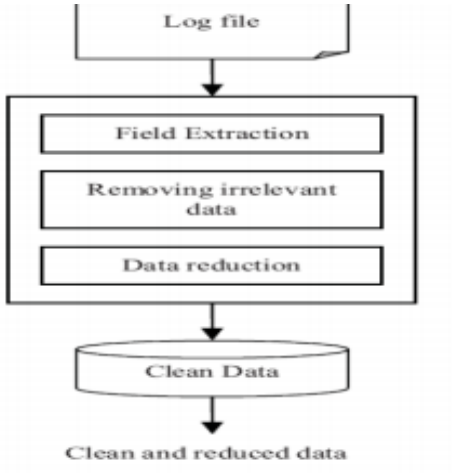
Data mining methodology is utilized to choose and describe the precedent from the available social affair of the destinations and the data from the locales mined are the colossal volume of data sources, the results gained are commonly used. WM is similar to DM since it incorporates the substance mining procedures that are used to look at the data and besides removing the profitable precedent from unstructured data. The proposed structure is extensively used by the governing body for antagonistic to fear mongering affiliations. The proposed system intends to help such relationship for following the dread based oppressor. Destinations must have characteristics that are referenced:

Weight Balancing: This is required by the destinations since the chairman can get to the system by the available logs of the manager subject to the stack that is given to the server is to be confined and set specialist over it. This is practiced for the passage of the executive.

Accessibility: For the straightforward receptiveness of the records and store the other available information for basic access independently.

The structure must be anything but difficult to utilize: The Website that is given to the open must be straightforward for basic use. The system must be powerful and moreover reliable. Straightforward help of destinations is essential for web data mining. These credits are said to be trailed by destinations for compelling mining of the locales.

Working System stream



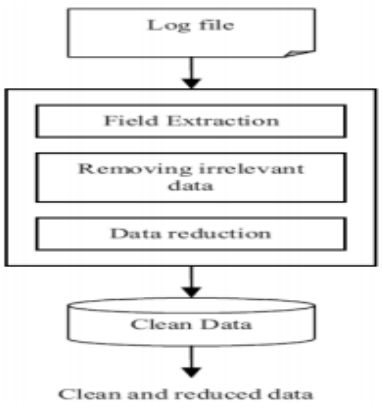
Information Storage: The deferred outcomes of preprocessing from the logs of web server are verified in a social database to enable clear recovery and examination.

Information Preprocessing (IP): The preprocessing changes over the foul information into the information discussions urgent for example revelation. The motivation driving IP is to enhance the information quality and expansion mining exactness. IP contains extraction of field, information cleaning. This stage is likely the frustrating and intolerant advancement of the general procedure. This structure basically portray it immediately and express that its central endeavor is to "clean" the harsh web log records and supplement the managed information into a social database, to apply the IM frameworks in the subsequent time of technique. Hence, the standard undertakings are:

1) Web log extraction that aggregate information in web server.

2) Web logs cleaning process and expel the bounty data.

3) Parse the information and spot a social database or an information stockroom and information is reduced to utilize in rehash examination to make plot reports.



Field Extraction

The log segment encompasses assorted ranges for discrete preparation. The way toward isolating range from the current line of log document is referred as the field extraction. The server encompasses the arranged characters as the dividers. The effectively utilized separator is the 'space' character.

Information Cleaning (IC)

Information cleaning disposes of irrelevant or insignificant things in the examined information. A site can be gotten to by an extensive number of clients. The fizzled HTTP status codes are consolidated into log information. IC is generally site unequivocal, and joins superfluous notes to installed articles is not a fundamental for reason behind examination, including notes to style records, portrayals or sound reports. All things considered passages are purposeless for examination stage is cleared from log documents. Through DC, blunders and oddities will be perceived and expelled to enhance the possibility of information. Estimation had cleaned uproarious information similarly as diminished isolated, conflicting and immaterial deals as indicated by sort out 4 and 5. Blunder demands are counterproductive for the way toward mining. The mentioning are cleared by investigating offer status. For instance, the status 404 shows the referenced asset isn't closeness. By at that point, this log region in log reports is exhausted. Furthermore, pointless log information is in addition executed URL name postfix, for example, gif, jpg, etc in stage 6 and 7. At long last, regard and suffering records stay in SLT of database after information cleaning.

Central focuses

•It gives showing data.

•Web logs give an animating better procedure for get-together data on guests.

•To make changed web look devices, which can comprehend an individual's advantage demand in an individual route by investigating and profiling the client's solicitation direct?

•The information mining systems used to effectively perceive noxious executable before they run.

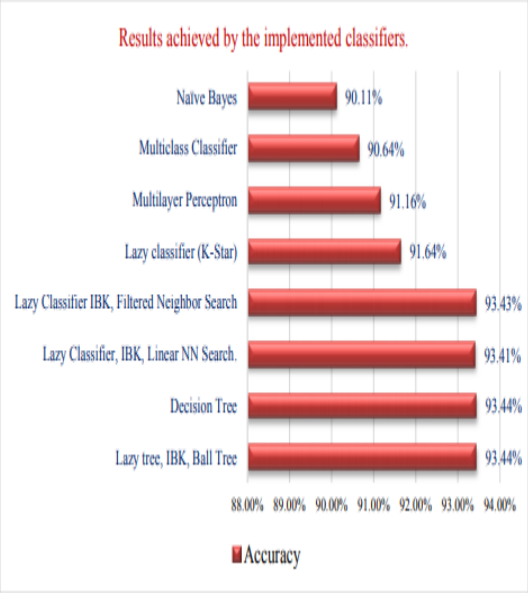
•Integrate information sources Clean/change information sources enhances the profiles of Terrorists and Examine results of Activities / Reports regarding the Prune results, last outcomes with data regarding the fear mongers and mental oppressor rehearses mine the information.

V. RESULTS

The classifiers utilized are: The Lazy-classifier IBK Filtered Neighbor Search and direct-NN, Multiclass Classifier, Decision Tree Random Forest, Lazy classifier K-star, Multilayer Perception, Ball Tree and Naïve Bayes. The accomplished outcomes with top of the line exactness' going from 90 to 95 %. Figure 5 depicts the execution outcome of utilized classifiers. The outcome tables demonstrate the yields accomplished by Multilayer Perception, Lazy Classifier K-star and IBK, Multiclass Classifier, Choice Tree

Random Forest and Naïve Bayes. The examination attempted to coordinate worldwide mental oppressor assaults by using different substance mining classifiers, for example, Decision Tree capricious woods, Lazy classifier IBK, NN, K-star and Filtered Neighbor Search. The reasonable exactnesses regarding classifiers execution is accomplished. This examination can be utilized to draw structures for disconnecting data about the dread strikes. A touch of the results of the work are as per the going with:

• Out of complete announced assaults from 1970 to 2015 which are 156772, 14664 are confirmed, 75966 are Not-Claimed and 66142 are bewildering.
• The degree of asserting the strikes by fear based oppressor affiliations fluctuates from 10-15 percent. This examination accomplished a rate of 11%. (Notwithstanding how maintained that assaults more occurred from 2016 and few more commitments taken to ambushes for the reason the degree is variable).
• The certified stake is Asia in continuing with ambushes which are in every way that really matters 45% of the immovable assaults.
• Law Enforcement and Government bodies are the practical objectives making up to 40% looked for after by Citizens is 22%.
• The loss occurred because of fear based oppressor strikes is most critical for Moderate afflictions which are detached from each other individual 64%.
• The sorts of strike, for example, assaulting and furnished catch are extensively seen is 48.45 and 24.50 percentages freely.
• Explosives, Firearms and Bombs are the noticeable weapon sent in the ambushes with 50.47 and 33 percentages independently.



Classifiers Graphical Result

The Clustering module gets to the assembled vectors and performs unsupervised gathering achieving n packs addressing the normal subjects seen by dread monger customers. For each gathering, the Terrorist-Represent or module enrolls the centroid vector (demonstrated by Cvi) which addresses a subject ordinarily gotten to by dread mongers. Along these lines, great deals of centroid vectors address a ton of dread mongers interests suggested as the 'Ordinary Terrorist-Behavior. Content examination is used to discover dark, genuine models and associations in considerable enlightening records. In reality, even substance examination has a remarkable potential to perceiving dark substance files, there is an obstruction that human created language is so far tangled for machine to understand semantic ramifications of it. Consistently, various examinations have been made by using quantifiable methods to address reports into noteworthy game plans, for instance, TF-iDF. This is the most principal system for making sense of which words are basic in the given substance educational gathering. Nevertheless, execution state subject to TF-iDF isn't sufficient if the proportion of data is pretty much nothing. What's more, this philosophy depends upon the sack of words to register TF-iDF regard

$$TF\ (t) = \left(\frac{n}{N}\right)$$

$$IDF\ (t) = \log_e\left(\frac{T}{t}\right)$$

n = Number of times term t appear in a document
N = Total number of terms in document
T = Total number of document
t = Number of documents with term t in it

VI. SOME COMMON MISTAKES

The Typical-Terrorist-Behavior relies upon a ton of Web pages that were downloaded from mental oppressor related goals and is the guideline commitment of the ID estimation. In order to make the revelation computation progressively definite, the route toward making the Typical-Terrorist-Behavior must be reiterated irregularly due to changes in the substance of mental aggressor related site. Common Terrorist-Behavior depends upon the amount of packs. Right when the amount of gatherings is higher, the Typical-Terrorist-Behavior joins more topics of excitement by mental activists where each subject relies upon less pages. It is hard to estimate what the perfect number of packs is. For the circumstance mull over showed in the accompanying region distinguishing proof execution for two settings of the amount of bundles are shown. The marker issues an alert when the likeness between the passageway vector and the nearest centroid is higher than the predefined edge implied by tr:

$$Max\left(\frac{\sum_{i=1}^{m}(tCv_{i1}, tAv_i)}{\sqrt{\sum_{i=1}^{m} tCv_{i1}^2 . \sum_{i=1}^{m} tA_i^2}}, \ldots, \frac{\sum_{i=1}^{m}(tCv_{in}, tAv_i)}{\sqrt{\sum_{i=1}^{m} tCv_{in}^2 . \sum_{i=1}^{m} tA_i^2}}\right) > tr$$

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VII. CONCLUSION

As the examination is client need based methodology, several additional points of reference can be found. This ought to be possible by hereditary estimations and huge neural systems near to the classifiers utilized in the proposed research work or mixer of diverse classifiers. The examination proceeded up to tertiary game-plan of a touch of properties and everything considered up to partner for individual trademark, which incurs inclinations and disadvantages too. Restricting the solicitation of at tributes lessens the estimation multifaceted nature for vaguely depressed event, it prompts biasing. The objective is to correspondingly develop the sub-gathering attributes and layers to discover powerfully strong precedents. Additionally with huge edifying rundown needs Big Data to dispose of tendency and change in want. In like manner, utilizing mental attacker information it is conceivable to anticipate the affiliations attracted with the detailed strikes. Regardless, further examination can be done to perceive a psychological oppressor bunch utilizing clear information. In the lieu of proposed work, IM, approaches are sent from determining the guides to counter fear mongering by making TAPM. The structure parameters are online substance, works out, easygoing system information, telephone calls, messages, and so forth by utilizing the layout and point of reference mining.

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Improved Data Security for Storing and Authenticating in Cloud using ERSA Algorithm

Rokesh Kumar Yarava, J Kavitha

Abstract*: Present days, huge amount of data stored with cloud service providers. The Third- party auditors (TPAs), with support of cryptography, are frequently utilized to prove this data. Auditing will be capability for cloud clients to prove the existence &functioning of their supplier's security measures. Authentication is done by using username and password. The important point in authentication is to protect data from the access of unauthorized people. The proposed scheme is Enhanced RSA (ERSA) Algorithm. This paper presents solution to enhance the security and privacy to stored data in cloud. Result demonstrates that this scheme can progress the security of data that stored in cloud.

Index Terms — cloud computing (CC); information security; confidentiality; integrity, Enhanced RSA (ERSA) algorithm

I. INTRODUCTION

The cloud computing will be an administration delivering method on internet. It could offer clients with versatile benefits as needed through the web &generally distinguished & applied. To use the resources of computing are very securely and effectively, people start to pay attention to unseen safety issues in cloud. The access control will be very significant dimensions to ensure the cloud computing safety.

The environment of CC will be usual disseminated environment; consequently the anonymity, dynamism, &distribution of data services &assets have notable characteristics of CC environment [1].

The main technique utilized in cryptography may be encryption. This technique conserves integrity & confidentiality of information. The confidentiality characteristic will be information constantly produced available to approved gatherings. The integrity is not permitting unapproved gathering to change the information that will be saved by client. The access control is the main significant dimension to ensure the safety of CC, numerous clients are using this access control to their data is confidential [2].

Cloud is also permits the similar strategy towards the concern of security. As stated by cloud environment, encrypting the information of clients might be finished by 2 parts, they are CSP or TPA. The 2 elementary purposes for development in storage of data in clouds are cloud based storage framework recoveries clients the overhead connected with assets that might make fundamental for an accepted in-house information storage result, & in its place, offloads these overheads to cloud, and ability proliferation compelled personal versatile registering devices [3].

Therefore, in present days the clients become under the encrypting methodology their sensitive information before sending it to cloud for storage. The ERSA technology utilizes 2 extra prime numbers in standard RSA method. This thought is raised from security RSA & high speed method that utilized 2 random numbers to generation procedure of key. Using this proposed algorithms proposed method insures the confidentiality, integrity, availability and durability property of service which will improve the cloud services reliability [5].

This idea is raised from Security RSA &High Speed method that utilized 2 random numbers for key generation procedure. Using this proposed algorithms proposed method insures the confidentiality, integrity, availability and durability property of service which will improve the cloud services reliability.

II. BACKGROUND

The public framework of auditing the data safely stored in CC & gives a PPA protocol. It empowers an outside auditor to audit cloud information of clients without know the information. A productive remote information auditing technique to storage the safety information in CC. Furthermore to dynamic operation, 3rd party verification, &other functions [1].

The TCM is presented under control method. The common trust among cloud service nodes & clients have guaranteed by trust device. The trust clients are access to cloud; concurrently clients might choose reliable service nodes of cloud. The method had a best malicious detection capability & adaptability. In environment of CC, whereas the reliability & safety of both connection parties have ensured, after the safety of information might be efficiently connections among cloud & clients [2].

The storage frameworks with various information sources are very applicable in numerous real world situations. The CSSP preserves a cloud storage giving the essential structure to make, store &upgrade outsourced databases, &makes this information accessible to subscribing customers. The customers are provided for read-only access to data base& commissioned approved customers have permitted to make variances under database [3].

In DCS supplier has infinite access to stored information, & this perspective turns into particularly critical whereas hybrid or public clouds have utilized.

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The data stored in CC will be secured from hardware faults. Whereas utilizing the CC & DCS in specific, there arises few problems associated to integrity & confidentiality of data in procedure of transmission & storage [4].

In RSA, an asymmetric key technology utilizing 2 diverse keys to decryption & encryption procedures. The size of key might be differed to create the procedure of encryption is strong. Consequently, it will be critical to the attackers to interrupt the information. Expanding key size correspondingly increments the time taken for procedure of decryption & encryption [5].

This paper introduces an enhanced data auditing and authentication scheme which helps to improve privacy of data owners this proposed theory.

III. PREVIOUS WORK DONE

The work [1] recommended a grid-based charging & joint routing technology for industrial remote rechargeable sensor networks. The authors Tie Qiuet. All recommended a greedy method with little world to enhancing the robustness for heterogeneous IoT. The suggested schema utilizes a best load dissemination approach that significantly lessens the computational overhead of customer. The recommended plan incorporates a lapse reaction scheme, & outcomes indicate that result has better error-handling capacity & provides lesser overhead payments for communication & computation than other methodologies.

The work [2] suggested trust based access control strategy in multi-domain of CC. The suggested strategy joining with TM, MTBAC method. The MTBAC method take credibility of cloud service nodes & behavior trust of clients under deliberation. The relationships of trust among service nodes of cloud & clients have recognized towards mutual trust component. The access control safety issues have resolved by executing MTBAC method under CC environment. The results represents that MTBAC method might ensure the collaboration among cloud service nodes & clients.

The work [3] suggested Auditing for information reliability & integrity in cloud storage. The suggested model introduces a scheme of query authentication for cloud-based storage framework whereas information will be retrieved towards customers & populated towards numerous sources. The framework permits customers to confirm the integrity & authenticity of retrieved information in proficient & scalable way, without need of implicit trust on storage service supplier. The suggested method will be rely on lately suggested “multi-trapdoor hash functions”, utilizing its assets to accomplish neighbor consistent computation &correspondence overhead to validating inquiry responses, in any case of the information size, or the amount of sources.

The work [5] recommended system for upgrading the information safety in cloud toward executing hybrid (Rsa&Aes) encryption method. The encryption may be completed by utilizing 1 popular asymmetric or symmetric key method like DES, AES, Blowfish, DES, RSA, & triple DES and so on; RSA method is a asymmetric key method utilizing 2 diverse keys for decryption & encryption procedures. The size of key might be varied to make encryption procedure will be strong. Therefore, it will be critical for attackers to interrupt the information. Expanding the size of key consistently enhances the time for decryption & encryption procedure. The suggested method lessens the time for decryption &encryption procedures by separating the document under pieces & increases the quality of method by expanding the size of key. This quality paves the path to store the information in cloud towards the clients without any trouble.

IV. EXISTINGMETHODOLOGIES

4.1 An Efficient Protocol with Bidirectional Verification

The suggested auditing protocol helps dynamic information operations that will be proficient& analyzed to safe in random oracle method. The suggested auditing protocol gives the help for statistical examination & bidirectional confirmation. The public framework of auditing the safety of information stored in CC & offer PPA protocol.

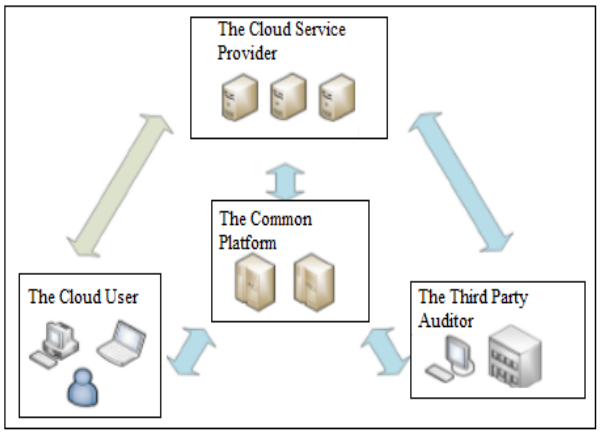

Fig. 1, System model

The recommended plan empowers an outside auditor to audit clients cloud information without learning the information. To make preparing much efficient, the calculations of customer account for little portion of total computation. Whereas the document will be changed, the owner of information might check to find if significant portions have in better situation. Further, the information manager might define the area of error, thus securing the information, which not been transformed.

V. 4.2 A MUTUAL TRUST BASED ACCESS CONTROL MODEL

The recommended system is presented trust computation method under access control method. The mutual trust among cloud service nodes & clients have ensured by trust mechanism. The MTBAC method not recognizes attitude of client trust & ensure the access of clients request postures no malevolent risk to cloud server, & takes cloud administration node's validity under account.

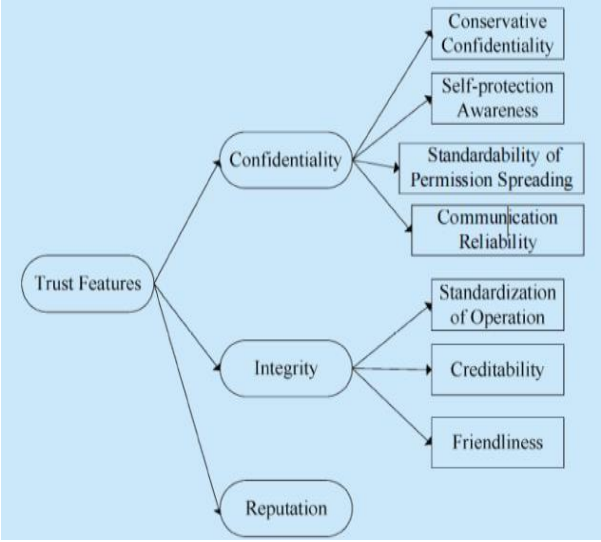

Fig. 2, the Division of Trust Attribute

The mutual trust method of cloud service nodes & clients has 2 part construction. One portion will be trust evaluation method of client's attitude & another portion will be trust computation method by cloud service nodes. The network level, made dependent upon of 3 attributes, reputation, confidentiality, & integrity.

VI. 4.3 Efficient and Scalable Query Authentication with Multiple Data Sources

The recommended system introduces a new component for query verification in cloud-based storage framework with help for several sources, which accomplishes persistent computation & correspondence overheads in any case of size of information, or amount of sources. The suggested plan accomplishes this towards producing confirmation tags of individual information components & aggregating tags of different information components utilizing a new system dependent on late suggested standard named as multitrapdoor hashing plan.

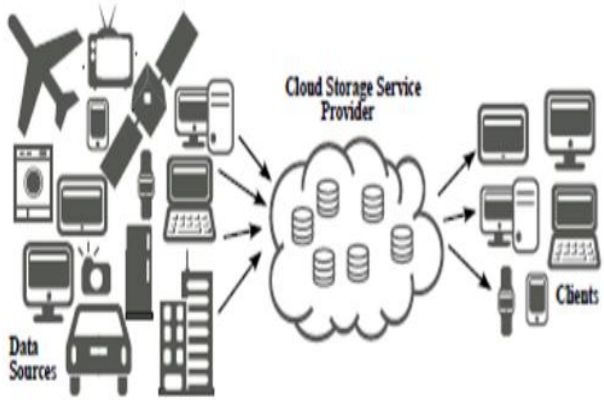

Figure.3. Cloud based storage system

The query authentication method for multi-source cloud based storage frameworks to give high safety & light weight operation. In terms of cost of operation, goal will be to decrease the communication, computation, & storage overhead at every entity utilizing cryptographic method, which scales with numerous sources, databases size & response of query.

VII. 4.4 The Method of Ensuring Confidentiality and Integrity Data

A method that describes the use of separate services outside the cloud for authentication, data management and metadata storage to eliminate the possibility of obtaining unauthorized access to data, and the use of metadata to perform integrity control. The owner of the database limits the access to data that is stored in an encrypted form and does not allow provider to interact with database.

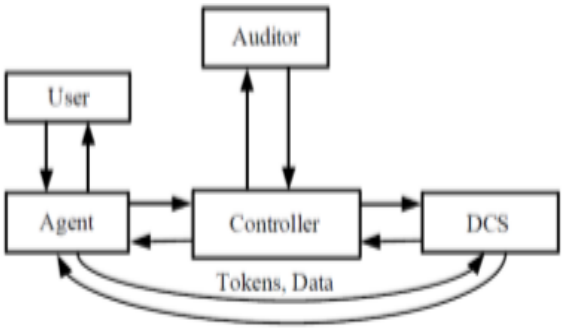

Fig. 4, Methods of encrypted data handling

Proposed a system of storage and generation of metadata based on checksums of information and time is introduced. Proposed method derived the set of methods of encrypted data handling in DCS that develop consists of procedures of saving, receiving and deleting data from DCS. All operations with encrypted data carried out in cloud computing should be performed without decryption. It is essential to store encryption keys beyond cloud computing.

VIII. 4.5 Enhanced RSA Algorithm with Varying Key Sizes for Data Security

The main technique utilized in cryptography will be encryption. This technique conserves integrity & confidentiality of information. The confidentiality characteristic will be information constantly produced available to approved gatherings. The integrity is not permitting unapproved gathering to change the information that will be saved by client. Numerous clients are using this access control to their data is confidential.

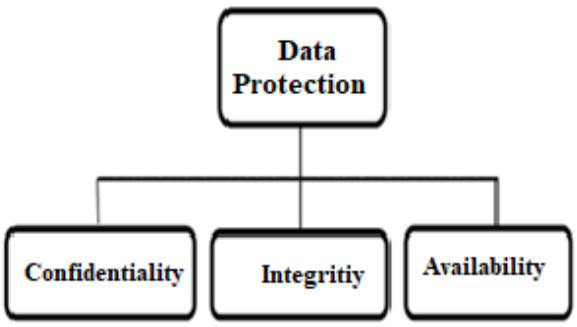

Fig. 5, Data protection method

The encryption may be completed by utilizing 1 popular asymmetric or symmetric key method like DES, AES, Blowfish, DES, RSA, & triple DES and so on; RSA method is a asymmetric key method utilizing 2 diverse keys for decryption & encryption procedures.

The size of key might be varied to make encryption procedure will be strong. Therefore, it will be critical for attackers to interrupt the information. Expanding the size of key consistently enhances the time for decryption & encryption procedure. The suggested method lessens the time for decryption & encryption procedures by separating the document under pieces & increases the quality of method by expanding the size of key. This quality paves the path to store the information in cloud towards the clients without any trouble.

IX. Analysis and Discussion

The auditing protocol support dynamic data operations, which is efficient and has been analyzed to be secure in the random oracle model. Proposed auditing protocol provides the support for bidirectional authentication and statistical analysis [1].

The access control is the main significant dimension to ensure CC safety. The mutual trust among cloud service nodes & clients have ensured by trust method. The trust clients are access to cloud, and concurrently clients might choose the most credible service nodes of cloud [2].

A new method for query authentication outcomes in cloud based storage framework with help for numerous sources, which attains constant computation & communication overheads irrespective size of data, or the several sources [3]. Whereas utilizing CC, DCS in specific, there arises an extent of topical problems associated to integrity & confidentiality of data in procedure of transmission & storage. Few services outside the cloud for data management, authentication, & storage of metadata to remove the probability of acquiring unauthorized access of information, & utilization of metadata to execute integrity control [4].

X. Proposed Methodology

First, Proposed Methodology proposes schemes which will helps to enhance security and authentication in cloud services. Proposed method introduce encryption and description scheme which eventually improves authentication process. First user login if user exists otherwise first user registration by using registration form. After the successful completion of login process then user can himself get the authority for storing the data into the cloud. Authorized user can select the two random picture or image from the gallery then form the one new image from these two images and this one new image is called as image fusion because this new image is a combination of these two images. Image fusion uses the numbers of XOR keys then user can select the random XOR key number. From these keys one strong password is generated and using this password, the user can select required data those are placed into the cloud. So that user can select maximum data for storing into the cloud and also achieve the security for stored data.

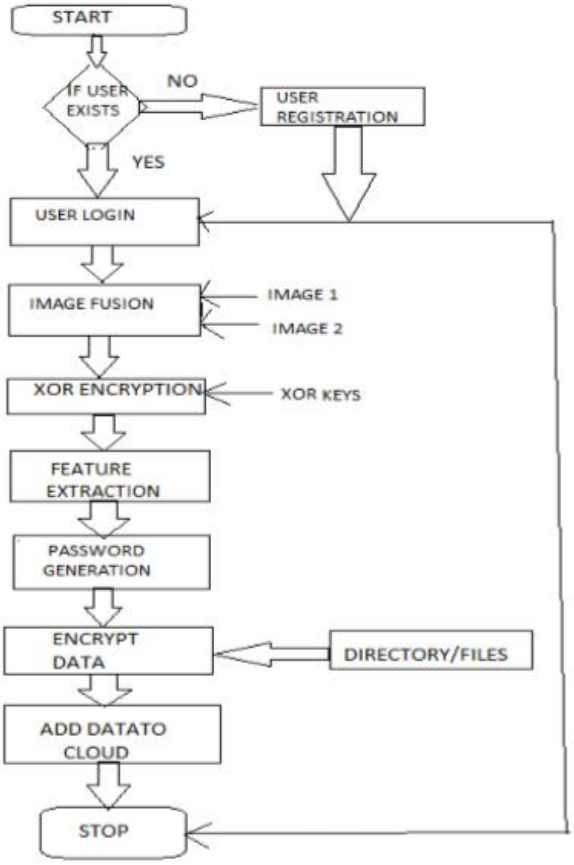

Figure.6. Data Encryption

XI. Outcome and Possible Result

This paper proposes a development concerning decryption &encryption time. The decryption & encryption time for secure RSA, high speed method &the suggested algorithm ERSA are taken into consideration for better performance. It is extremely scalable in terms of communication &computation overheads irrespective of data size, or numerous sources. Thus, overall, the proposed scheme achieves superior scalability and efficiency.

XII. Conclusion

This manuscript concentrated on speed is still improved in suggested method ERSA by separating the document into numerous blocks. Apart from incrementing the speed, the execution of ERSA method makes the increments the security strength. The outcome represents the decrease in decryption & encryption time as stated by ERSA than secure RSA & high speed.

Future scope

In this paper suggested method ensures the integrity &authenticity of choosing the query outcomes. In future plan is to prolong this mechanism to offer complete assurances that permit the customer to prove the cloud, returns each document, which satisfies the situation of query, help the diverse kinds of queries.

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Energy Efficiency Analysis between Green computing and Cloud Computing

J Kavitha, Rokesh Kumar Yarava

Abstract*: Usually cloud computing is based under effective data computing but green cloud computing focus on energy efficiency of device and computing mainly based on computing architecture. Here cloud computing is also known as green computing due its better effective energy. The purpose of green computing is to decrease the usage of harmful resources, maximizing energy efficiency throughout the living span of the good and also to promote the recyclability or bio degradability of useless goods plus misuse materials of the factory. In order to simulate the hardware by utilizing software, green computing plays a major role for various technologies like virtualization, green data center, cloud and grid computing and power optimization. Here computer resources are effectively utilized by replacing the data center standalone server system by artificial server so as to run the software by less number for large computers called as virtualized. Finally this paper is fulfilled by the advancement of recognized energy efficient computing.

Keywords: Cloud Computing, Green data center, Power optimization, Energy efficiency.

I. INTRODUCTION

Green computing and green technology are referred as ecofriendly by the usage of computer technology as well as technology related to other resources. The execution of energy effective central processing unit plus its peripherals and servers are included in green computing.

The main purpose of green technology is to reduce consumption of resources and also to improve the electronic waste (e-waste) disposal.

Green computing is huge in rising area that is intended for reduction energy that becomes the top priority in all segments of IT market and it is also needed for energy effectiveness that became a serious issue in designing of effective presented computing.

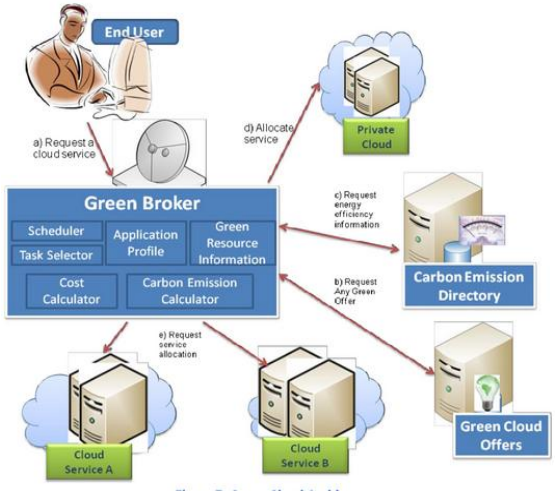

Fig 1 cloud computing for green computing

Those growing accessibility about high speed internet plus corporate IP associations may be empowering the delivery novel network-based services. Same time Internet-based mail administrations have been operating to a significant number years, management contributions bring stretched with fit in network-based ability plus network-based registering. These new administrations would be advertised both will corporate also distinct limit clients. Administrations about this sort need been generically known as cloud registering services. Those cloud registering administration model includes those provision, by a administration provider, for vast pools for high-octane registering assets and high-capacity capacity units that would imparted around wind clients as needed. There are a lot of people cloud administration models, in any case generally, conclusion clients subscribing of the administration need their information facilitated Toward the service, Also need registering assets allocated on interest from those pool. That administrative provider's advertising might additionally stretch out to the product requisitions obliged toward the end client [2]. With make successful, those cloud administration model likewise obliges a high-sounding system on give acceptable connection among those last client plus the administration provider infrastructure.

Cloud registering possibly offers a general budgetary benefit, in that end clients stake a large, centrally figured out how pool of stockpiling furthermore registering resources, as opposed owning and overseeing their systems. Frequently utilizing existing information centers likewise a basis, cloud administration suppliers put

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resources into those important foundation and management.

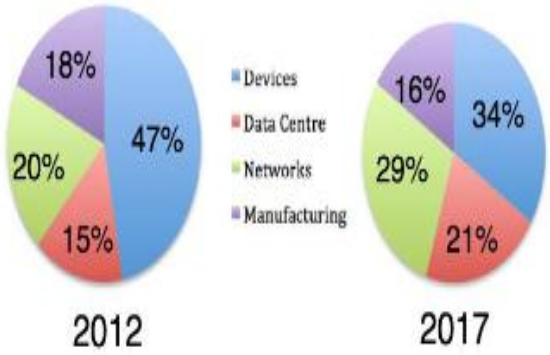

Figure.2. Electricity consumption by main components in ICT Sector

Figure 2, graphically depicts those examination about subside Corcoran and Anders Andrae for "Emerging patterns done power utilization for customer ICT" [15]. Assessing data, field records, Furthermore former researches, the writers have guessed that by the quite a while 2017, those power necessities of the cloud information Centers will bring arrived at an amazing 21%. This will be a disturbing conclusion, which might help gigantic sums for carbon dioxide emanation over our officially hampered surroundings. Various requisitions would run by information centers that fill in under cloud registering. Portion information will be transformed inside seconds, whereas, expansive information nourishing looking into imparted fittings stage takes more occasion when methodology will. Those cloud registering on-demand office countenances tests at different information will be with make processed, one by one alternately simultaneously. Asset Furthermore chance allotment is must with keep away from delay Also generation about wrong comes about [9].

Information centers are unavoidable; they are necessary for information storing, accessing, preparing and other administrations. The rate from claiming Vitality utilization may be alarmingly high, and the significant downside on this utilization is that, just a little portion for this vitality will be really used to generate a yield. The information centers need aid heavy spender on keep up, the extra foundation such as coolers, will administer those temperature about vast number from claiming servers inside an information Centre, includes of the expense and in addition the carbon foot shaped impression. Green cloud registering aides with those convoluted procedure for accomplishing decrease to Vitality utilization amidst proficient utilization of base.

II. GREEN COMPUTING TECHNIQUE MEANT FOR ENERGY EFFICIENCY.

Comprehension the routes done which control utilization effects those "greenness" of At whatever technology, Furthermore particularly registering technology, may be a vital venture to decreasing this use and instruct others. This area depicts those dissimilar particular systems that could be used to reduce energy operation**.**

2.1 Turn off equipment when not being used.

Powering down gear may be those simplest, more successful and a large portion clear approach to decrease registering control utilization. This adjustment be unreasonable because the fundamental gesture about powering rotten a processing device will fundamentally decrease its force consumption, in spite of the fact that it will be vital to note that huge numbers units might at present devour an little sum about control alternately "phantom load".

2.2 Machine control reserve funds Modes:

organization of force utilization be a normal, thus far frequently ignored, characteristic for A large portion Pcs and working system lying on the advertise nowadays. The boundary with wider selection may be that a lot of people Figure force reserve funds modes with make badly arranged by there might a chance to be a little delay into exiting a control cautious mode once again with typical utilize. Safety is understandable, in spite of the fact that with observant system association and gradual acclimation with an exchange technique for operational, this reluctance could make beat.

2.3 Monitor sleep mode

Permit those display will dip rotten behind sitting still to some time period will be an additional undoubtedly utilized technique for moving forward energy efficiency. While a screen fall sleeping alternately enters a "stand by" approach, it enters a small control utilization condition. The display will be plain, for no light emit as of it. To pattern, dell 20 widescreen LCD utilization give or take 55 watts about energy when it is looking into. Done rest mode, those force use drops on approximately 3 watts, bring regarding noteworthy energy preserve rites.

2.4 Hard disk sleep mode

A workstation could put its tough plate drive over a small control rest approach the point as they would unmoving pulley. solid plate drive ahead desktop machines camwood use 10 watts or additional The point when over utilize same time journal workstation drives use less Anyhow vitality reserve funds need those profit from the battery charge an aggregation. Working system settings once more deal with this mode naturally when arranged. This setting gives little funds and may be minimally intrusive, for All the more noteworthy funds time permits utilizing system standby mode [3].

2.5 system standby Mode

System standby will be a standout amongst those the vast majority compelling control sparing Characteristics. Later than specific moving phase, a workstation will close the vast majority from claiming its parts essentially decreasing force use. Unstable memory remains dynamic in this way that whatever that client might have been attempting for will at present make there at those workstation wakes up starting with standby approach. An desktop machine so as to employs further 100 watts without moving might utilize Similarly as little Concerning illustration 5 watts The point when over standby mode, utilizing you quit offering on that one twentieth of the power it utilized when sitting still.

2.5 Hibernal mode.

Those hibernal mode dives one venture further over

standby mode toward totally powering off the PC. Invoke the hibernal approach reasons the recollection state on a chance on the way to spare on the solid plate in front of powering down. When hailing crazy from claiming hibernal mode, those machine restore the recollection state, chronic the machine to it's pre-hibernate condition. A desktop machine determination devours pretty nearly 3 watts for hibernal mode vs. 5 watts for standby.

III. CLOUD COMPUTING ENERGY EFFICIENCY TECHNIQUE

A.

B.

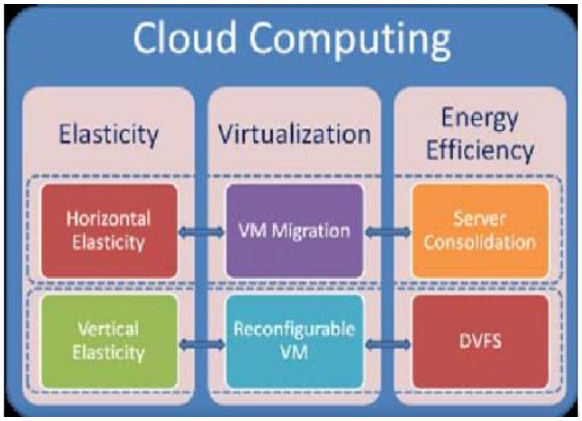

Fig 3 energy efficiency techniques

3.1 Applications

SaaS model need altered those route provisions and product would disseminate and utilized. Ever increasing amounts organizations need aid exchanging on SaaS Clouds with minimize the cost. Thus, it need get to be exceptionally imperative to tackle the energy efficiency during requisition level itself. though, this layer need accepted next to no fascination since a significant number provisions would as of now around utilize and the vast majority of the new requisitions are basically upgraded versify about or created utilizing A while ago executed instruments. Should accomplish energy efficiency during provision level, SaaS suppliers ought to pay consideration clinched alongside deploying product looking into straight sort of system which could execute those programming A large portion effectively [4]. This necessitates those Look into and Investigation of exchange-off the middle of execution and Vitality utilization because of execution of programming with respect to numerous platforms and equipment. To addition, the Vitality utilization during those compiler level Also code level ought further bolstering make recognized by programming developers in the plan about their future requisition usage utilizing Different Vitality productive techniques suggested in the expositive expression.

3.2 Cloud Software Stack: Virtualization and Provisioning

In the cloud stack, a large portion meets expectations in the written works tackle the tests by IaaS supplier stage the place Look into centering may be once planning Also asset administration to decrease the measure about animated assets executing those workload about client provisions. The combination for VMs, VM migration, scheduling, interest projection, high temperature oversaw economy Also temperature-aware allocation, Also load adjusting would utilized similarly as fundamental techniques to minimizing energy utilization. Likewise examined for past section, virtualization assumes a paramount part in these techniques because of its a few features for example, such that consolidation, carry on with migration, and execution confinement [4]. Merging serves done overseeing the exchange-off the middle of performance, asset utilization, Furthermore Vitality utilization. Similarly, VM relocation permits adaptable also changing asset administration same time encouraging shortcoming management and bring down upkeep cosset. Because of numerous levels about abstractions, it is generally difficult should look after sending information of every virtual machine inside a cloud datacenter. Accordingly, Different backhanded shipment estimation systems be utilized for combination about VMs.

3.3 Datacenter level: Cooling, Hardware, Network, and Storage

To begin with stage is those advanced mobile development of the datacenter and picking of its area. There need aid two real variables in that one may be vitality supply also different may be energy efficiency from claiming gears. Hence, those datacenters are being constructed done such an approach that power could a chance to be produced utilizing renewable wellsprings for example, sun Also wind. Presently that datacenter area will be chosen dependent upon their geological appearance; environment, fiber-optic connectivity and entry to an abundant provides about competitive vitality. because principle worry from claiming cloud suppliers will be business, vitality hotspot may be Additionally seen basically As far as cosset not carbon outflows. In turn territory of worry inside a datacenter may be its cooling system that contributes should practically 1/3 for downright Vitality utilization. Two sorts of methodologies would use: air and water built cooling systems. On both approaches, it will be vital that they specifically cool that hot gear as opposed whole room region. Subsequently newer vitality productive cooling systems would recommend dependent upon fluid cooling, Nano fluid-cooling systems, Furthermore in- server, in-rack, also in-row cooling by organizations for example alternatively the outside temperature/climate can need immediate sway on the vitality prerequisite for cooling system. Percentage systems need be construct the place outer cool air is utilized to uproot warmth starting with those datacenter.

3.4 Monitoring/Metering

First level is those advanced mobile development of those data center and picking of its area. There would two real elements in that person will be vitality supply and different will be energy efficiency from claiming gears. Hence, those data centers are constantly constructed previously, such an approach that power could a chance to be created utilizing renewable sources for example, sun and wind. At present the data center area will be concluded In view of their geological features; climate,

fiber-optic connectivity Also get to a plentiful should measure those bound together effectiveness of a data center and move forward its' execution per-watt, those Green Grid need recommended two particular measurements identified as the power utilization Efficiency (PUE) and Data center infrastructure effectiveness (DciE).

PUE = Total Facility Power/IT equipment efficiency. DciE = 1/PUE = IT equipment Power/Total facility power x 100%. The downright office energy is characterized by that energy measured during that utility meter that is committed exclusively of the data center power [5]. Those it gear energy is characterized Likewise those energy devoured in the management, processing, and capacity alternately directing of information inside the data center.

3.5 Network Infrastructure

At system level, the energy efficiency will be attained possibly toward that network level (i. E. Organize boundary card) or in that base level (i. E. Switches and routers). Those energy efficiency issue over systems administration is as a rule alluded on as "green networking", which identifies with embedding energy-awareness in the plan, in the units Furthermore in the conventions of network. Present would 4 categories about results advertised on literature, in particular asset consolidation, virtualization, specific connectedness, and proportional registering. Asset combination serves done regrouping those under-utilized units to decrease that worldwide utilization. Comparable to consolidation, specific connectedness of units comprises for dispersed instruments which permit the single bits from claiming gear on try unmoving pulley for a few time, Similarly as transparently as time permits from whatever remains of the networked gadgets. The Contrast between asset merging and specific connectedness will be that the combination applies should assets that would impart inside the system foundation same time particular connectedness permits turning off unused assets during those edge of the organization. Virtualization Concerning illustration examined in the recent past permits more than one administration with work on the same bit of hardware, accordingly moving forward the fittings usage. Proportional registering could a chance to be connected should an arrangement as a whole, on organizes protocols, and also should distinct units and segments. Progressive Voltage scaling and versatile join rate need aid commonplace illustrations for proportional registering. Dynamic Voltage scaling lessens that vitality state of the CPU Similarly as A capacity of a framework load, same time versatile join rate applies a comparative idea will organize interfaces, lessening their ability, and consequently their consumption, by a capacity of the connection pack.

IV. ENERGY CONSUMPTION ANALYSIS

To compute the measure for energy inspired by data centers, two measurements be built by Green –cloud grid, and global consortium [6]. Those measurements are control use adequacy (PUE) and information focal point foundation effectiveness (DCiE) Similarly as characterized belowPUI=Total office power/IT supplies control DCiE=1/PUE= (IT gear Power/Total office force) *100%. Those it supplies energy will be those load conveyed will at registering fittings resources, same time the aggregate office control incorporates other vitality facilities, specifically, those vitality expended Toward All that that helps it supplies load.

On cloud infrastructure, a network alludes all the will all multicore server alongside its parallel preparing units, organize topology, force supply unit and capacity ability. Those generally Vitality utilization of a cloud earth might be ordered as takes after:. E cloud = ENode + ESwitch + EStorage + EOhters utilization of vitality Previously, An cloud surroundings Hosting n number for networks and m amount of exchanging components might make communicated as:. ECloud = n (ECPU + EMemory + EDisk + EMainbosrd + Emainboard + ENic) + m(EChassis + ELinecards + EPorts) + (ENASServer + EStrorage controller + EDiskArray) + EOthers.

V. CONCLUSION

Here we investigate the energy effectiveness methods previously, cloud and green registering. It need be demonstrated so as to couple real parts for cloud building design which are answerable for high amount of force dispersal in cloud. Reasonably be expected approaches on help each division for outlining anenergy efficiency model about green & cloud registering need been examined. This review talked about techniques for enhancing that energy efficiency of registering. To registering resources, the results fill in toward distinctive levels, starting with distinctive networkss to whole infrastructures the place they take advantage for late propelled functionalities for example, such that virtualization. A standout among the primary leverages to decrease those electric bill and the carbon foot shaped impression of it base is should build the vitality familiarity with clients and suppliers.

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An Insight on Machine Learning Algorithms and its Applications

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Abstract— Machine Learning (ML) furnishes the ability of insights on automatic recognizing patterns and determining the prediction models for the structured and unstructured data even in the absence of explicit programming instructions. Today, the impact of Artificial Intelligence (AI) has grown up to several heights, ranging from Life sciences to the Management techniques. The integration of ML led to reduce or eliminate the errors in the prediction, classification and simulation models. The objective of the paper is to represent the ML objectives, explore the various ML techniques and algorithms with its applications in the various fields.

Keywords: Machine learning, Supervised learning, Unsupervised learning, Semi-supervised learning, Reinforcement learning,

I. INTRODUCTION

The ML is a process of making the system to learn automatically based on the earlier experimental data. The objective of ML is to determine the predictions based on the existing data. The following shows the procedure for ML adopted by Gartner [16].

Step 1: Gather the input data (may be structured or unstructured)

Step 2: Apply the ML algorithms (such as Supervised, Unsupervised, Semi-supervised, and Reinforcement Learning methods)

Step 3: Determine the Output (such as predictive, exploratory, classification)

After the data collection process, knowledge extraction or pattern determination process is imitated from the observations. ML has the following subdivisions based on the observations summarized from [17]. They are;

- Supervised learning,
- Unsupervised learning,
- Semi-supervised learning and
- Reinforcement learning.

The ML process is viewed as two phases, namely, (a) learning phase and (b) prediction phase. The training data is fed to the learning phase for predictions. In the prediction phase, the predicted results are obtained for the new data regarding the concerned trained model.

II. MACHINE LEARNING APPROACHES

The following section deals with the machine learning approaches.

Supervised Machine Learning (SML): SML approach's aim is to learn the mapping function 'f' from the input variable (X) to the output variable (Y) as represented in the equation (1) summarized from [18].

$$Y = f(X) \quad (1)$$

The mapping function tries to estimate during the arrival of novel input data (X) and forecast the corresponding output variable (Y). This algorithm learns from the training set and stops learning when the acceptable performance level is reached. The subdivisions of SML are classification (output variable needs categorization) and regression (output is real value). Some of the examples of SML algorithms are linear regression, random forest and Support Vector Machine (SVM).

UnSupervised Machine Learning (USML): The objective of the USML is learning, understanding and exploring the unlabeled input data (X) without historical data [19] and [17]. The USML is subdivided into association (discover rules to describe the data) and clustering (discover inherent group in data). Examples of USML include apriori and k-means methods for association and clustering problems, respectively.

Semi-Supervised Machine Learning (SSML): The SSML is considered as a mixture of SML and USML, and arises when huge unlabeled input data (X) with few labelled data (Y) [18]. That is, the mixture of very few labelled data and huge unlabeled data. The SML and USML algorithms can be applied to get knowledge and discover the data.

Reinforcement Learning (RL): The objective of RL is to map the actions according to situations to yield the maximum reward. During the mapping process, the algorithm should take in to account the immediate next and future rewards too. Some of the examples include Temporal Difference, Markov decision, Q-learning and Monte-Carlo methods [20].

The understanding of data types also referred as measurement scales in ML becomes mandatory for exploring the data analysis. Understanding the data type helps in dealing the right visualization (ML) method. The data types are broadly classified into (1) Categorical and (2) Numerical values. The former type represents the characteristics and the later represents the countable data. Categorical data is sub-divided into (a) Nominal type, to label the discrete variables without order, and (b) Ordinal type, to label the discrete variables with ordering. Numerical

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data is further sub-divided into (a) Discrete data, i.e., the countable data and (b) Continuous Data (represents the measurable data) is subdivided into interval and ratio data [21] and [22]. Table 1 shows the summary of applications of ML algorithms on the corresponding data types summarized from [23].

Table 1 Categorization of ML Algorithms

ML algorithm types / Data types	SML Algorithm	USML Algorithm
Discrete values	Classification or Categorization	Clustering
Continuous values	Regression	Dimensionality Reduction

III. MACHINE LEARNING TECHNIQUES

The following section deals with the introduction to ML techniques summarized from [1], [2], [4], [5] and [6]. They are;

A. Supervised Learning:

It is the common method adopted in industry use cases. Here both inputs, as well as desired outputs, are provided to a system with the aim to classify the future data. It is a routine process when an algorithm learns from a new training dataset. Self-driving cars, Chabot's, face recognition methods adopts Supervised Learning approaches.

B. Unsupervised Learning:

It is a complicated process and prone to use in smaller applications. "Teaching themselves" one of Machine Learning's property implies Unsupervised Learning. There are no explicit target outputs available in this method. In this approach, the classification is carried without the prior knowledge, that is, there is no prior knowledge about the data being classified. For example, clustering and association related problems fall into this learning approaches.

C. Semi-Supervised Learning

It is the study of how computers learn in the presence of labeled and unlabeled dataset. This technique put forths the protocol that generation of labelled data is costlier than the unlabelled data. Examples of this learning approaches are speech analysis and web content classification.

IV. MACHINE LEARNING ALGORITHMS

The following section deals with the description regarding the traditional ML algorithms summarized from [5], [7] and [8]. They are;

1. Naïve Bayes Classifier (NBC) Algorithm

NBC algorithm helps to classify a webpage, a document, a lengthy text note or an email, it is not easy to do it manually. Its popular application is spam filtering. The classifier function assigns a population's element value as one of the accessible categories. Sentiment Analysis is also its popular application. It performs well when we have categorical input variables.

2. K-Means Clustering Algorithm

When a user searches for a keyword "jaguar" in the World Wide Web (WWW), results will be the aggregation of Jaguar animal, Jaguar car and Jaguar Mac Operating System. The similar characteristic featured contents (may be text, images, videos, etc) are grouped and displayed to the user. The grouping (also referred as clustering) of similar features is done by K-means clustering Algorithm. Further, this algorithm is adopted by many search engines (namely, Google and Yahoo) to group the web pages based on the similarity and identifies 'relevance rate' of concerned search results.

3. Support Vector Machine (SVM) Algorithm

SVM, a supervised algorithm, is used for classification problems. SVM learns about classes of input dataset which are differentiated by a line in the dataset to classify the new data. It is categorized as Linear and Non-linear SVM. Linear SVM can classify using just a hyperplane but it's not possible for non-linear SVM. This technique does not make any substantial assumptions on the data. It is used to forecast stock market values.

4. Apriori Algorithm

Apriori algorithm, an unsupervised algorithm, depicts association rules from the input data set.

Association rule entails that on occurrence of item 'X', item 'Y' happens definitely, similar to "if-then" rule. For instance, ***IF*** a person purchases bike, ***THEN*** certainly they will purchase helmet. Critical observations on such purchases are examined to ensure the optimum decisions. Detecting unfavourable drug reactions and auto-complete applications are its applications.

5. Linear Regression (LR) Algorithm

LR algorithm depicts the association between the two variables and how they influence each other. It shows the impact on the dependent variable (termed as factor of interest) when the independent variable (termed as explanatory variables) is changed. It is a wide spread ML technique with rapid speed. Estimating sales and risk assessment is its applications.

6. Decision Tree Algorithm

It uses the branching method to represent the possible consequences for a decision with respect to specific scenario. The decisions in a tree are inversely proportional to the expected precision. Two sub-categories of decision tress are Classification and Regression trees. The classification and regression trees are used during the classification of nature and continuous/numerical variables, respectively. The decision tree classification is mainly used in finance and banking sectors to classify the loan applicants based on the probability of payments in a specific periodic intervals.

7.Random Forest Algorithm

Random Forest algorithm works by creating a cluster of decision tree with a subset of randomly chosen data. The prediction performance is improved by repeated training of a model with random samples. The final prediction is made from the integration of decision trees output followed by the polling procedure.

8. Logistic Regression Algorithm

Mainly this type of classification is applied to classify the discrete classes. For instance, to detect the mail as spam or not, online transaction made as a genuine or fraud, tumor classification as benign and malignant, etc. This type of regression transforms the desired output using sigmoidal function to determine the probability value. If the resultant classification is with two outputs (for instance, benign or malignant), then it is referred as Binary Logistic Regression. On the other hand, if the resultant output is of categorical values (for instance, dogs, cats, horses, etc), then it is referred as Multi-Linear Logistic Regression method.

V. MACHINE LEARNING APPLICATIONS

The following section deals with the insight on ML applications summarized from [9] and [10].

Spam Detection: Received emails are identified whether they are spam if yes then they are not shown to the user with regular emails in their inboxes. All these spam emails are maintained in a separate folder. This is done by learning how to recognize a spam mail by identifying the characteristics from newly received ones.

Face Detection: Identifying faces from a given number of photos and tagging them automatically if next time the same face is detected for a new photo. Currently, Facebook is popularly known for using this technique where when we upload a picture some suggestions of friends are automatically detected and shown to the user whose friends are in the picture. For example, Google photos separate all the pictures according to people in it.

Credit Card Fraud Detection: According to customers past transactions, if there are any inappropriate purchases made then the customer is warned immediately about the condition.

Digit Recognition: Machine's camera detects postal codes that are handwritten and arranges all the letters according to the geographical locations they have to reach. The machine is trained to learn handwritten numbers and transforms into digital signs.

Speech Understanding: Deals with listening to a speech by the user, understand user intentions process what machine has understood. Machine is expected to follow instructions from the users accurately. "Cortana" by Windows, "Siri" by Apple and "Okay Google" by Google are popular and successfully implemented applications of this technique.

Product Recommendation: With all the data of a customer's past purchases or interests online, the machine will recommend some products which would attract customers to view them and maybe even purchased. Flipkart, Amazon and many other e-commerce sites have been implanting this technique where we receive only recommended products as advertisements.

Medical Diagnosis: For detecting diseases more accurately, hospitals these days are using machines that could decide whether a person is affected with any diseases for symptoms he/her has, with the help of complete data about all diseases and symptoms. IBM designed a system with 95% precision in predicting the cancerous images in contrast to 75%-84% precision by doctors.

Stock Trading: Given the current and past price fluctuations of a stock, the machine decides to hold or sell the stock for better service of the customer(s).

Customer Segmentation: With the help of past behavior patterns, the ML algorithms tries to predict the number of users who will choose the paid versions from the trial versions. Amazon Prime has implemented this technique.

Chat smarter with Allo: Allo is a messenger application by Google which will learn from its users, how they are responding to what kind of messages and recommend the user with a response that he /she has thought of typing.

Financial Service: Companies can identify the company insights of financial sector data and can overcome the occurrence of financial fraud. It is used to identify the opportunities for investment and trade. We can also prevent the financial risks prone institutions by using cyber surveillance and take necessary actions to prevent fraud.

Transportation: By the travel history and pattern of travelling in various routes, machine learning helps in Transportation Company to predict the problem in routers and advice their customers to choose a different route. Transportation firmly uses machine language to carry out data analysis and data modelling.

Few other applications of ML are as follows:

Computational Intelligence: For many years computational intelligence is being developed actively. Constant improvements and improvements are being carried out on classical methods like machine learning algorithms. These days computational intelligence has been for many applications directly or indirectly.

Natural language processing: It is a field that which involves both computer understanding and manipulation of human language and its good in gathering new possibilities. It is mostly seen in a large pool of legislation or other document sets, trying to discover new patterns or to root out corruption. It is a better way to analyze, understand and find the meaning of human language easily and smartly. By using NLP developer can perform tasks such as speech recognition, entity recognition, automatic translation, and summarization.

Discrete Event Simulation is a technique where patients are modeled as an independent event associating each with some attribute information like age, weight and problematic scenarios, etc. Natural Language Processing is a technique used for system to read the physician's notes and convert it to digital data. Proprietary Predictive model is used to make predictions such as admissions can be predicted by hospitals to spread expertise which is in short supply. Disease prediction and diagnosis is achieved by helping radiologists to make intellectual decisions with radiology data (for

example, CT, Radiographs and MRI).

Sentiment Classification: It is difficult to classify documents based on sentiment rather on topic, like separation of comments into positive and the negative categories. Hence, the following ML techniques are adopted to classify the sentiments and subjected to further analysis.

- Naïve Bayes method is a trendy algorithm for text classification process; it is given some texts and its results to learn on how to decide about new text.
- Maximum Entropy classification it is an alternative technique to work on natural language processing although it fails to perform sometimes.
- Support Vendor Machine is highly effective and can perform better than the other two techniques but they are large margin classifiers rather than probabilistic classifiers. It is useful very much because classifying texts according to sentiments is not easy for human to carry out, whereas machine learning has made it simple.

Mobile Devices: ML techniques when applied on portable devices like Sensors, Smartcards, Smartphones, computing handheld and automotive systems had proved efficient. As mobile terminals are improving a lot these days mobile technology has encouraged technological advancements. The techniques like Naïve Bayesian, Decision trees and C4.5 are supportive for mobile devices. These techniques major categorised as supervised, unsupervised and reinforcement these are used to represent learning methods.

Here, machine learning approach is provided with some training examples for given function. Support Vector Machines (SVM), K-Nearest Neighbour (KNN), Random Forests and Decision trees are some of supervised algorithms. There is no supervisor available and learning in the Unsupervised ML category. Training samples and testing samples uses these techniques. Each ML technique has few strengths and weakness. It gives brief about techniques for application in mobile devices. It presents performance measures for machine learning algorithms.

Data Mining: There are two styles of data mining algorithms summarized from [13], [14] and [15]. They are (1) Predictive, and (2) Descriptive

Predicting the value of special attribute using the other attribute is called predictive whereas deriving the patterns that summarize the relationship among data points is called descriptive.

Supervised Data Mining: It is a pre specified target variable. Its goal is to specify the relationship between predictors and target. Model is provided with many training data where the target is known. It is applied to the data where the target is unknown

Unsupervised Data Mining: It is mostly used to determine whether the classes or clusters exist in data and also for exploratory analysis. All variables are treated in same way.

Pattern Recognition: Pattern recognition is the other main problem in machine learning. Pattern recognising algorithm generally aims to provide a reasonable answer for all possible inputs and to perform closest to matching of input. It uses two learning methods, namely (1) Supervised leaning and (2) Unsupervised learning method.

VI. CONCLUSION

The paper presented an overview and insight on the Machine Learning approaches and techniques applied to various applications. Apart from the applications, the paper also put forth an idea of applying the algorithms and its performances to various scenarios. For instance, whenever there exists a sample, the supervised machine learning algorithm comes in to the picture, whereas on the other hand, analyzing the data without existing data, the clustering technique from unsupervised machine learning algorithm is very useful in providing the solutions. As a future enhancement, authors would like to work on intelligent decision support systems integrated with machine learning techniques for predicting the cardiac diseases.

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Automatic Telugu Handwritten Character Recognition with the Help of Legendre-Sobolev Divergent Machine Learning Model

P. V. Ramana Murthy, CH. G. V. N. Prasad

Abstract: ***Online handwriting recognition or character recognition is the process in which a handwritten message is recognized by processing the handwritten data. It is the way toward changing over manually written characters to machine design. In penmanship, the strokes are made out of two arrange follows in the middle of pen down and pen up marks. Wide scope of highlights is extricated to play out thse acknowledgment. A complete internet hand-written recognition system for Indian language such as Telugu that addresses the ambiguities in separation just as recognition of buttons the recognition relies on conceptual model of penmanship structure joined with either a prejudicial model for stroke command. Such a methodology be able to flawlessly incorporate language and content data in the reproductive model then manage comparative and non-comparable strokes utilizing the single discriminative stroke grouping model. In this examination, we are utilizing disparate Legendre Sobolev conditions with the assistance of AI model, to such an extent that accomplishes 99.65% precision and improved the condition of craftsmanship esteem.***

Index Terms: ***Automatic telugu handwritten, machine learning, Legendre sobolev divergent equation.***

I. INTRODUCTION

The acknowledgement is performed in a simple base up design, beginning through the strokes, also the ambiguities at every phase are protected as well as moved to the following phase aimed at getting the greatest plausible outcomes at every phase. We additionally existing the aftereffects of different pre-handling, highlight determination also arrangement thinks about on a huge informational index gathered from local language journalists in 2 diverse Indian dialects: Malayalam as well as Telugu. The framework accomplishes a stroke level precision of 95.78% as well as 95.12% on Malayalam and Telugu information, separately [1]. The Akshara level exactness of the framework is about 78% on a corpus of 60, 492 words commencing 367 authors. The field of acknowledgement of manually written content is as yet a fascinating zone of research. Numerous writers have accomplished amazing outcomes in the field of manually written numbers for English digits however just a couple of them consume investigated the territory of numbers written in Indian provincial contents like Telugu. Penmanship acknowledgement is a difficult assignment that has been seriously examined for a long time in the field of PC vision and example acknowledgement. Because of difficulties similarly the assortment of composing styles, strokes also shapes the exactness is as yet restricted. Much study has been performed in the sector of English numerals,

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but there is a long way underneath exploring local numerals. India is a multilingual nation, which has 22 noteworthy dialects transcribed in 13 distinct contents. Right around 460 million individuals in India utilize local contents for composed correspondence like topping off the bank structure or transfer messages, the numbers are composed on those are in local contents which are here and there hard to distinguish. Along these lines, a legitimate acknowledgement framework is expected to recognize those digits and words. Highlight extraction assumes a significant job in the accomplishment of any acknowledgement framework. It necessitates that highlights ought to hold invariant attributes inside a similar class though consuming discernible qualities amongst different classes. Szarvas et al. [2] assessed the consequently improved highlights educated through the Convolution choice trees on passer-by location also clarified the AI mix gave the most noteworthy precision. Since both CDT and ML have just accomplished wonderful exhibitions in number acknowledgment, our concentration in this examination is to use their benefits through joining those composed [3]. The effort existed in the paper [3] centers around the digits written in 4 local dialects: Bangla, Devanagari, Oriya also Telugu. Segment 2 provides a short depiction of the condition of-workmanship methods (Literature Review). Segment 3 depicts the hypothetical parts of the procedure basic for getting it. Segment 4 depicts the anticipated work in full detail. In Section 5, analyses also results are quickly clarified. Area 6 has a talk in regards to the outcomes acquired. At long last, the work is finished up in area 7 with a touch of clarification in regards to future research.

II. LITERATURE REVIEW

In the sector of transcribed English numerals, some notable research has also been performed, but the range of numbers published in any of the regional dialects was not so studied. In[3], Surinta et al. 2013 used personality form recorded by 8-directional coordinates in conjunction with the nonlinear SVM classifier to acknowledge Bangla Numerals and achieved 96.8 times accuracy. Xu et al. [5] built up a various leveled Bayesian system which proceeds the database pictures legitimately as the system input in addition to arranges them utilizing a base up methodology. 87.5% acknowledgement precision has remained accomplished through an informational collection comprising of 2000 written by hand test pictures.

In (Khan et al., 2014) [6], Sparse portrayal classifier on behalf of Bangla number acknowledgement is presented where the acknowledgement rate of 94% was accomplished. In [7],

a quad-tree founded list of capabilities be utilized; the precision rate of this model was 93.38%. HBDR [Handwritten Bangla Digit Recognition] utilizing MLP stood exhibited in (Basu et al., 2005) [9] where the normal acknowledgement rate utilizing 65 concealed neurons achieves 96.67%. Das et al. [4], suggested a hereditary calculation created district testing methodology also accomplished 97% precision. All around as of late, Convolutional Neural Network (CNN) is utilized "Manually written Bangla Character Recognition" (Rahman et al., 2015) [10] with no element removal in earlier. The exploratory outcomes demonstrate that CNN achieves superior to elective techniques. For acknowledgement of Devanagari Numerals, Authors in [12][Arya et al. 2015] consume utilized Gabor channel constructed component descriptor through 3 distinctive channel sizes viz. 7x7, 19x19 also 31x31. The last characterization is implemented utilizing the Nearest Neighbor also SVM classifiers. The 98.06 percent acknowledgement accuracy is achieved. In[13] Showmik et al., grid-based Hausdorff segregation is suggested to provide a identifier speaking at the object room to the hand-written numbers. For setup, the Arbitrary Forest classifier is used and 93.03 percent accuracy has been achieved. In[14], Johnson et al. suggested an edge-dependent OCR structure produced by a dim pixel with either a zonal mass concentrate. Model Irregular Forest was used as a classifier. The 92.57 percent acknowledgement accuracy was achieved. Contractive self encoders were used in[15], which teaches the features by capturing data types. SVMs have been used to characterize and 96 percent accuracy was achieved. In[16] Prabhanjan also Dinesh et al. 2016, the near and global hints were deleted and SVM was used to arrange. A 98.77 percent accuracy was achieved. In[17], Mishra et al. used linear cosine shift (DCT) and linear wavelet shift (DWT) to acknowledge Oriya Numerals and achieved 92% and 87.50% accuracy. For the recognition of Odia numerals, the identification of form features based on the bi-quadratic interjection approach is demonstrated in[18]. In[19] Pujari et al. performed the character recognition of Odia numerals using SVM. They used perspective and hint of ebb and stream to obtain a recognition level of 95 times. In 2014, in addition to the Nave Bayes classifier, Sarangi et al.[20] calculated the suitability of LU factorization as well as asked for 85.30 percent accuracy. The author suggested a method to interpret Handwritten Telugu scripts using Zoning Features for the acknowledgement of Telugu numerals, In[21]. The acknowledgment precision is observed to be 78%. In [22] Saikumar, K explains deep learning based spinal card injury regarding image processing relations to machine learning mechanisms.

III. EXISTED WORKS

The existed methodology depends on the idea of crossover classifier. Our perception is that the half and half classifier repays the points of confinement of the separate classifier through joining the benefits of together. Fig.2, clarifies the projected strategy. Right off the bat, the digits pictures on behalf of preparing are pre-processed hooked on a structure that can be effectively feed addicted to the classifier, at that point highlights are extricated from the pictures utilizing CNN. At long last, grouping is performed utilizing SVM. In this paper, we have considered four noteworthy dialects to be specific Bangla, Devanagari, Oriya also Telugu. ISI Kolkata dataset was used for Devanagari, Bangla and Oriya Numerals, which includes 22556 instances consisting for Devanagari by 1049 individuals. There are 23392 instances for Bangla consisting of 1106 individuals and 5970 samples from 356 individuals for Oriya. This dataset was compiled from 368 parts of correspondence, 274 request forms of occupation and an unusually organized data collecting system. Telugu numerals used the CMATERdb dataset. It includes three thousand instances, three hundred per digit. The images of the instance are provided in Fig.

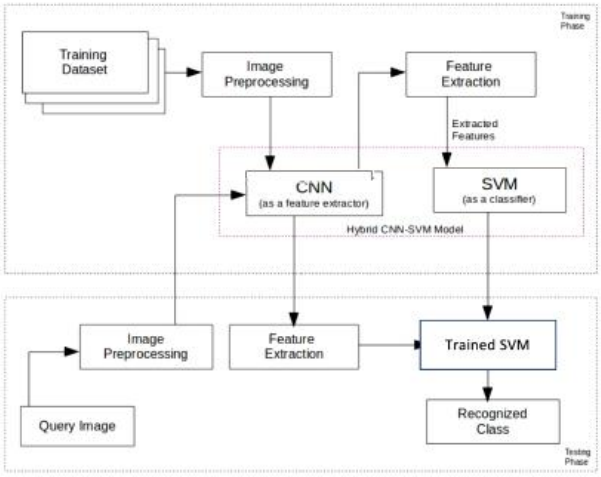

Figure: 1 Existed Work

Table :1 sample of digits

English Numerals	Sample Handwritten Numeral Images			
	Bangla	Devanagari	Oriya	Telugu
0	০	०	୦	౦
1	১	९	୧	౧
2	২	२	୨	౨
3	৩	३	୩	౩
4	৪	४	୪	౪
5	৫	५	୫	౫
6	৬	६	୬	౬
7	৭	७	୭	౭
8	৮	८	୮	౮
9	৯	९	୯	౯

The motivation behind pre-preparing is to improve the picture information and upgrading the picture by evacuating undesirable mutilations for additional handling. In this stage, we pre-process the dataset. Every picture in the dataset is changed over addicted to grayscale then after that resized to 28 X 28. In this stage, we utilize a Convolution Neural Network to concentrate highlights commencing the pictures. CNN consequently concentrate highlights from the crude pictures while giving a specific level of invariance to interpretation and scaling. The photo images pre-handled are reinforced into the CNN data section and the last pixel results are handled as hints.The development of the model suggested is shown in Fig. 1.

At this level, in the SVM classifier, the highlights divided from the CNN model are encouraged. Bolster Vector Machine has been used to rate the numbers in one of the 10 categories with two unique part capabilities: Linear and RBF Radial Base Function). Table: 1.Explains the depiction of images in a CNN sheet midway. First, we're giving the model an image, pre-forming it and producing an item vector using CNN. Then these examples are urged to recognize the number in the SVM classifier.

Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 32, 28, 28)	320
activation_1 (Activation)	(None, 32, 28, 28)	0
conv2d_2 (Conv2D)	(None, 32, 26, 26)	9248
activation_2 (Activation)	(None, 32, 26, 26)	0
max_pooling2d_1 (MaxPooling2	(None, 32, 13, 13)	0
dropout_1 (Dropout)	(None, 32, 13, 13)	0
conv2d_3 (Conv2D)	(None, 64, 11, 11)	18496
activation_3 (Activation)	(None, 64, 11, 11)	0
max_pooling2d_2 (MaxPooling2	(None, 64, 5, 5)	0
dropout_2 (Dropout)	(None, 64, 5, 5)	0
flatten_1 (Flatten)	(None, 1600)	0
first_dense_layer (Dense)	(None, 128)	204928
activation_4 (Activation)	(None, 128)	0
dropout_3 (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 10)	1290
activation_5 (Activation)	(None, 10)	0

Total params: 234,282
Trainable params: 234,282
Non-trainable params: 0

Figure: 2 Existed Works Based On Non-Trainable And Trainable Parameters

This methodology demonstrated to be very delicate to the nearness of numerous ascenders or descenders, bringing about mistakes of the center stature gauge. Additionally, short words can be risky. An optical assessment of one hundred words, haphazardly picked tests from misrecognized test information, appeared around 33% of the acknowledgment blunders being because of conflicting slant or center stature estimation. By this get 98.3 % exactness for capitalized and 86.7 % precision for bend molded penmanship.

IV. PROPOSED SYSTEM

The proposed work is an endeavor to build up an acknowledgement framework for perceiving the transcribed digits written in one of the local dialects like Telugu. The proposed framework initially standardizes the info picture having single digit from that point ML functions as an element extractor while Legendre Sobolev unique condition as a classifier. Assessments were targeted to ISI Kolkata's benchmark database (with Bangla, Devanagari, and Oriya dialect numerals) also CMaterdb (with Telugu language numerals). The results show that our system works highest for Devanagari English with an accuracy of 99.41% and for Bangla, Telugu, and Oriya, the accuracy is 99.14%, 99.16%, and 94.54% individually. In this way, the presentation of the proposed methodology is superior to anything condition of-workmanship approaches.

$$(f,g)=\frac{1}{2}\int_{-1}^{1} f(x)g(x)dx + M[f'(1)g'(1)+f'(-1)g'(-1)], \quad \text{-- eq(1)}$$

For each capacity f with the end goal that (f, Bˆ n) exists for n = 0, 1 ... present the Nth incomplete whole of the related Fourier-Sobolev arrangement for bend molding forecast appeared in eq(1)

$$S_N(f)=\sum_{n=0}^{N} c_n(f)\hat{B}_n(x) \quad \text{------ eq(2)}$$

Eq(2) traces the continues curve tracking such that if any single pen down and pen up strokes are identified easily. This is main advantage compared to existed work[1][2][3]

$$\begin{gathered} cn(f) = (f, B\hat{}\ n). \\ ||SN\ f||Lp([-1,1]) \le C||f||Lp([-1,1]) \quad \text{----- eq(3)} \\ \forall N \ge 0, \forall f \in L\ p\ ([-1, 1]). \end{gathered}$$

This eq(3) supporting to main strokes resembles at eq(1).

$$(f,g)=\frac{1}{2}\int_{-1}^{1} f(x)g(x)dx + M[f'(1)g'(1)+f'(-1)g'(-1)]$$

----- Eq(4)

Eq(4) explains that integral functions with 1st order multiplications and shiftings, these paramters link with

$$(f,g)=\int_{-1}^{1} f(x)g(x)dx + \sum_{k=1}^{K}\sum_{i=0}^{N_k} N_{k,i} f^{(i)}(a_k)g^{(i)}(a_k), \quad N_{k,i}>0$$

--- Eq(5)

Eq(5) has been examined in and for I = 0 in [4]. Likewise, we allude to [12], where some intriguing outcomes about Fourier developments as for Sobolev symmetrical polynomials are acquired.

$$P_n^{(\alpha)}(cos\theta)=\frac{1}{\sqrt{\pi n}}\left(sin\frac{\theta}{2}cos\frac{\theta}{2}\right)^{-\alpha-1/2} cos(k_\alpha\theta+\gamma_\alpha)+O(n^{-3/2}).$$

------- Eq(6)

Eq(6) explains angle modifications depending upon the theta value p_n is the probability of error strock and pen down and pen up uproach.Telugu character recognition (TCR) is based on an optical frame that allows a gadget to differentiate the personalities obviously. There are a few uses of ML, few of which are as follows, such as programmed mail arrangements, bank controls, library mechanization, vision handicapped assist perusing, language processing and safeguarding apps that give researchers a lot of excitement. The reputation accuracy is greater in OCR frameworks for printed texts as opposed to Telugu structures published by text pattern recognition (THCR)[1, 2, 3 and 4]. In essence, there are two types of HCR: online and offline. The information is captured in Online HCR throughout the

calligraphy process with the assistance of a distinctive brush on an electronic substrate, although accounts are verified in Offline HCR images of pre-written message[5]. Precision is littler for Offline HCR as comprehensive in text[1, 2 and 3], it is real in view of differential point problems, decipherability, overwriting, and verification of document and disturbance problems[2]. Similarly, there are no available norm or benchmark information, and dissecting Indian content on HCR could be a notable deterrent. Some conventional libraries such as MNIST, NIST, CEDAR and CENPARMI are accessible to Latin numerals[6], as there is no institutionalized Indian content database as it may be. Little records that are collected in the study facility[6] support the previous exams. Clients ' descriptive quality is one of all comprised teaching characteristics. It's a boring errand to distinguish after they separate from the formed personalities.

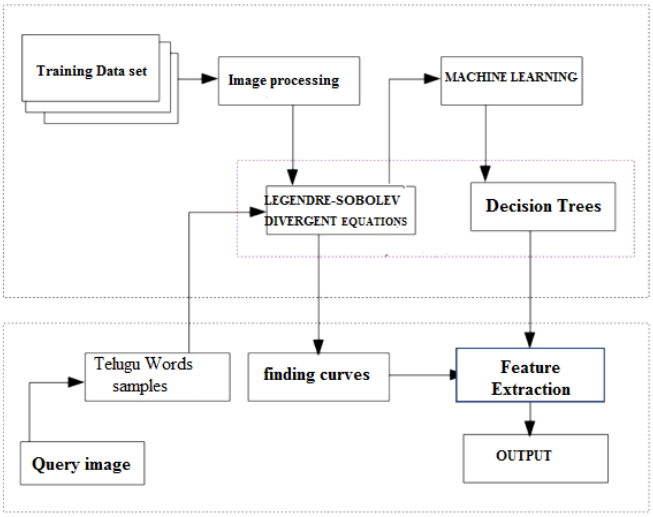

Figure: 3 block diagram of proposed work

Training data set is collected from MIT data blog which is available in web site, collected samples and applying machine learning and Legendre-Sobolev equations. Machine learning is applied with the help of Decision tress concepts. Here number of trees depending upon no of available samples. Shown in figure:3

$$\int_0^1 |\hat{B}_n(x)|^q dx \sim \begin{cases} c & if\ q < 4 \\ log\ n & if\ q = 4 \\ n^{q/2-2} & if\ q > 4 \end{cases} \text{-------- Eq(7)}$$

Equation 7 explains that the curve fitting and feature extraction methods based on proposed block diagram

$$\int_0^1 |\hat{B}_n(x)|^q dx \sim \int_0^{\pi/2} \theta\ |\hat{B}_n(cos\theta)|^q d\theta \text{ -------- Eq(8)}$$

Equation 8 is a supproting equation this decides that hand curve and angle method

$$= O(1) \int_0^{n^{-1}} \theta\ n^{q/2} d\theta + O(1) \int_{n^{-1}}^{\pi/2} \theta\ \theta^{-q/2} d\theta \text{ ---- Eq(9)}$$

Equation 9 is single curve hand down and hand up approach.

$$= O(n^{q/2-2}) + O(1) \text{-----Eq(10)}$$

This euation 10 is final orientation of proposed method.

V. RESULTS

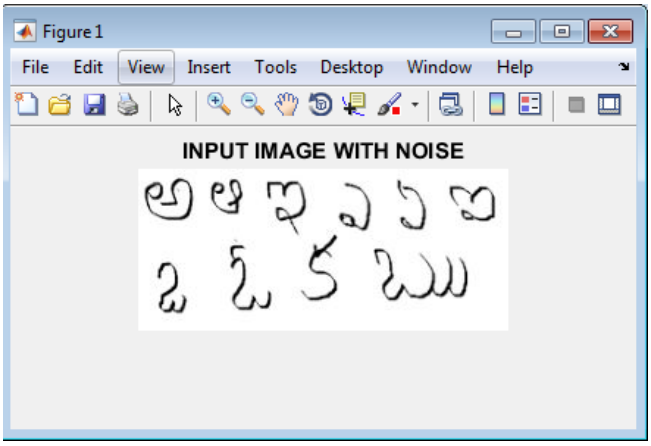

Figure : 4 input image



Figure : 5 output image

Figure 4 and 5 explains that proposed method results which are obtain from machine learning tool box and calculated errors strokes like single stroke and hand down & hand up approches. Output contains no errors and calculating efficiency. Using proposed equations with machine learning decission trees.

	◌ా ā	◌ు u
త ta	తా tā	తు tu
డ ḍa	డా ḍā	డు ḍu
ర ra	రా rā	రు ru
మ ma	మా mā	ము mu

Figure :6 telugu letters with english keys

Table: 2 Comparative Analysis of Online Telugu Hand Writing Recognition

S. No	Author	Method	Classifier	Approach	Accuracy (%)
1	G. Rigoll, A. Kosmala. J. Rottland Ch. Neukirchen[3]	Feature Extraction Methods	Discrete HMM	Vector Quantizer	99.35
			Continuous HMM		97.42

2	Andreas Kosmala, JoergRottlknd, Gerhard Rigoll[5]	Context Dependent Models	HMM	Trigraph -Based System	73	
3	Han Shu[6]	Feature Extraction Methods	HMM	Baseline Bbn	86.4 (height feature)	
4	Alex Graves, Santiago fern Andez, Marcus liwicki99k[7]	Global Feature Vector Matching	Recurrent Neural Networks	CTC Network	86	
5	R. Seiler, M. Schenkel, F. Eggimann[4]	Sliding window Techniq ue	Hybrid system of NN & HMM	Histogram	Upper case	98.3
					Cursive writing	86.7
6	P. M. Lallican, C. Viard-Gaudin, S. Knerr[11]	OrdRec	HMM	RefRec	97.5	
7	Muhammad Faisal Zafar, Dzulkifli Mohamad, Razib M, Othman[9]	Feature Extraction Methods	Counter propagation Neural network	Sequential Algorithm	60-94	

Table: 3 Comparative study

Method	1 without stokes acc	2 with stokes acc	Combination of 1 and 2 acc
Existed method-1[3]	84.05%	63%	73.525%
Existed method-2[2]	96.69%	82.96%	89.825%
Proposed	96.75%	99.65	98.2%

VI. CONCLUSION

Manually written character acknowledgment for Telugu characters is investigated throughout this work. A total assortment of 1500, 750 examples utilized for preparing also 750 examples for the testing territory is created and furthermore standardized to 300x300 pixels. These methods give better exactness by utilization of various classifier. This survey gives data about various classifier utilized in character acknowledgment methods. This far reaching dialog will give knowledge into the ideas included, and maybe incite further advances in the territory. The guarantee for what's to come is an altogether higher presentation for pretty much every character acknowledgment innovation territory. The popularity accuracy obtained by exploitation of Legendre-Sobolev divergent machine learning is 98.25%. (with all strokes).

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Classification of web services using data mining algorithms and improved learning model

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Abstract

As per the global digital report, 52.9% of the world population is using the internet, and 42% of the world population is actively using e-commerce, banking, and other online applications. Web services are software components accessed using networked communications and provide services to end users. Software developers provide a high quality of web service. To meet the demands of user requirements, it is necessary for a developer to ensure quality architecture and quality of services. To meet the demands of user measure service quality by the ranking of web services, in this paper, we analyzed QWS dataset and found important parameters are best practices, successability, availability, response time, reliability and throughput, and compliance. We have used various data mining techniques and conducted experiments to classify QWS data set into four categorical values as class1, 2, 3, and 4. The results are compared with various techniques random forest, artificial neural network, J48 decision tree, extreme gradient boosting, K-nearest neighbor, and support vector machine. Multiple classifiers analyzed, and it was observed that the classifier technique eXtreme gradient boosting got the maximum accuracy of 98.44%, and random forest got the accuracy of 98.13%. In future, we can extend the quality of web service for mixed attributes.

Keywords*: classification, data mining, QoS, web services*

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1. Introduction

The WWW was invented by Tim Berners Lee and a group of members in 1994, European Particle Laboratory in Geneva, Switzerland, the idea of hypertext information to keep personal information. W3 means a client program in one system which starts to display one object by clicking an option and retrieve another object from another system which is at remote server using network communication [1].

The web services are self-contained, loosely coupled to describe modular applications can be designed for interoperable business applications. The internet is mostly used B2C, B2B, e-commerce, and others, the growth of IT across companies worldwide to perform business activities. Web service uses technologies like XML, WSDL, UDDI (service discoveries), and SOAP protocols. Web service (WS) provided by internet, based system. The web page can be accessed by locating the service registry. The elements are used to build the web application one of the important web components is UDDI; the protocols are used for searching and publishing services. Web services use SOA architecture, which has three are roles, provider, requester, and registry. A service provider is the one who can publish, searching, and finding services. To discover applications by UDDI is a registry of services, the requestor is the end users who want to access the web services which are published by the service provider. Web service (WS) discovery is to identify the service with descriptions (WSDL), and APIs of business services. WS links the use of each WS interface.

In 2018, Global Digital Suit reported, 4 billion people (approximately) were using the internet across the globe among the total population of 7.593 billion, internet users are 52.95%, i.e., 4.021 billion, an active social media user 42.09%, i.e., 3.196 billion. The unique mobile users are 67.62%, i.e., 5.135 billion active mobile users in that 38.95%, i.e., 2.958 billion and applications like facebook, twitter, and other web-based applications. The applications are

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increasing very rapidly the designer and developer to ensure the quality design and development of applications which meet the client demands of user satisfaction of services [2]. Web service uses a dynamic business environment and user interactions, service quality, and satisfaction. For example, e-commerce, web service using SOA architecture, interactions of type and applictions used in large, medium, and small service users, features with service components have properties, functions, and operations [3]. Day to day business activities by web services made with quality of services, web service selection is the most important for the consumer to access applications. The rest of the paper deals with section 2 as related works, section 3 is the proposed approach, section 4 provide the results and discussions and finally section 5 ends with a conclusion and future scope

2. Related Work

M A Almulla et al. [4] proposed a model to classify into specific domains operated on text, similar service by the Fuzzy expert system; the results are compared with other methods. The WS quality dataset UDDI registries have 205 services which are classified into 11 classes or domains such as business, communication, and communication and others. Makhlughian et al. [5] use of CBA tool the services on demand, quality constraints, execution time, and accuracy of selections. Limitations do not know the importance of specific quality parameters. Mohanty et al. [6] used QWS dataset contains web services which can be classified into four categorical values using Markov Blanket, Naive Bayes, and Tabu search, the WSRF from data, naive Bayes is 85.62% using QWS data, and others methods used. The limitations are a quality model available, but prediction accuracy is low. Chen Li. et al. [7] use of models Naive Bayes, supporting vector machine 391 web services into service classifications using rough set theory classification of web pages into nine different classes like education, food, economy and weapons, limitations do not provide the best quality of web service.

The Guosheng Kang et al. [8] use of collaborative model filtering (CF) is a method to predict the interest of users, choice, preference, likes, and dislikes. In CF approach there are three concepts first, functional relations (keywords, input, and output), second is the score of the cosine similarity metricsof the users, and third is the utility operations the QoS into high and low values. Mohan Patro, et al. [9] used classifiers to classify the WS on QWS data set that are Fuzzy related techniques with feature selection, Gain ratio and Information gain with three methods which are compared. Hussein Al-Helal et al. [10] proposed an algorithm reparability as a metric to determine the web services plans equal or more tolerant plans. To discover and re-use web services in the organization to select the services which are business and quality of service (QoS) needs. The QWS dataset is used for experiments.

RK Mohanty et al. [11] proposed WS classification using PNN, BPNN, Treenet, GMDH, SVM, J48, CART to predict quality, identify and measure the quality and user satisfaction. DA Adeniyi et al. [12] used methods of KNN, CART, neural network (NN) model in the study. The RSS readers' data class labels, website, data categorical values world, business, politics, sports, etc. WS classification J. Liu et al. [13] are using naive Bayes semantic web to describe an attribute of Web service using method data preparation, classifying of OWLSTC dataset, semantic web into seven different areas. The heuristic approach proposed by M Makhlughian [14] by pre-processing, classification according to QoS levels of candidate service and ranking and selecting the best service. Class association rules using QWS dataset with non-functional and security parameters are not addressed.

Quality need for non-functional web service, in the real-world dataset, 21358 web services, over 30 million real-world web services by various counties, failure due to some of the causes like HTTP bad request, server error, bad gateway, service not available, network un-reachable, connection refused, time out and the Response time of users [15]. Soumadip Ghosh et al. [16] method neuro fuzzy classifier input vector, fuzzification into artificial neural network (ANN) and classifier into defuzzification. Experimental results by the use of UCI repository dataset KDD, breast cancer, iris, and other datasets find the classification accuracies.

Web service design, consumers, re-use functionality. Ali Ouni etc. [17] proposed a hybrid approach which uses heuristic-based approach to the design quality of web interfaces. The experimental results conducted 26 real-worlds Amazon and Yahoo. Web service classified by selection, discovery, and composition. The Yilong Yang et al. [18] proposed a deep neural

network service classification approach. The 10000 real-worlds web services into 50 categories of values. Evelum Setoani et al. [19] use re-usable text classification in Bahasa Indonesia.

Web services demand, provide good solutions with the interoperable property. Multifaceted match making framework, web service quality, and user seeks best quality services. Sambasivam et al. [20] identified 21 quality parameters, and experiments conducted 1000 web services, service discovery and search. Xiong et al. [21] proposed a novel deep learning hybrid approach for web application recommendation and improving performance. Web-based applications increase rapidly very fast. The designer and developer ensure to provide high quality services for customer satisfaction.

Problem definition: The software developer aim is to design and develop the best application which will meet the user specifications (including functional and non-functional parameters) according to the service level agreement (SLA). Web service quality is measured by the ranking of the web application. The ranking of web services using classification and predictions. We have used QWS dataset for conducting the experiments to find web service quality using various data mining methods (i.e., classification and predictions). The classification of web service helps the software designer to improve quality and performance. The proposed model is shown in Figure 1. This is applied for this problem to solve and web service classifications using input dataset.

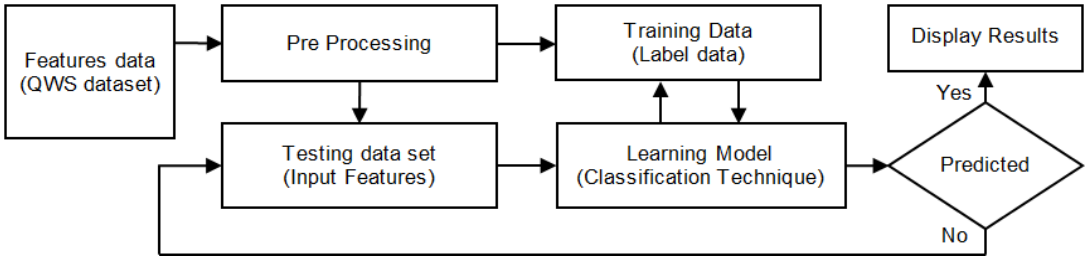

Figure 1. Quality of web service classification learning model

3. Proposed Approach

The internet-based applications quality is considered by non-functional parameters for satisfying the user requirements with functional parameters. The proposed model is shown in above Figure 1. The data mining algorithms are used to classify the quality of web services, i.e. QWS dataset. Initial stage use pre-processing, selection of training data with a testing dataset with use of various classification methods used to find a ranking of web services. Let the dataset consist of A_1, A_2,.., A_n each which belongs to class C_i, where C_i in {C_1, C_2,.., C_n} where C_i>= 2. Quality is most important, which compared with attributes like load distribution, service direction, throughput, cost, response time, and other elements. For example, e-commerce web applications provide functionality as per the SLA with satisfying quality parameters. The QWS dataset [22] was relevant objects in the domain. In this case, data contains various quality parameters such as response time, throughput, availability, accessibility, reliability, best practices, compliance, latency, and documentation. The classification of web services are Class-1 (high quality), Class-2m (quality), Class-3 (average quality), and Class-4 (poor quality services). This is applied for this problem to solve and web service classifications using Input dataset, learning methods (classification techniques such as random forest, artificial neural network, J48 decision tree, eXtreme gradient boosting, K-nearest neighbor and support vector machine) are used, and feature selections like response time, accessibility, reliability, throughput, availability, compliance, and best practices and training data to classify the data into categorical values (Rank 1, Rank 2, Rank3 and Rank4).The quality of web service QWS dataset consists of 2507 samples using classification approaches to find the accuracy of classification methods. Find the density of feature attributes response time is skewed left, availability is right side skewed, throughput is increasing and gradually decreasing, successability right side skewed, the reliability of curves, compliance curves, best practices at the range and class labeled ranked as 1, 2, 3 and 4, are shown in Figure 2. The QWS data read input, in initial stage pre-processing, training (labelled data) with testing (input data) using learning models such as

random forest (RF), Artificial Neural Network, J48 Decision Tree, eXtreme gradient boosting, KNN classifier, and SVM methods are used to classify and predict testing dataset into class labels(Class-1, 2, 3 and 4) for the experimental results conducted using R programming. The details of the algorithms are discussed below.

3.1. Random Forest

The random forest is a decision tree which has a collection of decision trees known as forest, the new object attribute classification of the class label, 1, 2, 3, and 4. The forest is chosen classification has the most votes overall tree in the forest. Algorithm1 explains random forest.

Algorithm 1. Random Forest

```
Input: QWS dataset
Output: Classification label class-1,2,3 and 4
Begin
   Step 1: The training set is N and sample training set in a growing tree
   Step 2: If input variables m< M each node, m is variable, M is a best to
           split node.
   Step3:  Find the Class label in the best split criterion leaf node.
   Step 4: Each tree grew at the maximum possible extent; then there will be no
           pruning.
End
```

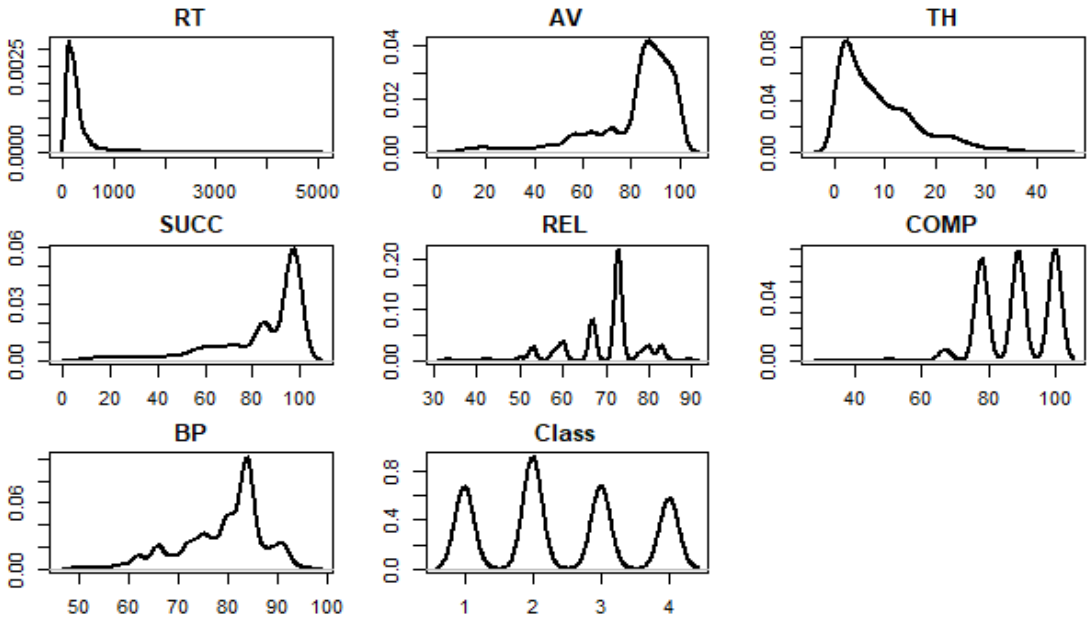

Figure 2. QWS data density values

RF classification, here we have used in experiments 500 trees, split each variable by 2, out of bag error (OOB estimate error)value is 1.79% using R programming. The results of random forest confusion matrix are shown in the Tables 1 and 2. It gives the comparative study of predicted class variables with observations.

Table 1. Random Forest-confusion Matrix

Prediction	Rank1	Rank2	Rank3	Rank4	Class Error
Class-1	583	2	2	6	0.016863406
Class-2	3	803	0	0	0.003722084
Class-3	1	1	587	10	0.020033389
Class-4	2	5	13	489	0.039292731

Table 2. Comparative Results with Actual Values asnd Predicted Classes Using Random Forest Algorithm Using Ten-fold Cross-Validation

Prediction	Observation	Rank1	Rank2	Rank3	Rank4	rowIndex	Mtry	Resample
Class1	Rank1	0.900	0.002	0.032	0.066	15	1	Fold01
Class4	Rank4	0. 062	0. 130	0.086	0.722	16	1	Fold01
Class3	Rank3	0.032	0.000	0.890	0.078	17	1	Fold01
Class4	Rank4	0.004	0.000	0.014	0.982	28	1	Fold01
Class1	Rank1	0.986	0.000	0.006	0.008	30	1	Fold01

Kappa and accuracy: Siegal and Castellan (1998), Carletta (1999), kappa control agreement P(A) for agreement change P(e). Kappa is an inter-rate qualitative agreement for categorical items and robust measure calculation, where Pr(e) is calculation, kappa is corrected measure classification for true classes, poor <= 0.2, Fair is equal to 0.2 to 0.4, moderate is in-between 0.40 to 0.60, good accuracy is 0.60 to 0.80, excellent measure is 0.80 to 1.0. Kappa statics is a mean for evaluating the prediction classifier performance across all instances. Classification measure for N items into mutually exclusive kappa measurement is described in (1):

$$\mathrm{K} = (\Pr\,(\mathrm{e}) - \Pr\,(\mathrm{e}))/((1 - \mathrm{pr}(\mathrm{e})) \quad (1)$$

Pr(a) probability of classification success, accuracy, Pr(e) probability to chance of success, Pr(e) replaced to Pr(b) agreement measure classification a and b, Summary of sample sizes of 2257, 2256, 2256, 2255, 2256, 2255 etc, by re-sampling results across tuning parameters with random forest classifier Cross-Validated(10 fold) and Kappa measurement are shown in Table 3.

Table 3. Random Forest Classifier Accuracy and Kappa Measurements of QWS Data Fine Tuning

S No	Random Forest Accuracy	Kappa Measure
1	0.9780699	0.9704352
2	0.9832524	0.9774364
3	0.9820508	0.9758201

3.2. Artificial Neural Network (ANN)

NN consists of an input layer which accepts input data here QWS dataset seven attribute values, the hidden layer used for weighing factors to calculate predictions and forward to the output layer, which predicts the class labels. A neuron is called processing elements (Artificial neuron is biological neurons). In Figure 3 shows ANN, let there be 'n' inputs {X_{i1}, X_{i2}, …, X_{ij}}, here we have taken seven input attributes of QWS data, Each X_{ij} is associated with weights Wij, Bias(c) is a network,used to calculate the net-input by adding input X_{ij}., Threshold (Θ_i), it is the reached to exceed the value of input neurons. Output (O) is after executing operations is a nonlinear functional (F_i) value [23, 24]. We have conducted experiments using neural network of QWS dataset 2507 samples, seven predictors and four classes 'Class1', 'Class2', 'Class3', and 'class4'. The generated Algorithm 2 is discussed below.

Algorithm 2. ANN: Neural network-classification and prediction of class labels of QWS data

```
INPUT:  D is an input dataset of training tuples which are associated with
        target values Rank1,2,3, and 4.
        L: learning rate of the network, Feedforward network use multilayers
        for accuracy
OUTPUT: A Trained NN with testing data to classify and predict class labels
        1,2,3 and 4

BEGIN
   Step1:  Initialize weights, bias and in networks and biases in the network
           Repeat until the condition is not satisfied
   BEGIN
      Step2:  Each training data records Xi, in D
```

```
    BEGIN
        Step3:  // Propagate input data forward to layer
        Step4:  For input of each layer with j
            BEGIN
            Compute Result (Fi) = Input (Xi);// result of i/p is actual i/p
            data.
        //if More than one hidden layer improves the performance accuracy
        Step5: each hidden layer or result at output layer unit J
            NetInput (Xj)=∑WijFij+Θj // calculate net input j which
            corresponds to the previous layer i, and compute Function output
            Fi  as Output (Oj)= (1/1+e-lj), calculate result output(sigmoid)
            for input each j value.
            each input j
            END// Step 4 end
        Step6: propagation errors if any
            each unit for  j  in the results of the output layer
            Errj=Fj(1-Fj)(Tj-Fj);// compute the error  if any
            For each input j in hidden layers; from considering last to the
            first hidden layer
            Compute Errj=Fj(1-Fj) ∑k ErrkWjk;// calculate error respect to
            next higher layer k
            weight for  Wij in the network associated with each layer and
            value
        BEGIN
            ΔWij=1+Err j Fj// increment of weight
            Wij= Wij+ ΔWij;//  update the weight value
        END
    Step7:  For   bias Θ  in each network  update value
           Δ Θj=(l) + Err j // Bias increment
    END
  END
END
```

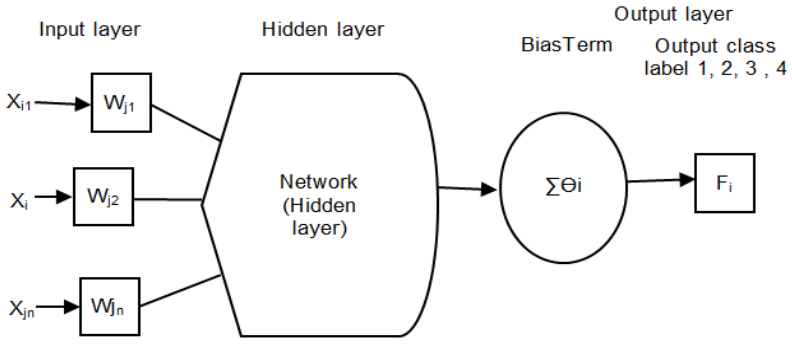

Figure 3. Artificial Neural Network Model

The experimental results conducted using R programming with QWS data and ANN confusion matrix is described in Table 4. ANN predicted values with observation comparison described in Table 5. Re-sampling of ANN with Kappa measures and the results are described in Table 6.

Table 4. Artificial Neural Network Confusion Matrix

Prediction	Rank1	Rank2	Rank3	Rank4
Class-1	587	1	2	1
Class-2	2	803	2	3
Class-3	2	1	587	4
Class-4	2	1	8	501
Accuracy (average): 98.11%				

The Accuracy (average): 98.11% fine-tuning accuracy is 98.20 Accuracy=9, and decay is 9 and 0.06

Table 5. Artificial Neural Network Confusion Matrix

S No	Prediction	Observation	Rank1	Rank2	Rank3	Rank4	RowIndex	Size
1	Class-2	Rank2	1.3828e-01	8.0440e-01	1.6946e-04	5.7138e-02	7	1
2	Class1	Rank4	5.6466e-01	5.7662e-02	5.7421e-03	3.7192e-01	13	1
3	Class-2	Rank2	5.3700e-02	9.2668e-01	3.7245e-05	1.9572e-02	18	1
4	Class2	Rank2	6.1467e-02	9.1569e-01	4.6043e-05	2.2786e-02	25	1
5	Class4	Rank4	4.7507e-01	1.0356e-03	3.6187e-02	4.8769e-01	34	1

Table 6. Re-sampling Results across Tuning Parameters using ANN with Kappa Measures

Size	Decay	Accuracy	Kappa
1	0.05	0.9740732	0.9650738
2	0.06	0.9852060	0.9758378
3	0.02	0.9776573	0.9698991
4	0.01	0.9768779	0.9688352
5	0.01	0.9792636	0.9720675

3.3. J48 Decision Tree

Is an approach which acts as a classification predictor from the list of values, the target is dependable value, and it is used to predict target value. The J48 Decision Tree is described in Algorithm 3.

Algorithm 3. J48-Classification of QWS data using Decision Trees

```
DTreeQoS(DatapartitionDp, data attributes)
Input: QWS data Attributelist(RT,AV,TH,SUCC,REL,COMP,BP)
RT Response time, AV: Availability, TH: Throughput, SUCC, Successability, REL:
Reliability, COM: Compliance, BP: Best practices.-

QWSselectionMethod: Procedure for splitting into individual classes.
Output: Decision Tree with class labels class-1,2,3 and 4.

Step1.   Create a new node N
Step2.   If data records partition Dp of the same class of type(1,2,3, and 4),
         then return the leaf
         Node N label with relevant class type as 1,2,3 and 4.
Step3.   If (data attribute list)is EMPTY  thenReturn N, leaf node, the
         majority of classes in data partition Dp / //    majority of classes
         of class type
Step4.   apply QWSselectionMethod(Dp, data attribute list) to find the best
         splitting criterion.
Step5.   Splitting criterion  label N
Step6.   If splitting data values and Multisplit permitted then//
Step7.   Adddataattributelist←data attribute list- splitting attribute; //
         removing splitting attribute
Step8.   For the result of the splitting criterion of each // To find classify
         label
Step9.   Let Dresult be set of data records in Da satisfy result; //
         apartition result
Step10.  If Dresult is EMPTY then   add to leaf label of majority class label
         in Da to node N; else add a node returned by DTreeQoS (Dresult,
         dataattributelist) to node N;
Step12.  end for
Step13.  Return N
```

Applying Algorithm3 (J48 Decision tree) on QWS data, which consists of 2507 record samples, results into four classes namely: 'Class1', 'Class2', 'Class3', and 'Class4' using seven predictors. Re-sampling: Cross-Validated (10 fold), using R language the summary of sample sizes of 2256, 2256, 2257, 2256, 2257, 2256, etc. the results shown in Table 7, and accuracy is 97.56637% and Kappa value is 96.72248%. Tuning with parameter 'C' was a constant value of 0.25. Tuning parameter at constant value M is held at 3.

Table 7. The Comparative Study of J45 Classification Predictions with Observations

S No	Prediction	Observation	Rank1	Rank2	Rank3	Rank4	RowIndex	Size
1	Class2	Rank2	0.0000	1.0000	0.0000	0.0000	2	0.25
2	Class1	Rank1	0.9979	0. 0020	0.0000	0.0000	5	0.25
3	Class1	Rank1	0.9979	0.0020	0.0000	0.0000	10	0.25
4	Class1	Rank1	0.9979	0.0020	0.0000	0.0000	12	0.25
5	Class4	Rank4	0.0000	0.0000	0.0000	1.0000	16	0.25

3.4. eXtreme Gradient Boosting (XGboost Technique)

This is a machine learning algorithm, supervised learning to find the tasks regression, ranking, and classification. Prediction (Y_i) for given a value (X_i,) using a linear model is used to prediction $Y'_i = \sum \Theta_i X_i$, where weight input, the prediction, can have different interpretations, the task depends on regression or classification, Θ_i co-efficient denote parameter the model is used for ranking the outputs. XGboost technique (eXtreme gradient boosting) uses seven predictors, four classes as Class-1,2,3 and 4, experiments at Cross-Validated (10 fold) of sample sizes: 2258, 2255, 2256, 2256, 2257, 2257, etc. The experimentations with XGBoosting method results are shown in Table 8, and Table 9 XGboost confusion matrix across tuning parameters.

Table 8. eXtreme Gradient Boosting Classification of QWS Comparisons Accuracy with Kappa Measures

S No	Theta	Alpha	Nrounds	Accuracy
1	0e+00	0e+00	50	0.9828397
2	0e+00	0e+00	100	0.9828397
3	0e+00	0e+00	150	0.9828397
4	0e+00	1e-04	50	0.9832381
5	1e-01	1e-04	100	0.9836046

Table 9. eXtreme Gradient Boosting Confusion Matrix

Prediction	Rank1	Rank2	Rank3	Rank4
Class-1	583	1	0	1
Class-2	3	800	0	3
Class-3	0	2	590	10
Class-4	7	3	9	495
Accuracy (average) : 98.44%				

The Accuracy (average) : 98.44% fine tuning accuracy is 98.45% constant value is 0.3 optimum model largest value, 50 rounds lamda=0.1, accuracy=9, and decay is 9 and 0.06

3.5. K-Nearest Neighbors Classification (KNN)

KNN classification algorithm [25] input have ‘k’ closet training tuples in the feature selection, the object being assigned to the most common is ‘k’ nearest neighbors. Find the most similar object from training data; the testing data will look into the training dataset to be the most similar object based on feature selection and distance functions. KNN algorithm is described in Algorithm 4.

Algorithm 4. KNN Approach

```
Input:  Given records and attributes S, from Matrix a=[Aij]
Output: classification label (class-1,2,3 and 4)

Each record classified into Rank the web service (WsRF: Web service Relevancy
Function)
begin

Step1. Given a set of records and attributes, form matrix A= [aij]
Step2. For each record P in the Test data do
       For each record in A, in the training data A do
       Calculate the similarity of input testing data which is most similar to
       trained
       dataset EUDistance(P,A)
       Store DIS_Array(Pi,Ai) and find the class label.
       end for
       end for
end
```

QWS dataset 2507 samples, for seven predictors and into four classes: 'Rank1', 'Rank2', 'Rank3', 'Rank4', use of cross-validation, 10 fold the sample sizes of 2255, 2256, 2256,

2257, 2258, 2257 etc, and Re-sampling results across tuning parameters and result conducted shown in Table 10. KNN with k value 5 is maximum accuracy of 89.34%.

3.6. SVM with Radial Basis Function Kernel Approach

This is a method used to classify the data. SVM classification use maximize margin for accurate values. It is a linear classifier, where Ai is input, W is variable of a straight line with constant B. IN (2)-(5) depicts the processing:

$$\mathrm{bF(Ai, W, B)} = \mathrm{sign(AiW + B)} \quad (2)$$

where Ai, is input data which is a variable and B is constant of a straight line:

$$\mathrm{WAi + b} \geq 1 \quad (3)$$

if Fi =+1 where W is a variable of line, tshe linear line WA_i+b is maximized margin M=2/|W|, minimize 1/2W_tw with the subject to Minimize (w) =1/2 Wt W and subject to output(wA_i+b) ≥1

$$\mathrm{WAi + b} \leq 1 \quad (4)$$

if Fi =-1 where W is a variable and

$$Fi(WAi + b) \geq 1 \quad (5)$$

for all remaining values.

QWS dataset 2507 samples experiments conducted using R programming with seven predictors and four classes: 'Rank1', 'Rank2', 'Rank3', 'Rank4', re-sampling, sampling the use of cross-validation ten-fold, the results using SVM with RBFK method are shown in Table 11. Summary of sample sizes: 2257, 2256, 2256, 2258, 2256, 2257, etc. re-sampling results across tuning parameters.

Table 10. The KNN Classification of QWS Data and Comparisons with Accuracy with Kappa Measurement

S No	K value	Accuracy	Kappa
1	5	0.8934794	0.8556596
2	7	0.8855096	0.8446677
3	9	0.8739349	0.8287782

Accuracy is at k=5, optimal model, the largest value

Table 11. SVM with Radial Basis Function Kernel with classify QWS Data Accuracy and Kappa Measurements

S No	C	Sigma	Accuracy	Kappa
1	1	0.1	0.9397494	0.9184620
2	1	0.2	0.9489032	0.930877
3	1	0.3	0.9548937	0.9390387
4	1	0.4	0.9548985	0.9390593
5	1	0.5	0.9573018	0.9423314

Accuracy at largest optimal value when sigma = 0.6 and C = 1

4. Results and Discussions

WS objects need the quality of services; this is associated with each object, in business process coordinating to deal with services and managing service qualities. To provide quality services according to user requirements, WS real-time applications use of video, text, image, and other elements by users, QoS of web service, satisfies the end-user requests. For example, the response time of Website quality is associated with various parameters like network, application services. The designer aim is to monitor the quality contents and ensure quality services. The customers require quality services, high availability, security, cost optimization, and others [26]. WS layer, quality monitored, and adjusted parameters, for example bandwidth, communication layer by web service, which handles message contents in a real-time layer which communicates with services between client and server. The web services quality parameters of access control the information of data audio, video, a text document and other documents with various parameters influence to measure the quality of software. Here we have taken QWS dataset, and the results are executed using R- Language and identified most important influence parameters are best practices, successability, availability, response time, reliability, throughput, and compliance shown in Figure 4 in web application development. The existing web service classification methods and its accuracy values are shown in Table12.

Table 12. Web Service Classifications of Existing Methods and Accuracy Values

S No	Classification Method	Accuracy
1	Naïve bays	83.62%
2	Group Method of Data Handling(GMDH)	98.32%
3	Back propagation and Neural Networks(BPNN)	97.22%

The accuracy values of classification methods implemented using R Language, and results are shown in Figure 5, computed classification accuracy, and kappa measurements graph are also shown. Figure 6 shows the results WS classifications using (ANN) method. The Figure 7 shows the accuracy of randomly selected predictors. Figure 8 shows the accuracy, number of iterations web service classifications by extreme Gradient boosting method. Randomly selected predictors for is shown in Figure 7, in which the prediction at a minimum accuracy by KNN is 89.39% and maximum accuracy by XGboost techniques are 98.44%.

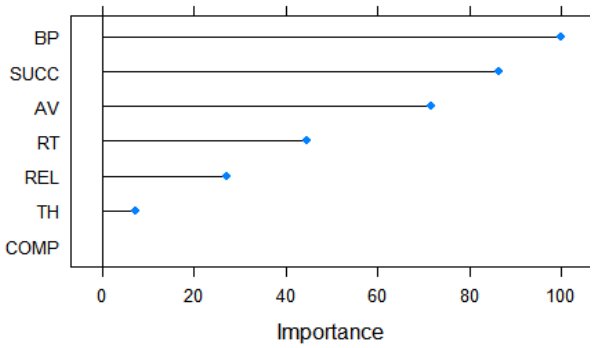

Figure 4. Importance of Web Services

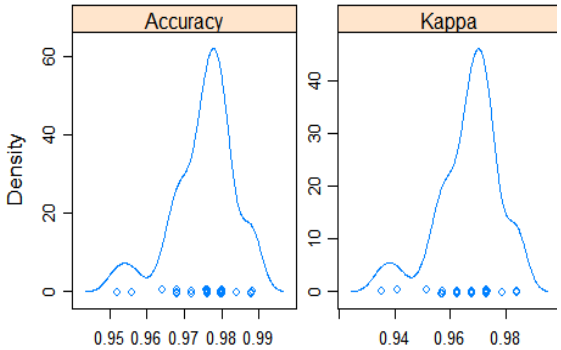

Figure 5. Web Service Classification accuracy with kappa measurements

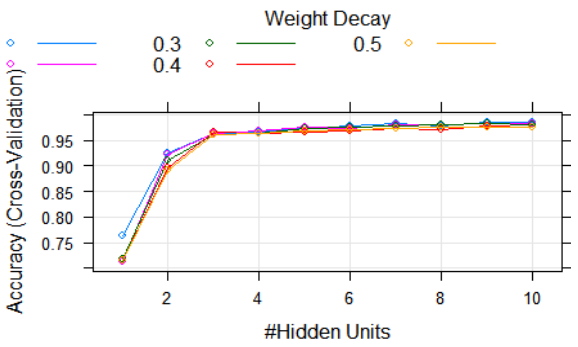

Figure 6. Web service classification using Artificial Neural Networks

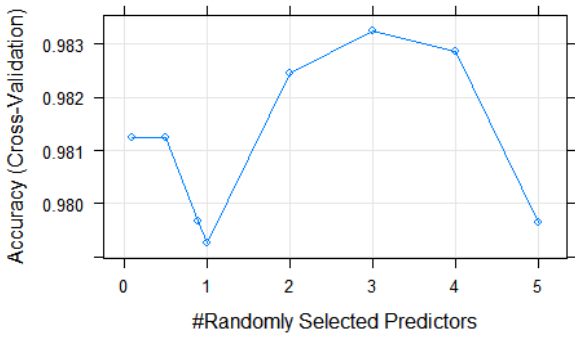

Figure 7. Randomly selected predictors

The eXtreme gradient boosting method results are described in Figure 8 that shows the accuracy by using alpha at iterations with the minimum which is 98.44% and the maximum value is 98.45% by iterations with alpha values. eXtreme gradient boosting method got the highest accuracy compared with various data mining methods accuracies are shown in Table 13. The experimental results conducted with QWS dataset using R language and various classification methods and comparative study of accuracy with fine tuning values are shown in Table 13.

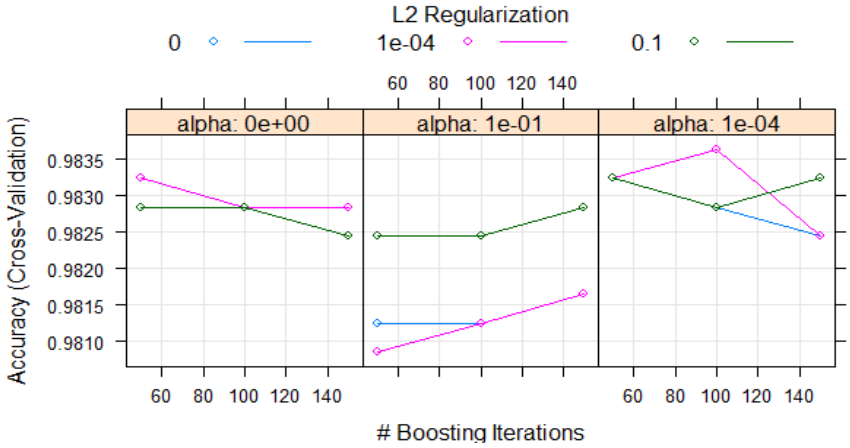

Figure 8. eXtreme gradient boosting method, alpha, first, second and third iterations with alpha values the comparison graph

Table 13. Web Service Classifications Using QWS Dataset, Various Methods, and Accuracy Values

S No	Classification Method	Accuracy	fine tuning Accuracy
1	Random Forest	98.13%	98.32%
2	Artificial Neural Network	98.11%	98.20%
3	J48 Decision tree	97.56%	97.57%
4	eXtreme Gradient Boosting	98.44%	98.45%
5	K Nearest Neighbor	89.34%	89.35%
6	Support Vector Machine	95.73%	95.74%

5. Conclusion and Future Scope

Web service is most important for business service; the user demands high-quality web services. The designer must provide high-quality web services based on demand. To meet the industry demands and policies, we recommended the best practices [27, 28] used for preventive measures, quality standards which will improve the performance of web applications, Successability depend on the availability of web applications by backup and fault tolerant systems, response time plays a significant role in interactive web user to the web server, reliability, throughput, and compliance. The existing methods depicted in Table12. We have taken QWS dataset using various data mining methods random forest, artificial neural network, J48, eXtremetgradient boosting, and Supporting Machine methods are described in Table 13, in which the accuracy is improved by using method eXtreme gradient boosting is 98.44%, improved fine-tuning performance has 98.45% and random forest has 98.13% and fine-tuning performance is 98.32%. In future use of mixed parameters will be suggested to improve the overall performance of web application by classifications, predictions, the recommendations to improve the quality software.

Acknowledgment

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Understanding Bitcoin as Crypto Currency and Concept of Application Development with Ethereum

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ABSTRACT

Bitcoin has been improving in its market share and competing with actual currencies in the real world. In this context, there is increase in the applications developed for crypto currencies and general applications that can be used in distributed environment. The block chain used for cryptocurrencies like Bitcoin became famous for other applications as well. Ethereum like platform has its support for developing applications of that kind. In this paper, Bitcoin is focused as crypto currency and regression analysis is performed on the financial data. An algorithm is proposed to have regression analysis. The paper also provides the dynamics of Bitcoin in the perspective of its usage as crypto currency. It also throws light into the concept of application development using Ethereum. Ethereum is the platform to build distributed applications where millions of computers and users can involve for secure communications. The results revealed that Ethereum platform is useful and regression analysis showed the performance dynamics found in the financial data.

Keywords – Crypto currency, Bitcoin, regression analysis, Ethereum platform

1. INTRODUCTION

The term currency has acquired two broad meanings. They are physical currency that is in the form of coins or notes measured in, for example, Euros and electronic currency that is not tangible in nature. Alternative currencies are various forms of electronic currencies other than physical currency. Bitcoin has emerged as one of the electronic currencies or electronic cash. It is decentralized digital currency that does not need a central governing bank or a governing entity. In other words, Bitcoin is a new kind of money with innovative payment network. There are many factors that influence the exchange rate of physical currencies like Euro. The factors include inflation, political stability, economic conditions, recession, and interest rates. The aim of this thesis is to investigate the hypothesis that "the factors affecting traditional macro-finances do not drive Bitcoin price". Towards this end, a methodology is formulated with a conceptual framework required to complete the research. From the analysis of the research findings, it is understood that the Bitcoin prices are not predictable as done in the case of traditional currencies. Its presence of digital form is one of the fundamental reasons why the Bitcoin currency is not affected by factors that influence standard currency. Another important observation in the study is that there are some other factors like media, word of mouth and advertising affect price of Bitcoin. The remainder of the paper provides more details on Bitcoin and crypto currency and provides regression analysis besides the concept of developing distributed applications with Ethereum platform.

2. RELATED WORK

This section provides review of relevant literature on cryptocurrency and its related works.

2.1 The concept of alternative currency

According to Levy &Glimcher [8], complementary or alternative currency is a term predominately applied to denote any currency that is used as a determined alternative to the multinational or dominant national currency system. Patel et al. [10] argued that alternative currencies are often created by the corporation, individual or an organization. Moreover, such form of currency can be created by either local or state governments [11]. Luther and White [9] opined that an alternative system of currency might develop naturally once people consider using a particular commodity as currency. The current literature provides several argumentative explanations regarding the concept of alternative currency. Levy

&Glimcher [8] opined that an alternative or complementary currency could act as a certain medium of exchange (exchanging alternative currency for traditional currency and vice versa) which definitely is not a country's recognized currency. However, it is thought of or considered as a currency system that supports, in fact, supplements the national currencies.

However, according to Levy &Glimcher [8], complementary currency is seldom considered as legal tender. Legal tender is the payment medium that is recognized by a legal system and valid across a country in general. For instance, Euro coins or bank notes are considered legal tender in the European Union. The application of complementary currency adheres to agreement between two distinct parities which may consider exchanging currency. Luther and White [9]argued on the concept as he stated that complementary currencies were created to stimulate, protect or orientate a nation's economy. Alternative currency is considered as a tool that is applied to advance any specific environmental, social and political goal (Burnside, Eichenbaum&Rebelo, 2016).

Experts such as Patel *et al.* [10] highlighted several interchangeable terms, which are used for denoting alternative currency. One such example would be the term "community or local currency". Various experts often consider several private currencies to be alternative currencies, which are majorly issued by various private enterprises. Kim &Dilts [8]opined that alternative currency is majorly injected in an economy for a plethora of purposes. Moreover,Luther and White [9]exemplified several such purposes in his research procedure. The expert claimed the necessity of issuing alternative currency when a nation intends to augment its definite financial health and stability [8]. Xiao *et al.* [11] advocated the usage of alternative currency during situations when a nation or a particular community has no sound access to designated financial capital. Details of crypto currency such as Bitcoin are reviews more in [12]- [20]. The bottom line is that Bitcoin became famous as crypto currency.

2.2 Factors That Impact the Value of Currency

CiaianandRajcaniova (2016) stated that foreign exchange rate is one of the most significant means by which value of economic health of the country is determined. The value of currencies is dependent on some factors such as interest rate, political stability, gross domestic product, inflation, import ratio, export ratio and price of Gold [8]. Change in market inflation can cause changes in currency exchange rates. In addition, changes in interest rate affect value of currency as well as euro exchange rate. The Government Debt is dependent on political stability by which value of currencies are changed [8]. A country with Government Debt is less acquires foreign capital that leads to inflation and impact on the value of currency. The above mentioned factors determine the value of currencies and help the country to avoid potential falls in the rates of currency exchanges by analysing the factors. The factors also ensure that currencies are exchanged at proper rate (Burnside, Eichenbaum&Rebelo, 2016).

According to Dembiermont *et al.* [6], the primary factor that contributes towards the overall strength or weakness of a particular currency is the interest rate of the country. As stated by, Xiao *et al.* [11] interest rates are the determined amounts that a country needs to pay in order to borrow a certain sum of money. The rate of interest rate level moves definitely lower or higher by a nation's central bank to stimulate or either slow the economy down [11].

Inflation is another essential factor that impacts the value of currency in a country [8]. This economic factor is essentially determined by the rise in prices of the commodity and the services of the nation [10]. When a particular product witnesses rise in its price, it essentially signals the determined underlying demand for the products [10]. It is a matter of common fact that higher prices may not seem good to a consumer [10]. However, a country is seemed to be benefited from a certain moderate increase in their respective inflation in a growing or developing economy [10]. Several central banks have a certain target inflation rate for their rate of economy which is approximately 2 % per year [11]. The growth in economy and current account balance are other two factors which cause a certain increase or decrease in the value of the currency [8]. Furthermore, there are economic elements like GDP, export and import rate and their respective ratio influence currency fluctuation in an economy [11. These are explored in the below given portion of this literature review.

However, several experts have presented contradictory views on this aspect of currency valuation. Kim &Dilts [8]opined that the central bank of a particular nation creates currency and

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uses such to purchase government based debts (which essentially lowers the rate of interest). A certain fall in interest rate may lead to a simultaneous increase in aggregate supply and aggregate demand. The repercussion of this policy on the overall market value of money or currency depends on major expectation, but a bigger increase in respective (along with the associated surge in people's confidence) may essentially counter or may moderate the decline in the determined value of the currency [8].

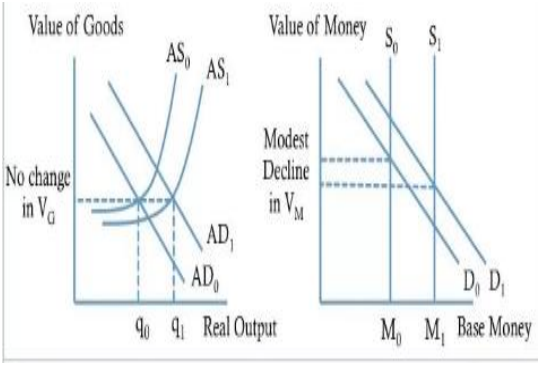

Figure 1: Graph representing lowering of interests and the exhibited illusion of prosperity

As shown in Figure 1, it reflects the lowering of interests and also illusion of the prosperity. It is to know actual value of goods and actual value of money [8].

3. TECHNOLOGY AND DYNAMICS OF BITCOIN

3.1 Understanding Bitcoin

In order to study the impact of alternate currency and its impact on financial industry, a comprehensive understanding of Alternate Currency is required. In this section, the innovation, arrival and impact of currencies such as bitcoin and other forms are explored in great detail. Bitcoin is synonymous with alternate currency and has drawn the attention of a variety of fields from cryptography to economics and computer science apart from financial aspects as well [3].

Bitcoin is one of the most successful cipher or cryptocurrencies in the world. It was first introduced to the world by the genius mind of Nakamoto [5], who used a 'systematic structural specification' for this purpose [3].

"*The root problem with conventional currency is all the trust that's required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that trust,"*[5].

The purpose of the bitcoin is its decentralised philosophy. It is an emerging technology which challenges conventional trading currencies. Bitcoin is one of the first forms of cryptocurrency to emerge and has slowly changed the ways of money. The currency at its time of debut in 2008 to its current format in 2018 has evolved achieving astounding values of approximately $330 per bitcoin. Hence, it is necessary to focus on a study of this transactional currency exchanged for fiat currencies [5].

There are several aspects to this unique currency. First and foremost, digital currency did have its own history. But the difference that Nakamoto[5] brought about to this currency is that, the applied the unique concept of 'public key cryptography,' in making these digital cryptocurrency[5].

The purpose of bitcoin, for Nakamoto was to free the currency systems from the control of the governments and therefore a decentralisation which is far different from the 'fiat currencies' which use central banks in the current system. The philosophy is to build 'trust' among participants of the bitcoin market during the process of the formation of the block chain technology using two key inputs – (A) Cryptography methods and (B) Hash functions. The evolution of this system has expanded theoretical studies in this science and is emerging as advanced levels of 'machine learning [5].

Though, Nakamoto's identity is shrouded in secrecy, his white paper has stood the test of time and bitcoin continues its ascendency of the cryptocurrency scenario [3].

Nakamoto defined in his seminal work, 'Bitcoin: A peer-to-peer Electronic Cash System,' that the fundamental feature of this currency is to use the ledger format for transactions which were rendered in the form of block chain. Hence, the key components of bitcoin as proposed by Nakamoto are: 1) Blockchain or the ledger for all transactions (2) Mining- the capability of the decentralised authority to authenticate transactions. This process is uniquely termed as mining records [3].

3.2 Validation by Users

The principle adopted for the purpose of validation is the concept of 'mining.' The users will begin by validating the transaction and its integrity prior to adding it to the block chain. The process of validating is very expensive as it involves

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encryption and using complex alphanumeric keys. As soon as the user, who is also called the miner, performs the integrity check of all of the transactions and adds them to the block chain, then the user will perform the mining. These efforts are rewarded by BTC currency and thus the bitcoin or the currency is created or generated records [3].

3.2 Enabling Technology of Bitcoin

Bitcoin; The exchange rate is determined by fiat currencies. The bitcoin prices are in relationship are between actual markets as well as Bitcoin markets. Hence, the difference is in terms of bitcoin market and the currency markets. Since bitcoin is virtual currency and relies on block chain technologies, the factors or economic size E, Velocity V and the capacity of the Bitcoin market, B are related in a close relationship, where market variables are measurable. These are captured from the Blockchain platform. Hence, if P is the price level of the goods and services then it can be determined indirectly by considering the global macroeconomic indexes in real time [4].

Hence Price of Bitcoin (P_B) = PE (Price into the economic size)/VB or Velocity into the bitcoin market [4]

$$P_B = \frac{PE}{VB}$$

Blockchain; The decentralisation is the derivation that cryptocurrencies pursue and is in direction opposition to the fiat currencies which are valuation of the central banks.

A discussion on decentralisation identifies the following goal framework about (1) transaction ledger has to be maintained and managed (2) The right to validation transactions has to be handled at user end (3) New bitcoin is creation has to be managed. An answer to these goals was found only in the technology of block chain [4].Hence, blocks that are generated in block chain are directly involved in trading and creation of bitcoin. They are directly influenced by the supply and demand of bitcoin. Thus, block chain technologies with relation to bitcoin market are an example of working seamlessly between high-level cryptography and market economics [1].

The solution to the goals mentioned above is to include the participant as part of the Bitcoin network itself. It is the participant who will provide the necessary hardware resources through their own computer. These are called as 'distributed systems.' The relay or the issuing and transaction of money are handled by P2P networks. The block chain then records the trading history and is then shared on the network. The entire past transaction history is then verified by every network participant. The unit is also called as the 'block' and will provide every degree of latest transaction and the most important hash value. This value is derived from the 'previous block' and the attempt is to create irreversible data which works with has function and indicates the next block [4].

Thus, the basic premise of block chain technology is validation by the users themselves and thus eliminating the need for third parties or banks to centrally validate the currency generation. Instead every user in generating the coin has already performed the validation or the arrival or origin or birth of the coin.

The advantage of bitcoin is that it allows a participant on the network to perform the process of mining. Every transaction then becomes into a further node or block where further operations are performed and decentralised phase is developed. The actions or sequences are independent and are broadcast horizontally or from each participant in the network to every other participant on the network. This process is continued until all of the transactions are spread across the network. The block chain is thus cloned or copied to all of the participants in the network, and becomes a 'full node,' apart from storing each of the records [3].

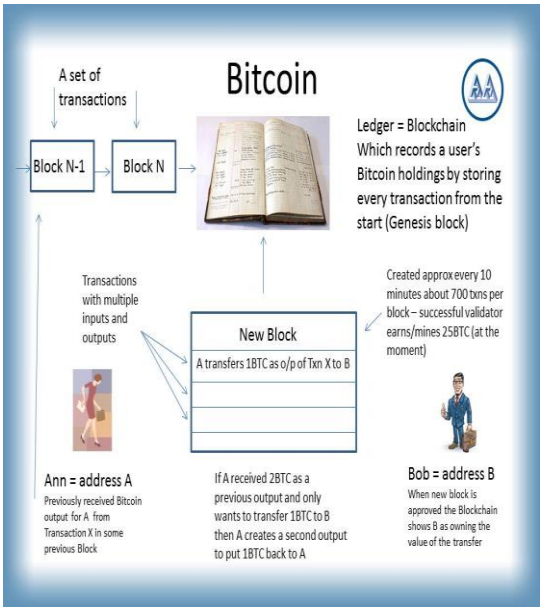

Figure 2: Difference between Bitcoin and Blockchain (PC:microexpert.com)

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3.3 Bitcoin Price Formation

According to Bouoiyour&Selmi [2]showed evidence of significant body of research investigating the facts which drive bitcoin prices and the main determinants of it. The least influential factor was macroeconomic factors, financial factors, speculative factors and technical determinants apart from the general events (like socio-economic-political-geographic) which derive the value of bitcoin. The researchers relied on 'Bayesian quantile regression' to determine the structure of the dependency relation between price and its determinants, within the framework of conditional distribution of bitcoin price movements. With the aid of the statistical tool they were able to they identified three groups of determinants. The year in consideration for the study influenced the prices.

The first group of determinants was the adoption of bitcoin in trade, associated with China's sluggish economic growth. When markets improved, two key influences were Brexit and the demonetization exercise in India. In normal mode of market functioning, there was anxiety about Trump's ascendency of United States Presidency. However, the fear of US sanctions and similar upheavals actually led to further interest of investors in the alternate currency option. Thus, during that phase, prices of bitcoin rose significantly. The last group of influencers were – bitcoin circulation speed, price of gold, demonetization of currency in Venezuela and the hash rate as fundamental influencers in bitcoin price markets heading into decline[2].

3.4 Economics of Bitcoin and Market Opportunity

Literature review will establish the current economies which are supportive to this format of currency and gain insight over the trading opportunities of digital currencies in foreign exchange. There is no legal recognition in the use of complementary currency and is usually an agreement between parties for the purpose of exchanging currencies [8]. However, despite the dominance of traditional currencies, the opportunities that the new finance format offers are unique and exciting. The intrinsic as well as volatile value is creating wider interest and participation in digital finance [3].

BTC transactions are on the rise and adoption of bitcoin. The price of BTC shows dramatic price peak prior to 2013. The change in adoption of bitcoin due to increase in number of bitcoin exchanges and finite supply of bitcoin, to become a major opportunity for speculative investments;

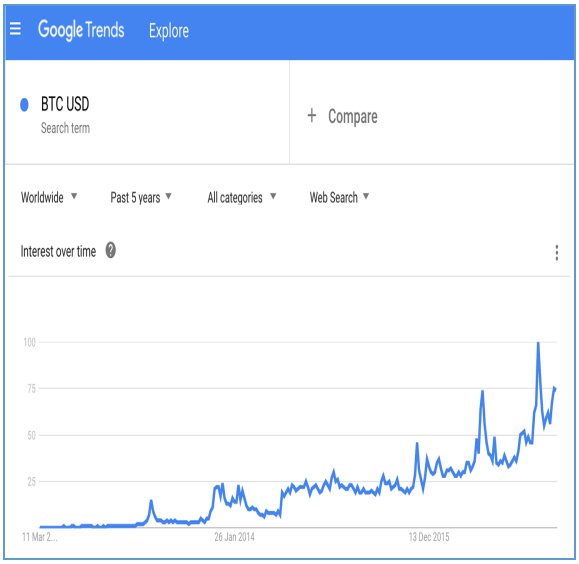

Figure 3: Bit coin market from Google Trends

The market for bitcoin has been continuous and has been providing opportunities for trading and markets are showing tendency for high volatility. The issue of volatility will provide opportunities and signify changes in terms of price and increase in returns. The flip side of this is that an increase returns will also provide opportunities for risk taking. The predictive model for high volatility in the market is related to accuracy for significantly for an exclusive random model [3].

4. LINEAR REGRESSION ALGORITHM

This algorithm takes dataset as input provides regression results. The regression analysis is made by the algorithm. It is known as linear regression algorithm.

Algorithm: Linear Regression
Input: Dataset D (described in Section 6.1)
Output: Regression results

1. For each Mass Window
2. Use peaks with highest intentions
3. Compute distance matrix
4. Perform cluster analysis
5. Prune duplicated well-behaved clusters
6. End For

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```
7.    For each cluster Do
8.      Take peaks from well behaved clusters
9.      Fit regression line
10.     Compute statistics
11.   End For
12.   Return statistics
```

Algorithm 1: Linear regression algorithm

As presented in Algorithm 1, it is understood that the dataset is taken from financial domain as described in Section 6.1 and the data is subjected to regression analysis. It includes clustering, well behaved cluster analysis, removal of duplicated well-behaved clusters and finally performing actual regression to generate results.

5. APPLICATION DEVELOPMENT WITH ETHEREUM

Ethereum is the platform to develop decentralized applications with ease. Such applications do have distributed architecture and serve specific purposes. In addition to this, those applications provide interactions among different parties. It supports the API used for Bitcoin and BitTorrent to have peer to peer network that can be used by users across the globe. Ethereum also supports blackchain technology that can be used to have secure financial and other applications in distributed environment. Ethereum Virtual Machine (EVM) is a distributed virtual machine where millions of computers can participate. It supports two kinds of accounts namely externally owned accounts (EOAs) and contracts. The contracts can serve different purposes like maintaining data store, serving as an account, manage relationship between many users and provide library functions. In a betting application, the parties involved can have secure communication with Ethereumapplication as shown in Figure 4.

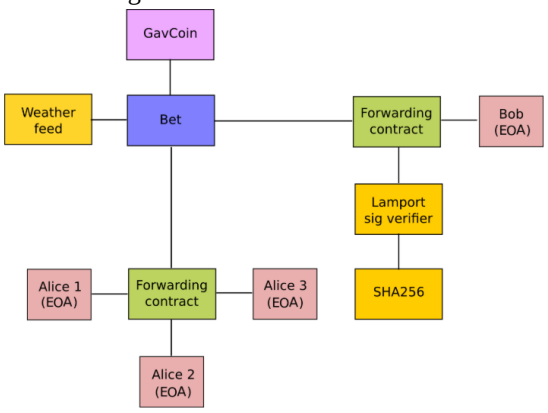

Figure 4: Distributed interactions in an Ethereum application

As seen in Figure 4, in a betting application, there are secure interactions among different parties in the world. Ethereum application can help to achieve such complex interactions with end to end security.

6. EXPERIMENTAL RESULTS

6.1 Data Used for Regression Analysis

Data has been collected from http://fundforpeace.org/fsi/ that contains the price details of Bitcoin besides Fragile States Index. The data reflects different attributes like Year, Bitcoin Price, USD/EUR/ and GoldUSD. It also provides other attributes related to fragile states index for countries like USA, Kuwait, Latvia, United Kingdom and Switzerland. An excerpt of data collected is presented in Table 1.

Year	Bitcoin	USD/EUR	goldusd	USA	Kuwait	Latvia	United Kingdom	Switzerland
2014	854.0	1.4	1292.0	35.4	59.0	48.0	34.3	23.3
2015	229.0	1.1	1150.0	35.4	57.5	48.5	33.4	22.3
2016	409.0	1.1	1339.0	34.0	58.5	47.4	32.4	21.8
2017	1197.0	1.1	1318.0	35.6	58.5	46.4	33.2	21.1
2018	9521.0	1.2	1316.0	37.7	58.5	46.4	33.2	21.1

Table 1: Shows dataset used for regression analysis

The data reflects the aforementioned attributes from the years 2014 to 2018. The data shows how the Bitcoin has improved in price from 2014 to 2018. It also shows the GoldUSD performance over the years. The ratio of USD/ERU is also reflected in the data.

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6.2 Regression Analysis Made

Regression analysis has been made for the purpose of analysing bitcoin and Euro prices and the factors that drive the prices or exchange rates of the same. Data of some countries are considered for data analysis as mentioned before. Different factors that affect fiat currency such as Euro are analysed. In the same fashion, the bitcoin prices are driven by certain factors. The factors that influence Euro may not be same for Bitcoin. This is actually the part of the hypothesized model that has been tested in this chapter. Gold prices are also considered in order to have better analysis. The predictability of fiat currency and the unpredictability of Bitcoin as per the hypothesized model are evaluated. Irrational behavioural theory as discussed in the literature is used to deal with the factors that drive price of Bitcoin. The rationale behind this is that the Bitcoin, according to literature, is influenced by different factors like media, popularity, and technology usage and user base.

The statistical modelling approach known as Regression Analysis is used to predict or estimate relationship among different variables. If there is statistically significant relationship between sets variables, it can be detected using regression analysis. In other words, the relationship among given variables is modelled using regression analysis. It makes use of the concept of independent variables and dependent variables. The independent variables are known as predictors. It reveals the changes in the value of dependent variable when the independent variables are subjected to changes. The function employed on the independent variables is called regression function. Thus it helps in prediction of significant relationships or forecasting in other words.

Regression analysis needs proper data preparation which is taken care of in this thesis. The data presented in Table 1 is appropriately used in the Regression analysis. The regression analysis tool is taken from the spreadsheet application known as Microsoft Excel. The regression analysis makes use of formulae related to sum of squares, degree of freedom, mean square, F value and significance or P value. Based on the P-value, it is possible to know how two sets of variables are significantly related. Sum of squares is computed as $SSB = \Sigma n_j (\bar{X}_j - \bar{X})^2$, degree of freedom is computed as m-1, mean square is calculated as SSB/m-1, F value is computed as (SSB/m-1)/(SSE/n-m) and finally significance is computed where m is the number of columns while the n indicates number of responses considered. There is concept of between groups and within groups considered internally for the regression analysis. R square and adjusted R square are computed as in Eq. 1 and Eq. 2 respectively.

$$R^2 = \frac{F*(m-1)}{(n-m)+(F*(m-1)} \quad (1)$$

$$Adjusted\ R^2 = 1 - \frac{(n-1)(1-R^2)}{(n-m)} \quad (2)$$

In the process of regression analysis mean and standard deviation are computed as in Eq. 3 and Eq. 4.

$$\text{Mean } \mu = \frac{Sum\ of\ values}{Total\ number\ of\ elements} \quad (3)$$

$$\text{Standard Deviation } \sigma = \sqrt{\frac{(x_i-\mu)^2}{N}} \quad (4)$$

6.3 Result Analysis

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.1629234
R Square	0.026544
Adjusted R Square	-0.297941
Standard Error	4529.036
Observations	5

ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	1677968	1677968	0.081804	0.793481			
Residual	3	61536501	20512167					
Total	4	63214468						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-66616	241458.9	-0.27589	0.800546	-835046	701814.1	-835046	701814.1
Kuwait	1182.5	4134.425	0.286013	0.793481	-11975.1	14340.09	-11975.1	14340.09

Table 2: Provides results of regression analysis

7. CONCLUSION AND FUTURE WORK

In this paper we focused on the understanding of Bitcoin and its trends and dynamics in the real world. It throws light into different aspects associated with the crypto currency. They include Bitcoin, block chain and Ethereum. Bitcoin is the virtual currency made using cryptography technologies. Its operations are protected in distributed peer to peer environments using Blockchain. Ethereum is used to build distributed applications that make use of security primitives that are used in Bitcoin and BitTorrent kind of distributed P2P applications. An algorithm is proposed and implemented to have regression analysis on the financial data related to Bitcoin. It is understood that Bitcoin as crypto currency technology has advanced right from its inception in a progressive manner. The empirical study also revealed the utility of the Ethereum platform for building P2P distributed applications that provide secure interactions among many users across the globe. In future we intent to work on building an Ethereum application with block chain technology that can be used to safeguard biomedical documents in a distributed multi-user environment.

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Multiple Linear Regression On Movie Data For True Rating Prediction

Sireesha Jasti, Tummala Sita Mahalakshmi

Abstract— Amino acids are little bio-particles with different properties. Data mining, being the science of mine dealing with the databases for gathering information and knowledge, has lately developed innovative axes of functionalities and stimulated an promising discipline, called Sentiment Analysis. Now-a-days, Sentimental content is available across the social media websites in a form such as consumer comments or reviews for the products, movies, testimonials, significance in discussion forums. Well-timed sentimental discovery of the online content on these websites have significant role that supports the distribution and monetization. Consideration of the sentiments of individual on diverse elements and goods facilitates to serve better services in terms of recommendation structures, contextual advertisements, and marketplace trend analysis. The focus on this research is to facilitate the swift detection of true and positive analysis of movie reviews. This research study highly discusses the regression algorithm that aims to predict with over 89% accuracy the true rating of the movie reviews based on the users matching profiles and the given reviews which of those may be false positive or true negative.

Keywords— Sentiment Analysis, Multiple Regression, Analysis of Variance (ANOVA), Movie Review, Prediction.

I. INTRODUCTION

Mining a valuable data from a large data set can be achieved through a process called Data mining. Clustering, Classification and Regression are various analyzing tools which can be availed for the tasks like sentiment analysis [1][2]. One important aspect of data mining is a sentiment mining through which the imperative data be able to excavate depending on the affirmative or unconstructive sense of data composed so far. Opinion mining referred to be Sentiment Analysis employs analysis of text, Natural Language Processing, in addition to computational semantics to discover and dig out biased information from the source content [3]. For this reason, a statistical model is adopted namely Multiple Linear Regression Analysis algorithm.As it frequently affords superior predictive ability and also presents a basic estimate of the relative significance of every variable in the correlation. This algorithm predicts the true positive review of a particular movie accurately compared to logistic regression [23] and multivariate regression analysis.

Multiple Linear Regression Analysis is a statistical model that helps to portray data as well as explicate the liaison involving a dependent and set of independent variables. The said model constitutes three phases: 1) Scrutinizing the correlation and data directionality, 2) model estimation or line fitting and 3) estimating the weight and expediency of the model [4].

II. REVIEW STATUS

Studies demonstrated that Sentiment Analysis is still in use for a range of applications from promotions, reviews, feedback and social media these days. Sentiment Analysis in expansion got a primary significance in making decisions. Sentiment Analysis provides the intellectual information associated with communal views, as it analyzes diverse reviews, tweets. It is a demonstrated tool for predicting several noteworthy events like box office act of movies [11]. For Sentimental Analysis, many of the available techniques were used. Few of them are:

Dey, L., at al., [12] focused web crawling framework to assist the swift discovery and analysis of sentimental contents in reviews of hotels and movies. Researchers made use of statistical techniques for taking into account the essentials of subjective style and polarity of sentence. Supervised machine learning algorithms namely K-Nearest Neighbor (K-NN) and Naïve Bayes'(NB) were discussed by comparing on the whole accuracy, precisions and recall values. They proved that Naïve Bayes' in the case of reviews on movies, produced outlying results compared to K-NN but for hotel reviews the algorithms proved to be less significant with almost equal accuracies.

Liu, B. et al., [13] used large scale datasets to assess the scalability of Naive Bayes classifier (NBC). Researchers presented an effortless and absolute system to mine sentiments from large datasets using NBC and Hadoop framework. NBC is employed to attain superior grain control of the analysis process for a Hadoop implementation. They showed that NBC is able to scale up to examine the sentiment of millions of movie-reviews through escalating throughput. The dataset used is Cornell dataset on which the code was executed that resulted in 80.85% average accuracy.

The researchers [14] presented a framework that integrated Word2vec and Convolutional Neural Network (CNN). Primarily, the word2vec anticipated by Google was utilized to calculate word vectors that are the input for the CNN. Word2vec is adopted to represent words in vector form and reflect the distance between words. Subsequently, a 7-layers architecture model is applied for analyzing sentences sentiment utilizing word2vec and CNN. In order to advance

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the generalizability and accuracy of the model, Parametric Rectified Linear Unit (PReLU), Normalization and Dropout technology were used. The framework is then tested on a movie review dataset with fives labels termed as positive, fairly positive, neutral, negative and fairly negative and achieved test accuracy of 45.4% which is improved compared to Recursive Neural Network (RNN) and Matrix-Vector Recursive Neural Network (MV-RNN).

The authors in [15] built a Treebank to defeat the deficit of labeled and large corpus in accessible models. Recursive Neural Deep Model (RNDM) was proposed to envisage the labels similar to positive, negative at sentence level. The model has attained high performance to Maximum Entropy (ME), Support Vector Machine (SVM), and Nave Bayes (NB). ICTCLAS, a Chinese word segmentation tool is considered to segment 2270 movie reviews. The anticipated model enhanced the prediction of sentence sentiment labels by 90.8% closing 13550 Chinese sentences and 14964 words.

R. Socher, et al., [16] used the model RNTN (Recursive Neural Tensor Network) for Semantic Compositionality purpose by using the dataset with 11,855 solitary sentences from movie review database. The RNTN accomplished 80.7% accuracy in sentiment forecast, a progress of 9.7 % above bag of features.

P. Ruangkanokmas et al. [17] used the model Deep Belief Network with Feature Selection (DBNFS) for Feature Selection on five sentiment classification datasets in which one is movie review dataset with totality 2,000 labeled reviews out of which 1000 are positive and 1000 negative. The accuracy outcomes are evaluated against earlier works and confirmed that DBNFS is better than Deep Belief Network.

Lee, S., et al., [18] selected Internet Movie Database (IMDb) data as the subject for analysis, and categorized movie reviews by six fields namely 'action', 'animation', 'comedy', 'drama', 'horror', and 'sci-fi'. Highest and lowest grade movies are considered to train the model and movie data since two years is collected to test the proposed model. Using Semantic Orientation from Point-wise Mutual Information (SO-PMI) technique, they constructed tailored sentiment dictionary per field and compared predicting accuracy on review ranking for enhancement. The performance improvement is 2.82% in on the whole due to the personalized dictionary on 'sci-fi', an utmost accuracy expansion amongst six fields. The researchers conclude that the text with verbs and adverbs plays a key role in improving performance of sentiment analysis.

Researchers [19] in their study considered five accepted classification algorithms in machine learning alike NB, SVM, ME, Classification and Regression Tree, and Random Forest to provide a relative evaluation on three different datasets namely Large Movie Reviews Dataset V1.0, Polarity Dataset V2.0 and IMDb dataset. Naïve Bayes, Tree and Random Forest could not be trained on large movie reviews dataset. Naïve Bayes classifier produces very poor results on Polarity dataset and IMDb dataset. Tree and Random Forest algorithms turn out average results on both Polarity Dataset and IMDb Dataset. SVM and Maximum Entropy outperformed well to outstanding algorithms on all the three datasets though the unprocessed data is given as input especially on Large Movie Review Dataset with 86% and 84% respectively.

Neethu M S and Rajasree R [20] used four different algorithms NB, SVM, ME and Ensemble classifiers. All the classifiers had approximately similar accuracy. NB has improved precision evaluated against remaining three classifiers, but a little poorer accuracy and recall. SVM, MEClassifier and Ensemble classifiers have analogous accuracy, precision and recall. The researchers attained an accuracy of 90% whereas NB with 89.5%.

AkshayAmolik and Dr.M.Venkatesan [21] in their paper used two machine learning classifiers NB and SVM. These two algorithms performed well and also provided higher accuracy. The results show that they got 75 % accuracy form SVM and 65% accuracy form NB classifier. They have concluded that, the accuracy of classification can be increased by increasing the training data.

Nagamma P and Pruthvi H.R [22] in their study used clustering combined with classification model to reduce the data employed for prediction and result in good accuracy. The classification with and without clustering resulted similar for smaller datasets. The authors concluded that the use of clustering with classification model could be seen principally in case of large datasets.

Teja, J.S., et al., compared three major algorithms namely NB, SVM and Logistic Regression based on accuracy precision and recall. The result analysis claims that highest accuracy was achieved by Logistic Regression(92.15), followed by SVM and NB. [23]

Any classification algorithm works well and produces better output only when the data is consistent. It can be concluded that cleaner the data, better the performance of an algorithm in forecasting the movie success rate.

III. RESEARCH METHODOLOGY & RESULTS

The idea proposed in the present work is to perform analysis on movie data using Multiple Linear Regression Analysis model considering number of parameters for the derivation of algorithmic performance and true review rating prediction. In this study, the emphasis is on Multiple Linear Regression Analysis algorithm to amplify the accuracy. The architecture of the proposed True Movie Rating Prediction System is shown in Figure1.

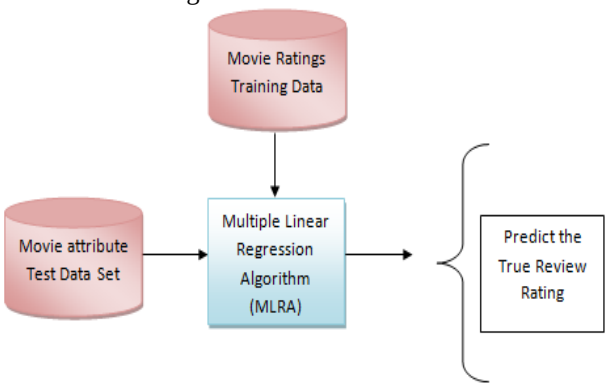

Figure 1: Structural Design of the Proposed System

The system is based on labeled dataset of reviews on movies from IMDb dataset that includes attributes like actor, actress, director, story, screenplay, climax and other relevant attributes along the movie rating labels with utmost quantity of reviews for every movie, around or less to 100 and number of movies considered is around 50. The Multiple Linear Regression Analysis model is trained with this dataset. A test dataset has been taken from IMDb reviews which are not rated with any rating labels. The test dataset is applied on the model that helps to predict the true review rating with a precision of 89%. The Multiple Linear Regression Analysis algorithm performed well in predicting the true review compared to the performance of Logistic Regression and Multivariate Regression Analysis.

Multiple Linear Regression Analysis - MLRA

The aim of this study is to calculate probability of true rating of the review by applying the statistical technique, namely Multiple Linear Regression model. At least two predictor variables are enclosed in the model [25]. Multiple linear regression model with two forecaster variables (independent) $x_1$and $x_2$is shown in (1).

$$Y= \beta_0 + \beta_1 x_1+ \beta_1 x_2 \quad (1)$$

Where Y is a dependent variable and β_1, β_2 are regression coefficients.

trainModel=lm(train$OverallRating~train$Hero+train$Heroine+train$Director+train$Story+train$Theme+train$ArtDirector+train$MusicDirector+train$SupportingArtists+train$Dance+train$Fights+train$ScreenPlay+train$IntervalBang+train$Climax,data=train)

Here the trainModel is the dependent variable and the parameters like OverallRating, Hero, Heroine and so on applied to the linear model (lm) are the independent variables.

This Multiple Linear Regression Analysis (MLRA) system is implemented in two stages. In the primary stage, the training data set is applied to Multiple Linear Regression Analysis [5] algorithm. Then for assessing model and predicting values, the test data set is utilized. In the final stage, Analysis of variance (**ANOVA**) is a statistical technique that helps to make analysis of disparities among group means and their allied procedures [6].

IV. EXPERIMENTAL RESULTS

This method is built and carried out by means of .NET framework; Visual Studio IDE; SQL Server, and a graphical GUI technology, termed as winForms. In the present work, IMDb movie dataset is used to prepare a training set that can be applied to model the relationship between attributes of dataset and the given movie rating ranging from 1 to 5. The regression line represents the estimated true rating of the movie for a certain blend of the entered features [7]. Scatter plot is given using a linear equation (2)

$$Y=\beta_0 + \beta_1 x_1+ \beta_2 x_2+.....+ \beta_i x_n \quad \text{for i = 1…n.} \quad (2)$$

Where Y is dependent variable, x_1, x_2,…x_n are independent variables and β_0, β_1.. are regression coefficients.

The divergence amid the regression line and solitary data point is the distinction that the model cannot explicate. This inexplicable distinction is called as residual. Eq (3) illustrates the technique of least squares to diminish the residual.

$$\sum (y_i - \beta_0 - \beta_1 - x_1 - \widehat{\beta_2 - x_2} - - - \beta_p - x_n)^2 \Rightarrow min = \beta_0 + \beta_1 - x_1 + \beta_2 - x_2 + \beta_3 - x_3 + - - + \beta_p - x_n \quad \text{for i = 1…n.} \quad (3)$$

The multiple linear regressions' variance σ^2 is estimated by (4)

$$\sigma^2 = \frac{\sum e_i^2}{n-p-1} \quad \text{for i = 1…n.} \quad (4)$$

Where e_i is the predicted value of ith sample, n being a size of sample; p adds up to the number of autonomous variables. Following the receipt of the multiple linear regression equation, evaluate the usefulness and validity of an equation. R^2 is an important gauge to validate the probable linear line (5)

$$R^2 = SSR / SST \quad (5)$$

Where SSR is Regression sum of squares SST is the total sum of squares [26]. To discover if the multiple linear regression model fits efficiently, an adjusted R^2 can be deliberated as

$$adjusted\ R^2 = R^2 - J(1 - R^2)/N - P - 1 \quad (6)$$

Where P is the total independent variables and N is size of a sample.

The final step for the regression analysis is an analysis of significance. Multiple linear regression employs two tests. F-tests being the first tests if the value of R^2 is 0. Later on, multiple t-tests are performed to scrutinize the significance of every individual intercept as well as coefficient. Finally, The t-test has the void hypothesis [24] that the coefficient or intercept be zero [8].

ANOVA offers a statistical test to test out whether the means of several groups are identical, and consequently simplifies the *t*-test to three or more means. ANOVA is further conventional and is suitable to an extensive range of realistic problems [9]. A sample dataset with attributes such as MovieID, Actor, Actress, Director that is used as training set and test set for the model are shown in Table 1 and Table 3 respectively.

Table1: Sample Data set to use as Training Set for True Rating Prediction of a Movie

MovieID	*Hero*	*Heroine*	*Diroctor*	*Story*	*JounorTheme*	*ArtDiroctor*	*MusicDirector*	*SupportingArtists*	*Dance*	*Fights*	*ScreenPlay*	*IntervalBang*	*Preclimax*	*Climax*	*OverallRating*
101	*3.5*	*3*	*5*	*3*	*3*	*5*	*4*	*4*	*3*	*5*	*5*	*3*	*3*	*5*	*4*
101	*4*	*3*	*2*	*3*	*4*	*3*	*5*	*3*	*5*	*3*	*5*	*2*	*3*	*3*	*4*
101	*5*	*4*	*3*	*5*	*3*	*5*	*2*	*3*	*5*	*3*	*4*	*3*	*3*	*3*	*4*
101	*4*	*3*	*2*	*3*	*5*	*3*	*2*	*1*	*4*	*3*	*5*	*2*	*3*	*2*	*3*
101	*5*	*4*	*4*	*3*	*4*	*3*	*4*	*3*	*4*	*3*	*4*	*3*	*4*	*3*	*4*
101	*5*	*4*	*5*	*4*	*5*	*4*	*5*	*4*	*5*	*4*	*5*	*4*	*5*	*4*	*5*
101	*4*	*3*	*2*	*5*	*1*	*1*	*1*	*1*	*2*	*1*	*1*	*1*	*1*	*1*	*2*
101	*1*	*5*	*3*	*2*	*3*	*5*	*4*	*5*	*1*	*3*	*2*	*1*	*5*	*2*	*3*
101	*3*	*3*	*4*	*3*	*1*	*3*	*4*	*5*	*5*	*4*	*4*	*1*	*1*	*5*	*4*
101	*5*	*4*	*4*	*1*	*4*	*3*	*1*	*3*	*4*	*5*	*1*	*4*	*3*	*5*	*4*
101	*5*	*2*	*5*	*1*	*1*	*4*	*5*	*4*	*1*	*4*	*1*	*3*	*5*	*3*	*4*
101	*2*	*3*	*3*	*3*	*2*	*1*	*3*	*2*	*5*	*5*	*5*	*1*	*3*	*5*	*4*
101	*2*	*1*	*2*	*4*	*5*	*2*	*2*	*5*	*1*	*2*	*4*	*1*	*3*	*2*	*3*
101	*1*	*5*	*3*	*3*	*4*	*4*	*5*	*5*	*2*	*4*	*3*	*1*	*3*	*3*	*4*

After Applying Multiple linear Regression analysis on trained model the attributes and the corresponding coefficients are shown in Table 2 and the corresponding bar graph is show in Figure 2.

Table 2: Attributes and their corresponding regression coefficients

Attribute	**Coefficients**	**Attribute**	**Coefficients**
(Intercept)	0.39282166	train$MusicDirector	0.05285565
train$Hero	0.07023824	train$SupportingArtists	0.10107730
train$Heroine	0.10112529	train$Dance	0.06329525
train$Diroctor	0.09513435	train$Fights	0.12131865
train$Story	0.06381991	train$ScreenPlay	0.05997412
train$JounorTheme	0.04206581	train$IntervalBang	0.06817720
train$ArtDirector	0.04473461	train$Preclimax	0.04484354

Movie ID and the corresponding predicted movie ratings are shown in Table 4.

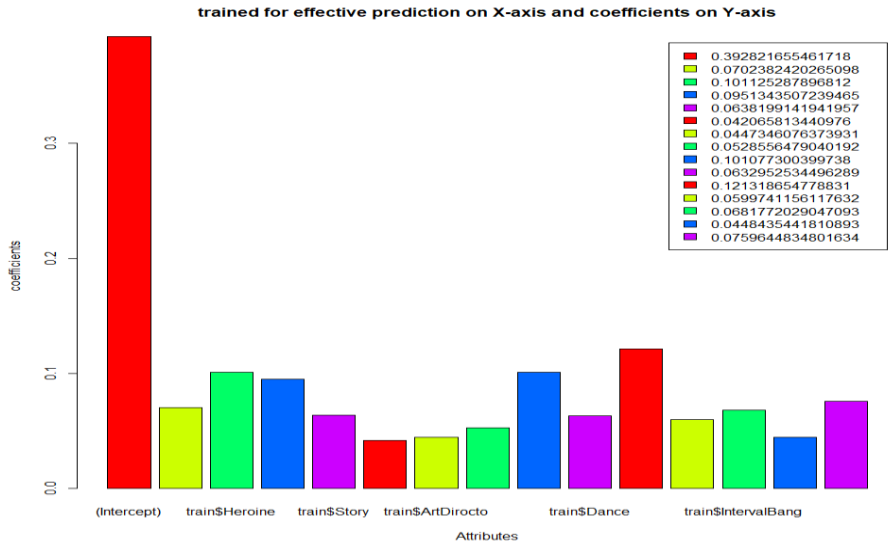

Figure 2: Attributes trained to the Multiple Linear Regression model for effective prediction

Table 3: Test Data set to be applied to the MLRA Model for accurate review rate prediction

MoveId	Hero	Heroine	Director	Story	Jonner	Art Director	Music Director	Supporting Artists	Dance	Fights	Screenplay	Interval Bang	Paraclimax	Climax
101	3.5	3	5	3	3	5	4	4	3	5	5	3	3	5
101	4	3	2	3	4	3	5	3	5	3	5	2	3	3
101	5	4	3	5	3	5	2	3	5	3	4	3	3	3
101	4	3	2	3	5	3	2	1	4	3	5	2	3	2
101	5	4	4	3	4	3	4	3	4	3	4	3	4	3
101	5	4	5	4	5	4	5	4	5	4	5	4	5	4
101	4	3	2	5	1	1	1	1		1	1	1	1	1
101	1	5	3	2	3	5	4	5	1	3	2	1	5	2
101	3	3	4	3	1	3	4	5	5	4	4	1	1	5
101	5	4	4	1	4	3	1	3	4	5	1	4	3	5
101	5	2	5	1	1	4	5	4	1	4	1	3	5	3
101	2	3	3	3	2	1	3	2	5	5	5	1	3	5
101	2	1	2	4	5	2	2	5	1	2	4	1	3	2
101	1	5	3	3	4	4	5	5	2	4	3	1	3	3

Table 4: showing the predicted movie ratings for each movie in percentage

ID	101	102	103	104	105	106	107	108	109	110
Prediction probability in %	80	77	84	78	65	91	100	100	100	100

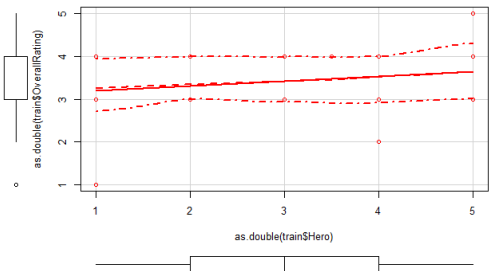

Figure 3: Sample Dependency relationship between two different variables namely hero and overall rating through fit line

Dependency relationship of each variable on each other variable to find the line of best fit which is an output of regression analysis for prediction is revealed in Figure 3.

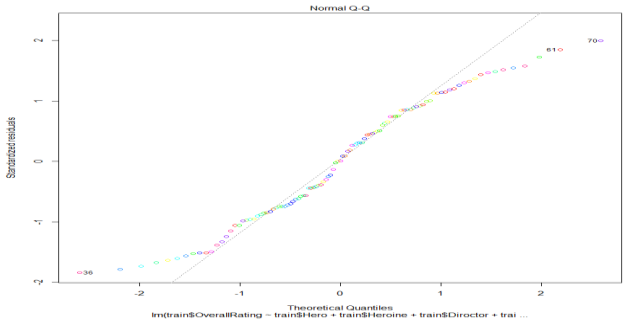

Figure 4: Regression Line illustrates predicted score on Y for each possible value of X.

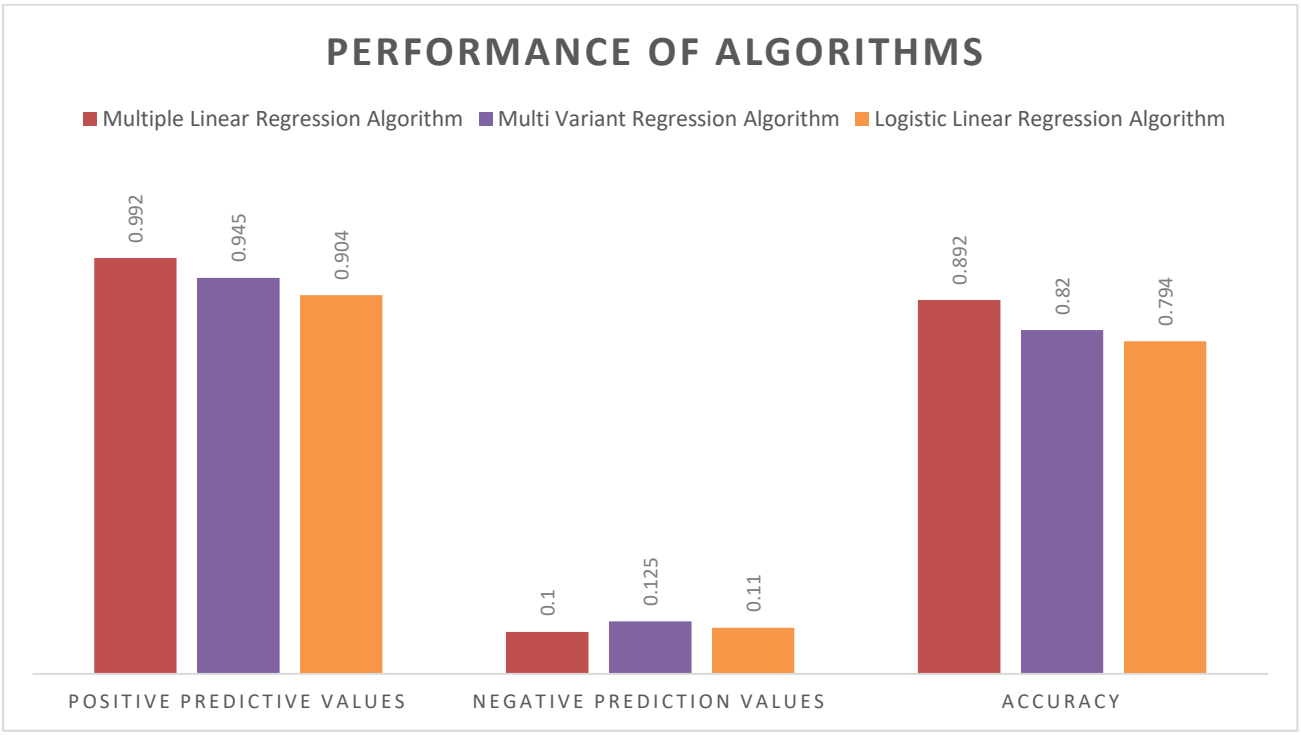

Figure 5: Performance measures of each algorithm considered for predicting the movie rating labels.

V. CONCLUSION

To predict the true positive rating of a movie has become a great concern in commercial aspects. It provides the rating of the movie that falls between the ranges from must see to unwatchable depending on the user profile settings. The scale of the study is to explore the prediction accuracy of true positive rating of the movie and to estimate the performance of data mining technique used in such an environment. For this a machine learning algorithm [10] is adopted. MLRA learns the training data set and builds a model that allows application of test data on it. Logistic regression and multivariate regression algorithms were also applied on the same data in the same way. From the trial outcome it is verified that MLRA algorithm is most suitable for envisaging accurately the true positive reviews based on the attributes with over 89% compared to multivariate regression with 82%, logistic regression with 79% predicting accuracy. To conclude, we can say that Optimum Predictions could be obtained by this MLRA Model.

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Diabetes Prediction using Machine Learning Techniques

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Abstract

Diabetes Mellitus is one of the growing fatal diseases all over the world. It leads to complications that include heart disease, stroke, and nerve disease, kidney damage. So, Medical Professionals want a reliable prediction system to diagnose Diabetes. To predict the diabetes at earlier stage, different machine learning techniques are useful for examining the data from different sources and valuable knowledge is synopsized. So, mining the diabetes data in an efficient way is a crucial concern. In this project, a medical dataset has been accomplished to predict the diabetes. The R-Studio software was employed as a statistical computing tool for diagnosing diabetes. The PIMA Indian database was acquired from UCI repository will be used for analysis. The dataset was studied and analyzed to build an effective model that predicts and diagnoses the diabetes disease earlier.

Keywords

Diabetes, Classification, Clustering, Regression, SVM, K-NN, Neural Networks

Introduction

As we all know that the growth in technology helps the computers to produce huge amount of data. Additionally, such advancements and innovations in the medical database management systems generate large volumes of medical data. Healthcare industry contains very large and sensitive data. This data needs to be treated very careful to get benefitted from it. Diabetic Mellitus is a set of associated diseases in which the human body is unable to control the quantity of sugar in the blood. It results in high sugar levels in blood, may be as the physique cannot create sufficient insulin, or may because cells should not respond to the formed insulin. The focus is to develop the prediction models by using certain system trained methods. The system learning is one of the branches of synthetic intelligence as it helps the computer to learn on its own.[1] The two classification of ML are supervised and unsupervised. The Supervised learning calculation utilizes the past experience to influence expectations on new or inconspicuous information while unsupervised calculations to can draw derivations from datasets.

Machine learning algorithms are:

Supervised Learning Techniques:

Classification

This is a procedure of detecting the obscure information label name utilizing recently known (preparing information) class mark.[2] The familiar supervised learning methods are mentioned as follows.

i. Random forest
ii. SVM
iii. K-Nearest neighbors
iv. Decision tree
v. Naïve Bayes

Regression

It is also a prediction modeling method such as classification. It detects the association between the free (given) features with few target (new) features.

The popular algorithms are:

i. Simple Linear Regression
ii. Multiple Linear Regression
iii. Logistic Regression
iv. Polynomial Regression
v. Linear Discriminant Analysis (LDA)

Unsupervised Learning Techniques

Clustering

Cluster investigation or grouping is a process of classifying the similar instances into classes called groups.[3] Some of the grouping methods are as follows:

i. Mean based grouping for the given number of clusters ‘k’

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ii. Level-by-level grouping based on similarity distance metrics.

R-Studio Tool

R studio 3.4.1 is used in this study. R-Studio is a United Improvement Environment for R programming language founded by JJ Allaire. It uses command line interpreter. It is used for statistical computing and graphics. Since it is having many built-in packages it can manipulate huge dataset for analysis

Literature Review

S.No.	Paper	Author(s)	Name of the Journal	Methods	Findings	Notes/Critique
1	Detecting Diabetes in Health Data by using Machine Learning Methods	U. Ali Zia, Dr. N. Khan.	International Journal of Scientific and Engineering Research (IJSER).	Boot strapping resampling technique to enhance the accuracy and then applying i. Bayes Theorem ii. Decision Trees iii. k-NN Method	After Bootstrapping Accuracy: i. NaiveBayes-74.89%; ii. Decision Trees-94.44%; iii. k-NN(for k=1) 93.79%; 4. k-NN(for k=3) - 76.79%	i. Plan to use further more advanced classifiers such as Neural Networks. ii. It should consider some other important factors that are related to gestational diabetes, like metabolic syndrome, family history, habit of smoking, lazy routines, some dietary patterns etc.
2	Prediction of Diabetes Using Data Mining Techniques	Fikirte Girma, Woldemic hael, Sumitra Menaria	International Conference on Trends in Electronics and Informatics (ICOEI)	i. Back Propagation Algorithm; ii. J48 Algorithm; iii. Naïve Bayes Classifier; iv. Support Vector Machine.	Back Propagation Algorithm has Accuracy-83.11% ; Sensitivity-86.53%; Specificity-76%	i. Increment the accuracy of the algorithms.
3	Diabetes Illness Detection Using Knowledge Mining Methods	D. Shetty, K. Rit, S. Shaikh, N. Patils	International Conference on Innovations in Information, Embedded and Communication Systems(ICIIECS).	i. Bayes Theorem; ii. k-NN algorithms	Detection of the illness can be finished by using Bayes theorem and K-NN method and analyze them based on various attributes of diabetes.	i. Increment the accuracy of the algorithms.; ii. Extending analysis on much attributes so to handle diabetes effectively.
4	Effective Detection & Classification of Diabetic candidates from huge Data using R-Studio	Sharmila K, Dr. S. A. V. Manickam	International Journal of Advanced Engineering Research and Science (IJAERS).	Decision tree	i. Using R, the dataset is analyzed and the correlation coefficient for two attributes is calculated.; ii. Predict the type of Diabetes by using decision tree based classification.	Possibility of developing efficient predictive models using the information from the analysis which is already carried out.

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5	Identification of diabetes by using Classification techniques	A. Iyer, Jeyalatha S, and R. Sumbaly	International Journal of Data Mining & Knowledge Management Process (IJDKP).	i. Decision tree; ii. Naïve Bayes.	J48 Cross validation-74.8698%; J48 Percentage Split-76.9565%; Naive Bayes-79.5652%	i. In future, authors gather the data from distinct places all over the universe.; ii. The existing work can be enhanced for the diabetes analysis automatically.
6	A practical study on Sickness decision using Data extraction methods.	Deepika M, Dr. K. Kalaiselvi	International Conference on Inventive Communication & Computational Technologies (ICICCT).	i. Artificial Neural Network; ii. Decision Tree; iii. Logistic Regression; iv. Naïve Bayes; v.SVM	ANN: 73.23%; Logistic Regression: 76.13%; Tree based classifier:77.87%	Efficient and Accurate classifier can be developed.

Proposed System

The propose a classification model with boosted accuracy to predict the diabetic patient. In this model, we have employed different machine learning techniques are using like classification, regression and clustering. The major focus is to increase the accuracy by using resample technique on a benchmark well renowned PIMA diabetes dataset that was acquired from UCI machine learning repository, having eight attributes and one class label.[4] The proposed framework is shown in Figure 1.

The description of each phase is mentioned below:

Data Selection

Data selection is a process in which the most relevant data is selected from a specific domain to derive values that are informative and facilitate learning. PIMA diabetes dataset having 8 attributes that are used to predict the diabetes at earlier stage. This dataset is obtained from UCI repository.

Data Pre-processing

It also includes machine learning technique that includes changing crude information into reasonable configuration. The various activities involved here are Cleaning the data, integrating the data and transforming the data and Discretizing the data.[5]

Feature Extraction through Principle Component Analysis

Feature Extraction on the dataset to determine the most suitable set of attributes that can help achieve better classification. The set of attributes suggested by the PCA are termed as feature vector. Feature reduction or dimensionality reduction will be benefitted us by reducing the computation and space complexity.

Resampling Filter

The supervised Resample filter is applied to the pre-processed dataset. Resampling is a sequence of techniques used to rebuild your sample data sets, combining training sets and validation sets. In this study, Boot strapping resampling technique to enhance the accuracy.[7]

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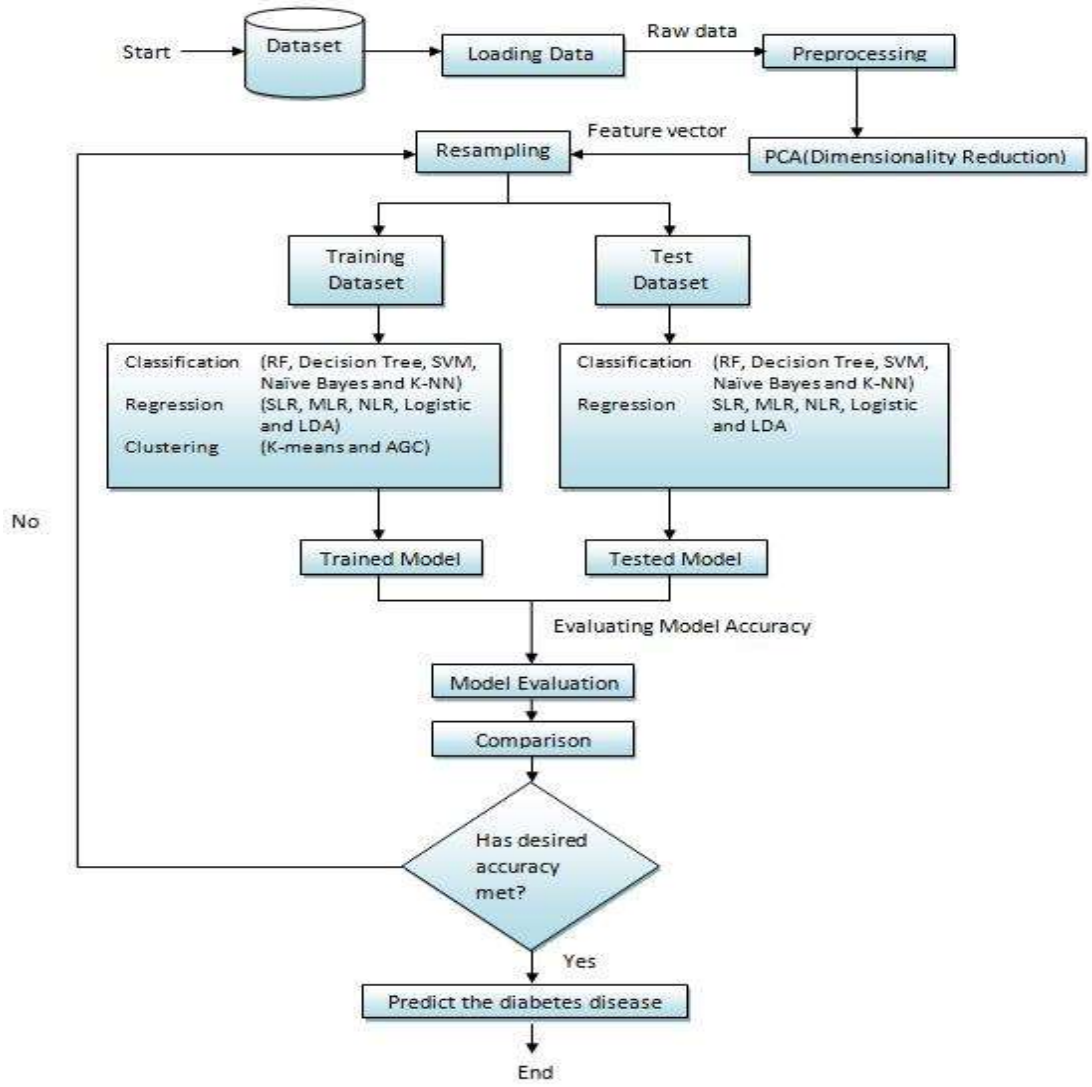

Figure 1: Proposed System for Diabetes Prediction System

Machine Learning Techniques

Classification

Random Forest Technique

Random Judgement Forest is an outfit knowledge technique used for supervised learning methods and extra jobs that operates by building a group of decision trees during learning phase and label the class that is the frequency of the class labels used in classification and mean can be used for prediction of the independent trees. Irregular choice woods right for choice trees tendency for overfitting to their given known dataset.[8]

Support Vector Machines (SVM)

It is one of the most partition of classification Algorithms family. It is utilized strategy to implement prediction, guessing a class label and outlier analysis of data. SVM will grouping the information dependent on the hyper plane. The hyper plane should totally isolate the two class labels in the better way and the most extreme edge hyper plane ought to be picked as a best divider. The various classes of SVM are as follows:

i. Linearly separable Classifier
ii. Non-Linearly separable Classifier

Decision Tree

Decision tree algorithm is mainly used to produce a classification on training data and regression model into a tree structure, which is based on previous data to classify/predict class or target variables of future/new data with the help of decision rules or decision trees.[10] It can be useful for both numerical and categorical data. In a complete decision tree, the root node in each level is a starting point or the best splitting attribute in that position which helps to test on an attribute. The yield of the test will create branches. Leaf hub will go about as a last

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class mark or target variable to characterize/foresee the new information. Arrangement rules are attracted from root to leaf.

Naïve Bayes Method

The naive Bayes algorithm performs classification tasks in the field of ML. It can perform classification very well on the dataset even it has huge records with multi class and binary class classification problems.[11] The main application of Naive Bayes is text analysis and Natural Language Processing. Bayes theorem works based on conditional probability.

It can be represented as: $P(X \mid Y) = [P(Y \mid X) * P(X) / P(Y)]$

Here X and Y are two events and, P (X|Y) is the conditional probability of X given Y. P(X) is the probability of X.

P(Y) is the probability of Y. P (Y|X) is the conditional probability of Y given X.

k-Nearest Neighbors

K-NN is also a supervised learning model used for classification. It is also a significant choice for the classification type of analyses. In order to detect the target class label of a supplied data, this method detects variation between nearest given data classes and new given data values with the concern of K-value. [12] It uses K feature value in between 0-1usually.

Regression

Simple Linear Prediction Model

It explains the association between individual and dependent variables to detect the outcome of the dependent feature. A Simple prediction model uses only one individual feature.[13]

The simple linear regression model is represented as

y= (b0 +b1x)

Here, x (independent variable) and y (dependent variable) are two factors involved in simple linear regression analysis. Also, b0 is the Y-intercept and b1 is the Slope.

Multiple Linear Model Regression

It explains the association between two or more independent features and a dependent feature to guess the labels of a dependent feature.[14] It will take two or more individual variables. Dependent feature has a continuous but an independent variable may be discrete or continuous values.

The multiple linear regression model is represented as

y= (p0 +p1x1+p2x2+…+pnxn)

Here x1, x2,..., xn (independent variable) and y (dependent variable) are two factors involved in multiple linear regression analysis. Also, b0 is the y-intercept and p1, p2,…, pn is the slope.

Logistic based Prediction

It is one type of binary classification method and is used when the dependent feature is nominal. It models the association between one dependent feature and one or more independent variables.[15]

The various types of Logistic Regression are:

a. Binary class labeled Regression
b. Multinomial Regression
c. Ordinal type Regression

The categorical response has only two possible outcomes. Multinomial Logistic Regression has three or more outcomes without ordering whereas Ordinal Logistic Regression has three or more outcomes with ordering.

Polynomial Regression

Polynomial Regression is a type of prediction analysis which explains the association between the individual variable and dependent feature as polynomial of degree of ‘n’. It models a non-linear association between the independent variable and restrictive average of dependent variable. It should be represented as

x = a + b * y ^ n

Here ‘x’ is Dependent Variable, ‘y’ is Independent Variable and ‘n’ is Degree.

It is used to fit the data very well when the data is below and above the regression model. It minimizes the cost function and provides optimum result on the regression.[16]

Linear Discriminant Analysis (LDA)

It is a process of using different data elements and reflecting different functions to detect class labels of objects or instances separately. [17] It is applicable in the fields of Pattern Recognition and Prediction analysis.

Clustering

Mean based Clustering for the given ‘K’ Clusters

K-means grouping is not a supervised system learning algorithm. It can be used to solve clustering problems by classifying the dataset into a number of clusters k (group of similar objects), which defines the number of clusters which is assumed before classifying the dataset.[18]

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Hierarchical Clustering

It is a type of clustering which is used to build a ladder of groups. The two methods of this type of grouping techniques are Agglomerative nesting and Divisive analysis. The first method is used to group objects into clusters based on their similarity. The result obtained at last is a tree representation of objects called 'Dendrogram'. Divisive Analysis is a best down methodology where all perceptions begin in one bunch, and parts are performed recursively as one moves down the pecking order. A hierarchical clustering is often represented as a dendrogram. Each cluster will be representing with centroids. Distance will be calculated by using linkage.[19]

Results and Discussions

Indian diabetes dataset named PIMA were used for analysis for this study. It consists of eight independent attributes and one independent class attribute. The study was implemented by R programming language using R Studio. Machine learning algorithms like classification (Judgement Tree, Bayesian Classification, KNN and Ensemble Learning), regression (linear, multiple, logistic, LDA) and clustering (k-means, hierarchical agglomerative) are used to predict the diabetics disease in early stages. Measure Performance model by using accuracy.

Table 1: Predictive Analysis of Machine Learning Algorithms

S. No	Algorithm	Accuracy
1	Random forest	73%
2	Decision tree	67%
3	SVM	82%
4	Naïve Bayes	76%
5	K-NN	81%
6	Simple linear regression	88%
7	Logistic regression	78%
8	LDA	78%
9	k-Means	71%
10	Hierarchical agglomerative	64%

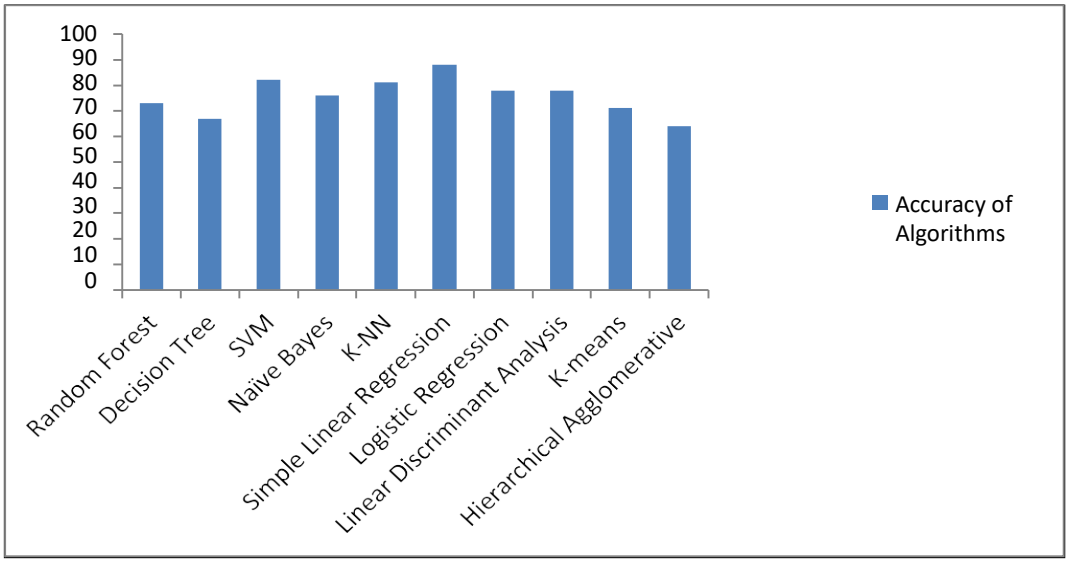

Figure 2: Comparison of Accuracy of Various Algorithms

Conclusion and Future Work

Knowledge extraction creates a significant position in various fields such as Simulated Intelligence and Device Learning, Database Systems and more. The core objective is to enhance the accuracy of predictive model. This PIMA dataset will increase the accuracy of almost all algorithms but the SVM and linear regression leads over others. In future many advanced techniques will be used to increasing the accuracy of the algorithms.

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Scaling the Architecture of Big Data as a Solution for Data Overflow in Clouds

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Abstract- ***The global deployment of cloud data centers is empowering enormous scale logical work processes to improve execution and convey quick reactions. This exceptional geological dissemination of the calculation is multiplied by an expansion in the size of the information taken care of by such applications, bringing new moves identified with the effective information the executives crosswise over destinations. High throughput, low latencies or cost-related exchange offs are only a couple of worries for both cloud suppliers and clients with regards to taking care of information crosswise over server farms. Existing arrangements are restricted to cloud-gave capacity, which offers low execution dependent on inflexible cost plans. Thus, work process motors need to ad lib substitutes, accomplishing execution at the expense of complex framework designs, support overheads, diminished dependability, and reusability. In this paper, we present Over Flow, a uniform information the executives framework for logical work processes running crosswise over geologically disseminated destinations, intending to receive monetary rewards from this geo-decent variety. Our answer is condition mindful, as it screens and models the worldwide cloud framework, offering high and unsurprising information taking care of execution for exchange cost and time, inside and crosswise over locales. Over Flow proposes a lot of***

pluggable administrations, assembled in an information researcher cloud unit. They furnish the applications with the possibility

to screen the hidden foundation, to endeavor shrewd information pressure, de duplication, and geo-replication, to assess information the board costs, to set an exchange off among cash and time, and streamline the exchange procedure as needs be. The framework was approved on the Microsoft Azure cloud over its 6 EU and US server farms. The tests were led on many hubs utilizing manufactured benchmarks and genuine bio-informatics applications (A-Brain, BLAST). The outcomes demonstrate that our framework can show precisely the cloud execution and to use this for proficient information scattering, having the option to diminish the fiscal expenses and move time by up to multiple times.

Keywords: Big Data, scientific workflows, cloud computing, geographically distributed, data management.

I. INTRODUCTION

Big Data is working on different storage model on multiple nodes in a single cluster. WITH their globally distributed data centers, cloud frameworks empower the quick improvement of enormous scale applications. Instances of such applications running as cloud benefits crosswise over destinations extend from office shared apparatuses (Microsoft office 365, Google Drive), web indexes (Bing, Google), worldwide financial exchange investigation instruments to excitement administrations (e.g., sport occasions broadcasting, enormously parallel diversions, news mining) and logical work processes [1]. The majority of these applications are sent on different destinations to use nearness to clients through substance conveyance systems. Other than serving the nearby customer demands, these administrations need to keep up a worldwide cognizance for mining questions, upkeep, or observing tasks, that require huge information developments. To empower this Big Data preparing, cloud suppliers have set up various

server farms at various topographical areas. In this unique situation, sharing, dispersing, and dissecting the dataset results in incessant huge scale information developments crosswise over broadly appropriated destinations. The focused on applications are figure serious, for which moving the preparing near information is fairly costly (e.g., genome mapping, material science reenactments), or just requiring huge scale start to finish information developments (e.g., associations working a few server farms and running standard reinforcement and replication between destinations, applications gathering information from remote sensors, and so on.). In all cases, the cost investment funds (predominantly calculation related) should balance the critical between site separate (organize costs). Studies demonstrate that the between server farm traffic is relied upon to significantly increase in the next years [2], [3]. the current cloud information the board benefits ordinarily need instruments for progressively organizing exchanges among various server farms to accomplish sensible QoS levels and advance the cost-execution. Having the option to successfully utilize the hidden stockpiling and system assets has in this way turned out to be basic for wide-zone information developments just as for combined cloud settings. This land conveyance of calculation turns out to be progressively significant for logical revelation. numerous Big Data logical outstanding tasks at hand empower these days the parceling of their info information. This permits to perform the majority of the preparing autonomously on the information segments crosswise over various destinations and afterward to total the outcomes in conclusive stage. In probably the biggest situations, the informational indexes are as of now apportioned for capacity over various locales, which disentangles the undertaking of

planning and propelling topographical dispersed handling. Among the famous models, we review the 40 PB/year information that is being produced by the CERN LHC. The volume bridges single site or single organization ability to store or process, requiring a framework that ranges over various locales. This was the situation for the Higgs boson disclosure, for which the preparing was stretched out to the Google cloud framework [4]. Quickening the way toward understanding information by parceling the calculation crosswise over destinations has demonstrated compelling additionally in different regions, for example, taking care of bio-informatics issues [5]. Such remaining tasks at hand regularly include a colossal number of factual tests for affirming potential critical locale of interests (e.g., connects between cerebrum districts and qualities). This handling has demonstrated to profit enormously from dispersion crosswise over destinations. Other than the requirement for extra process assets, applications need to agree to a few cloud suppliers prerequisites, which power them to be sent on topographically dispersed destinations. For example, in the Azure cloud, there is a cutoff of 300 centers apportioned to a client inside a server farm, for burden adjusting purposes; any application requiring more process power will be in the end disseminated over a few destinations. All the more for the most part, a huge class of such logical applications can be communicated as work processes, by depicting the connection between individual computational undertakings and their information and yield information in an explanatory manner. Not at all like firmly coupled applications (e.g., MPI-based) imparting straightforwardly by means of the system, work process assignments trade information through documents. As of now, the work

process information dealing with in mists is accomplished utilizing either some application explicit overlays that guide the yield of one undertaking to the contribution of another in a pipeline style or, all the more as of late, utilizing the Map Reduce programming model, which does not fit each logical application. When sending a huge scale work process over numerous server farms, the geologically dispersed calculation faces a bottleneck from the information moves, which bring about mind-boggling expenses and huge latencies. Without proper structure and the executives, these geo-different systems can raise the expense of executing logical applications. In this paper, we handle these issues by attempting to comprehend to what degree the intra and between server farm moves can affect on the all out make the range of cloud work processes. We initially look at the difficulties of single site information the board by proposing a methodology for proficient sharing and move of information/yield documents between hubs. We backer putting away information on the figure hubs and moving records between them legitimately, to abuse information territory, and to keep away from the overhead of associating with a common document framework. Under these conditions, we propose a document the executives administration that empowers high throughput through self-versatile choice among different exchange procedures (e.g., FTP-based, Bit Torrent-based, and so forth.). Next, we center around the more broad instance of huge scale information dispersal crosswise over geologically circulated destinations. The key thought is to precisely and powerfully anticipate I/O and move execution in a dynamic cloud condition to prudently choose how to perform move advancements over united server farms. The proposed checking administration refreshes progressively the presentation models to reflect changing remaining

burdens and differing system gadget conditions coming about because of multi-occupancy. This learning is additionally utilized to foresee the best blend of convention and move parameters (e.g., multi-courses, stream tally, multicast upgrade, replication degree) to augment throughput or limit costs, as indicated by clients arrangements. To approve our methodology, we have actualized the above framework in Over Flow, as a component of the Azure Cloud so applications could utilize it dependent on a Software as a Service approach.

II. RELATED WORK

Title: Overflow: Multi-Site Aware Big Data Management for Scientific workflows on Clouds:

Authors: Radu Tudoran, Member, IEEE, Alexandru Costan, Member, IEEE, and Gabriel Antoniu, Member

Publishing Year: 2015

Method: The worldwide sending of cloud datacenters is empowering huge scale logical work processes to improve execution and convey quick reactions. This exceptional land circulation of the calculation is multiplied by an expansion in the size of the information taken care of by such applications, bringing new moves identified with the effective information the executives crosswise over locales.

Disadvantage:

Information scattering, having the option to decrease the financial expenses and move time by up to multiple times.

Advantage:

Over Flow proposes a lot of pluggable administrations, gathered in an information researcher cloud unit. They give the applications the likelihood to screen the hidden framework, to adventure brilliant information pressure, de duplication, and geo-replication, to assess information the executives costs, to set a tradeoff among cash and time,

and improve the exchange technique in like manner.

Title: Data Transfer Scheduling and Optimization as a Service:

Authors: Tewfik Kosar, Engin Arslan, Brandon Ross, and Bing Zhang

Publishing Year: 2013

Method: Wide-area transfer of large data sets is still a big challenge despite the deployment of high-bandwidth networks with speeds reaching 100Gbps. Most clients neglect to acquire even a small amount of hypothetical paces guaranteed by these systems, an "information move planning and improvement framework as a Cloud-facilitated administration," Stork Cloud, which will mitigate the large-scale end-to-end data movement bottleneck by efficiently utilizing underlying networks and effectively scheduling and optimizing data transfers.

Disadvantage:

Concept but not functionally implemented.

Advantage:

Initial design and prototype implementation of Stork Cloud, and show its effectiveness in large dataset transfers across geographically distant storage sites, data centers, and collaborating institutions.

Title: Inter-Datacenter Bulk Transfers with NetStitcher:

Authors: Nikolas Laoutaris, Michael Sirivianos, Xiaoyuan Yang, and Pablo Rodriguez

Publishing Year: 2011

Method: Huge datacenter administrators with locales at various areas measurement their distinct advantages as per the pinnacle request of the geographic territory that each site covers. Planned, actualized, and approved NetStitcher, a framework that utilizes a system of capacity hubs to join together unutilized transfer

speed, at whatever point and any place it exists.

Disadvantage:

The dimensioning of a site in terms of key resources, such as the number of servers and the amount of transit bandwidth to the Internet, depends highly on the peak demand from the geographic area covered by the site

Advantage:

Contrasted NetStitcher and other mass exchange components utilizing both a tried and a live sending on a genuine CDN. Our tried assessment demonstrates that NetStitcher outflanks every single other system and can save up to multiple times extra datacenter transmission capacity, along these lines making it a significant apparatus for datacenter suppliers.

Title: The cost of a cloud: research problems in data center networks:

Authors: Albert Greenberg, James Hamilton

Publishing Year: 2011

Method: The server farms used to make cloud administrations speak to a huge interest in capital expense and progressing costs. As needs be, we initially look at the expenses of cloud administration server farms today.

Disadvantage:

The cost breakdown uncovers the significance of streamlining work finished per dollar contributed. Shockingly, the assets inside the server farms frequently work at low use because of asset stranding and discontinuity.

Advantage:

Expanding system spryness and giving suitable motivating forces to shape asset utilization. Second, we note that cloud specialist organizations are working out geo-disseminated systems of server farms. Geo-assorted variety brings idleness down to clients and expands

unwavering quality within the sight of a blackout taking out a whole site.

III. PROPOSED WORK

A fully-automated single site software system for scientific workflows data management. Multi-Node Cluster approach for storing away the information with the data with the help of Hadoop. Indexing helps the data the user to have complete access to the data. The multi-route transfer approach across intermediate nodes of multiple data centers. The Compression mechanism is proposed to compress the text data file. Map reduce-Byte Offset algorithm is implemented, which shows the file in an unstructured format large data set. Single site data management for effective sharing and exchange of input/output files between nodes.

Every system has its objectives. It can be either the main objective or sub-objectives. The main objective is to Simplifying the processing of storing the Big Data on a single site data center/cloud. The distribution of nodes is proposed to process the capacity of data on the various nodes across a data center. To compress the data, big data will be divided and stored in different nodes.

The system has the sub goals which are as follows

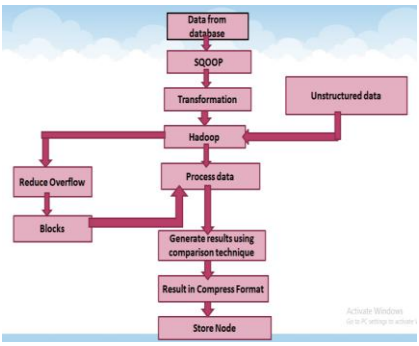
Big data will be divided and stored in different nodes and processed on the small data sets and large data sets in a structured and unstructured manner.

To process the data, the distribution of nodes can be performed on that data. Distribution of the nodes can be done in the form of blocks based on the data set.

The compression mechanism is applied to reduce the overflow of data problem on a virtual machine. This helps us to compress the text data, which has any repetition of words in the data set and represent in the word power n in matrix form. Analyzing the data can be done by

importing data to geographical location into the analytical platform.

IV.IMPLEMENTATION



System architecture

The existing system is mainly focusing on the data over flow problem in a different geographical locations.

The data over flow problem occurs by getting to the normal shared cloud in different location. When accessing the overall data from all clouds, there may get a chance that the cloud might go down in some location. Providing solution in Data management on cloud with different geographical locations. This causes a serious problem in the efficiency of the system in accessing the data. There will be no Data loss for the data on the nodes. Even we can have the data replication so theta multiple copies of data can be maintained. Processing has a good time. Efficiency increases for storing and processing of the Big Data and Learning about the current framework and techniques of how data is stored and control the overflow. Extracting the business logic - working with new enhancement over the previous statistics and applying the algorithms and methods from previous and current enhanced algorithms and developing Architecture and implementation.

Algorithm:

Step1: The resultant output is divided and distributed over nodes.

Step2: Data is then consolidated to a single file making all the similar words to bag and represented with

word control n and power speak to how many times the word is repeated in the result.

Step3: Each repetition is represented by matrix form man.

Step4: Word ^n[x, y] like happy^3[1,3][2,4][4,5].

Step5: Every word is indexed with the line and place of in the line based on the above method the compression works.

In step1, the resultant yield is detached and disseminated over the nodes; we are compressing the resultant output data because the output will be more than the input size, which causes an overflow problem. In the step2, in the given text data if there are any similar bag of words repeated that represents with that word power of n times. In step3, each repetition of that word is represented in matrix form. In the step4, the formula word ^n[x,y] like happy^3[1,3][2,4][4,5]. In step5, every word is indexed with the line and place of in the line based on the above method the compression works.

Map Reduce – BYTE OFFSET

Step1: Initiate default constructor map().

Step2: Once the map() constructor invokes the method identifies the data and calculates the size of data.

Step3: Divides the data based on configuration size is m GB, then divides m GB/64MB

Step4: => (m * 1024) MB /64mb = x MB files, x is the number of files

Step5: map<key, value>, key => IntWritable, value => text writable

In step1, to run the algorithm, we use the map constructor (). In step2, Once the map() constructor invokes the method identifies the information and computes the size of data. In step3, then the data will be divided based on the configuration size, if it is in 1'm' GB, then it divides m GB/64MB. In Step4, using the

formula (m * 1024) MB /64mb = x MB files, x is number of files. In step5, finally mapping the key and value which speaks to the key => Int Writable, value => text writable.

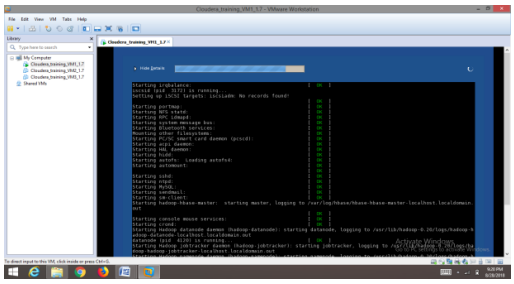
V. EXPERIMENTS AND RESULTS

Cloud has been setup by creating the nodes in the network Virtual Machine Work Station. Within the local server virtual machine creating the Cloud era. There will be process the data and finally produce the results.

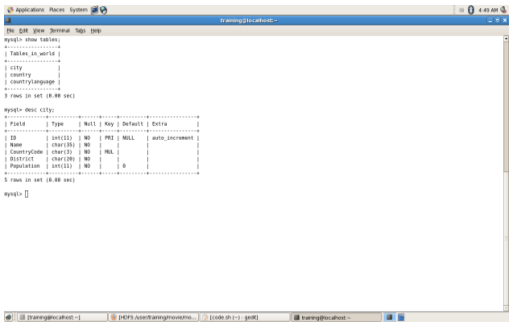
Access the Nodes: Transformation of the data can be processed to and from the nodes. This process can be performed by importing of the data from MYSQL to Hadoop. Accessing the data to and from Node can be done with any of the datasets. Creating the tables with a large number of fields and also accessing the information of each field. This produces the result in the hdfs file local host with blocks.

Data Pre Process: By processing the data available on the node, the large data file where there will be an overflow problem of the data which we lessen the measure of that data and also distributing that data.

Result Analysis: Finally, generating the reports upon the processed data, which can demonstrate the outcomes in the HDFS file system of all the datasets we are taken to process the data.

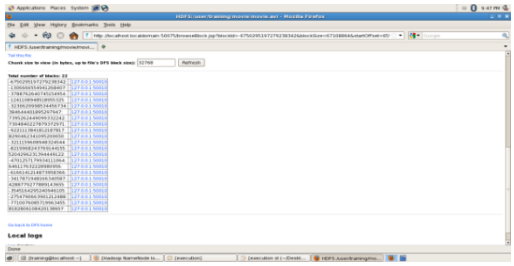


Cloud era desktop has been setup within the server which contains some folders in it



Accessing of the nodes can be done by taking sample dataset, and we can know how the information has been accessed and transformed.

This is the training@localhost where we execute the commands in the terminal to process the data, first; make the database in mysql this will load the data from MySQL to Hadoop.



Hadoop fs -copyFromLocal Src ... Dest

This command is utilized to move our file from local file system to HDFS.

To copy the two files in Hadoop

Hadoop fs -copyFromLocal /home/training/Desktop/BX-BooksCorrected.txt /user/training/uncompress/y

File Name	File Size	Number Of Blocks	Block Size
Movie.avi	1.19 GB	22 Blocks	64 MB
BooksConnected.txt	69.96 MB	2 Blocks	64MB
Data.csv	8.56 KB	1 Block	64MB

Files with number of blocks

VI. CONCLUSION AND FUTURE ENHANCEMENTS

The single node cluster approach for storing away the information with the help of Hadoop, which helps us to overcome the overflow problem. The source VM replicates its data to destination VM. For small data sets (69.96 MB brought about less number of blocks), the overflow introduced by our solution makes the transfer less efficient. The outcomes demonstrate that the framework can show precisely in cloud execution. The framework can successfully use high-speed networks connecting the cloud data centers. Working with the overflow idea helps in diminishing the cloud space.

In the future, there will be working on the number of nodes across multiple processors with an efficient result. The overflow problem can be seen with the multiple servers available in any location by using a LAN or Cloud to perform in a real-time environment. For logical work processes dealing with numerous little records, this can turn into a bottleneck, so further wanting to supplant the per-site metadata vaults with a worldwide, various leveled one.

Moreover, an intriguing bearing to investigate is the closer mix between Over Flow and progressing chip away at dealing with floods of information in the cloud, just as other information preparing motors. To this end, an expansion of the semantics of the API is required.

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Speech Discrimination-Identifying the Speaker

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Abstract- Despite the recent success of deep learning for many speech processing tasks, single-microphone, speaker-independent speech separation remains challenging for two main reasons. The first reason is the discretionary request of the objective and masker speakers in the blend (change issue), and the second is the obscure number of speakers in the blend (yield measurement issue). We propose a novel profound learning system for discourse detachment that tends to both of these issues. We utilize a neural system to extend the time-recurrence portrayal of the blend signal into a high-dimensional implanting space. A reference point (attractor) is made in the implanting space to speak to every speaker which is defined as the centroid of the speaker in the inserting space. The time-recurrence embeddings of every speaker are then compelled to bunch around the relating attractor point which is utilized to decide the time-recurrence task of the speaker. We propose methods for finding the attractors for each source in the embedding space and compare their advantages and limitations. Identifying the speaker from a mixture of speakers with the help of neural networks with deep learning. The target work for the system is standard sign recreation blunder which empowers start to finish task during both preparing and test stages. We assessed our framework utilizing the voices of clients on two and three speaker blends and report tantamount or preferred execution over other best in class profound learning techniques for discourse partition.

I. INTRODUCTION

Speaker recognition Speaker acknowledgment is a sort of discourse acknowledgment innovation, which acknowledges ID of speaker dependent on discourse parameters in the discourse waveform reflect physiological and social attributes of the speaker[1]. The whole acknowledgment process requires the investigation of information discourse signal, highlight extraction, at long last to decide if the speaker is in preparing speaker accumulation. The exploration of speaker acknowledgment

in speaker acknowledgment framework comprises of highlight extraction and example coordinating [2]. At present the commonest trademark parameters are LPC, LPCC, MFCC [3], etc. The acknowledgment model in like manner use is DTW, VQ, HMM, etc. In current acknowledgment framework, when we extricate the MFCC trademark parameters, we for the most part basically evacuate the first or the initial two element segment, so as to understand the standardization of intensity range. Anyway this strategy doesn't assess other element parts' commitment to the acknowledgment execution. Research demonstrates that distinctive cepstrum coefficient has an alternate commitment to the acknowledgment execution [4]. Along these lines we chose coefficients which contribute fundamentally to the acknowledgment framework to do the exploration in the speaker acknowledgment. At present, there are two techniques to assess the component's commitment to speaker acknowledgment. One is concentrating the commitment of each element part by methods for expanding or diminishing the quantity of highlight segments. The other strategy is characterizing the fisher proportion of each element part to recognize their commitments to acknowledgment [5]. In this paper we receive the second technique.

Voice acknowledgment or speaker acknowledgment alludes to the robotized technique for recognizing or affirming the personality of an individual dependent on his voice.

There are two noteworthy uses of speaker acknowledgment advances and systems. In the event that the speaker professes to be of a specific character and the voice is utilized to confirm this case, this is called confirmation or validation. Then again, recognizable proof is the errand of deciding an obscure speaker's personality. It could be said, speaker confirmation is a 1:1 match where one speaker's voice is coordinated to a specific layout though speaker distinguishing proof is a 1:N match where the voice is looked at against numerous formats.

From a security point of view, distinguishing proof is unique in relation to confirmation. Speaker check is normally utilized as a "guard" so as to give access to a protected framework. These frameworks work with the clients' learning and commonly require their collaboration. Speaker recognizable proof frameworks can likewise be executed clandestinely without the client's information to distinguish

talkers in a dialog, alert computerized frameworks of speaker changes, check if a client is as of now taken a crack at a framework, and so on.

In criminological applications, usually to initially play out a speaker ID procedure to make a rundown of "best matches" and afterward play out a progression of confirmation procedures to decide a definitive match.

II RELATED WORK

Title:

Speaker_independent_Speech_Separation with Deep Attractor_Network :

Authors: Yi Luo, Zhuo Chen, and Nima Mesgarani

Publishing Year: 2018

Method: Speaker-independent speech separation remains challenging, speech separation, the assessed our framework utilizing the Wall Street Journal dataset (WSJo) on two and three speaker blends and report tantamount or preferred execution over other cutting edge profound learning techniques for discourse division.

Disadvantage:

Works with predefined speakers audios sets

No live tracking of audio voices

Advantage:

Speaker identification has been provided

Used as security feature in bio metric applications.

Title: A deep ensemble learning method for monaural speech separation:

Authors: X.-L. Zhang and D. Wang

Publishing Year: 2016

Method: fundamental problem in robust speech processing to address monaural speech separation

Disadvantage:

The first multi-context network averages the outputs of multiple DNNs whose inputs employ different window lengths

Works on single speaker, classifying his audio

Advantage:

Identifies all possible pitchs of the speaker in low high frequency.

Title: A regression approach to single channel speech separation via high-resolution deep neural networks :

Authors: J. Du,Y. Tu, L.-R. Dai,and C.-H. Lee

Publishing Year: 2016

Method: Approach to single-channel speech separation based on deep neural networks (DNNs) to directly model the highly nonlinear relationship between speech features of a mixed signal containing a target speaker and other interfering speakers.

Disadvantage:

Separation of speech of individual from a set of mixed results.

Advantage:

Achieve a better generalization capability than that with output features of only the target speaker

Noise-dependent resolution

Title: Informational and energetic masking effects in the perception of two simultaneous talkers:

Authors: D. S. Brungart.

Publishing Year: 2001

Method: Spatially separated speech signals for identification

Performance in this speech perception task decreased systematically when the level of the target talker was reduced relative to the masking talkers.

Disadvantage:

Problems if the speaker has similar voice characteristics

Advantage:

Works with any decible of audio ratio

Performance evolution in identifying the voice characteristics.

III METHODOLOGY / FRAMEWORK

There are two modules for the project

Speaker Identification

Speaker Detection

Verification versus identification:

There are two noteworthy utilizations of speaker acknowledgment innovations and strategies. In the event that the speaker professes to be of a specific personality and the voice is utilized to confirm this case, this is called confirmation or verification. Then again, recognizable proof is the undertaking of deciding an obscure speaker's personality. As it were speaker confirmation is a 1:1 match where one speaker's voice is coordinated to one layout (likewise called a "voice print" or "voice model") though speaker recognizable proof is a 1: N match where the voice is thought about against N formats.

From a security point of view, distinguishing proof is not quite the same as check. For instance, exhibiting your identification at outskirt control is a confirmation procedure: the operator looks at your face to the image in the record. On the other hand, a cop contrasting a sketch of an attacker against a database of recently recorded hoodlums to locate the nearest match(es) is a distinguishing proof procedure.

Speaker confirmation is typically utilized as a "guardian" so as to give access to a protected framework (for example phone banking). These frameworks work with the clients' learning and regularly require their participation. Speaker distinguishing proof frameworks can likewise be actualized clandestinely without the client's learning to recognize talkers in an exchange, alert mechanized frameworks of speaker changes, check if a client is as of now taken on a framework, and so on.

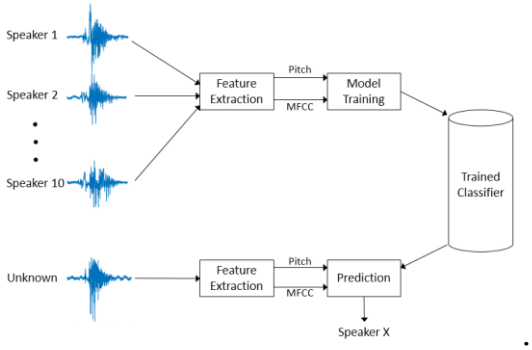
In criminological applications, usually to initially play out a speaker recognizable proof procedure to make a rundown of "best matches" and after that play out a progression of check procedures to decide a convincing match..

IV. RESULTS AND ANALYSIS

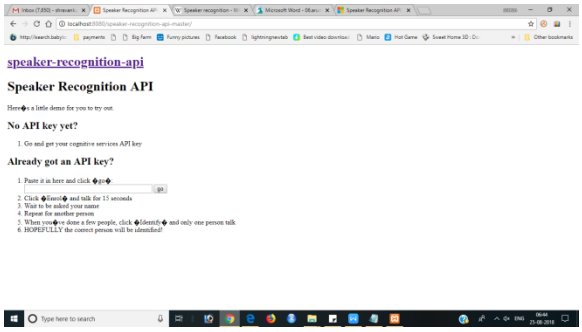
Deep Neural Networks

A deep neural network (DNN) is an artificial neural network (ANN) with multiple hidden layers between the

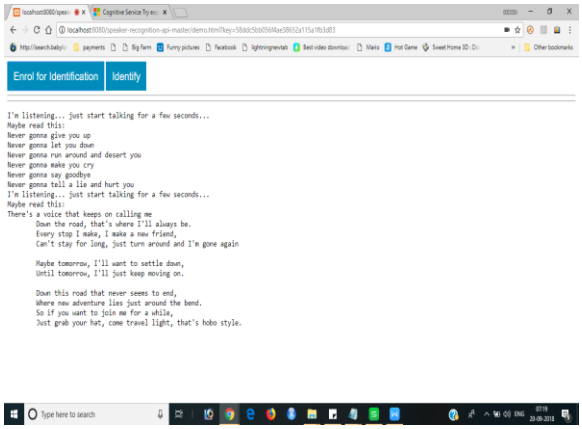
input and output layers.



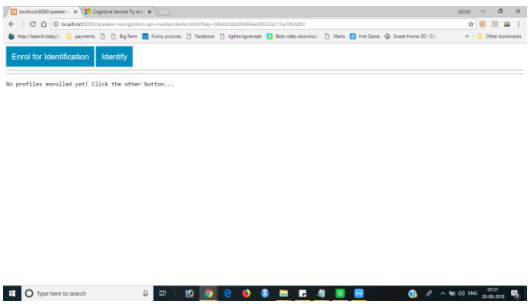
Speaker acknowledgment frameworks fall into two classes: content ward and content autonomous.



Speaker can be added with the key



Now read the following content from the screen as we read the user will be enrolled to the application



Based on the previous enrollment we can identify the users

V. CONCLUSION & FUTURE WORK

The mixture of the speech in the audio is isolated by utilizing the DANet which performs profound grouping system by making attractor focuses in the inserting space which force together the embeddings that have a place with a particular speaker. Every attractor in this space is utilized to frame a period recurrence cover for every speaker in the blend. From the blend of the sound subsequent to applying DAN at the discourse is isolated from the blend of speakers and the sign of the every discourse is plotted. The future works incorporate investigating approaches to consolidate speaker data in the estimation of grapple focuses and in the age of the embeddings. These angles can result in both speaker-ward and speaker-autonomous partition by a similar system. Isolating more sources

past discourse flag by making a bigger and progressively instructive inserting space is additionally a fascinating and significant theme, which prompts the likelihood of structuring an all inclusive acoustic source partition system. Additionally a programmed division is required, that separated the sign into portions, contingent upon the quantity of the dynamic speakers. Be that as it may, for this, likewise a dependable location of the dynamic speakers is required. With a programmed division, the speaker acknowledgment could likewise be tried on the information, recorded in a genuine meeting situation.

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Extracting the Data, Transforming and Analysing with Ecosystem of Hadoop Over Big Data

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Abstract **- Information is an important asset. Appropriate utilization of amazing information can enable individuals to improve forecasts, investigations and choices. Nonetheless, regardless of how much exertion we put into gathering a decent dataset, blunders will definitely crawl into the information, making it vital for information cleaning. This turns into a worry especially when substantial scale heterogeneous information from different sources are incorporated for different purposes. Information cleaning can be confounded, time consuming, and costly, yet it is a vital stride in any information related framework since low quality information may not be appropriate to accomplish the planned purposes. The center of our information cleaning framework is information affiliation and repairing. Affiliation means to recognize a similar question and connection with the most related protests, and repairing is to make a database dependable by fixing blunders in the information. For huge information applications, we don't really need to utilize every one of the information. Much of the time, we just need a little subset of the most applicable information. So the objective of affiliation is to change over huge crude information into a little subset of the most significant information that are most helpful for a specific application. After we acquire a little measure of pertinent information, we additionally need to additionally dissect the information to enable individuals to process the information and transform the information into learning. We utilize various procedures to relate the information to get helpful learning for information repairing. Our exploration demonstrates that information affiliation can viably help with information repairing. To catch the cooperation, we give a uniform structure that unifies the affiliation and repairing process consistently in view of setting designs, use examples, metadata, and repairing rules.**

Keywords- **Data Cleaning, Data Association, Data Repairing.**

I. INTRODUCTION

Data is a valuable resource. Proper use of high-quality data can help people make better predictions, analyses and decisions. Poor-quality data may not be suitable for the intended purposes. Data cleaning is the process of fixing or removing damaged or inaccurate data. This process is necessary and extremely important for Big Data, because erroneous data may lead to poor conclusions and analyses. Data is not always entered properly and needs to be corrected before we use them. Datasets from different data sources need to be cleaned before we combine them together. If data are created for one purpose and are used for another, then the data may not be of sufficient quality for the intended purpose.



Fig 1.1 Different wellsprings of information

Data could be collected from different applications, which may provide data with the same entities, but different identities. Data from social network may arrive with unclear or dishonest information. This becomes a concern particularly when large-scale heterogeneous data from multiple sources are integrated for another purpose. In big data, applications don't necessarily use all the data. In most situations, applications only need a small subset of the most relevant data. Through association between multiple data sources, the big raw data is converted into a small subset of the most relevant data that are most useful for a particular application. After obtaining the small amount of relevant data, the data is further analyzedto help usersdigest the data and turn the data into knowledge. We use a number of techniques to associate the data to get useful knowledge for data repairing. Data association from multiple data sources is a crucial step in data cleaning, because this process can severely influence the outcomes of the data repairing processes. To capture the interaction of users with data, we provide a uniform framework that unifies association and repairing process seamlessly based on context patterns, usage patterns, metadata, and repairing rules. As both context and usage patterns are produced by humans, it tends to have a lot of useful knowledge about people's preferences and opinions. That makes it possible to mine data to discover those latent preferences of people, which could be very useful to build an intelligent system to help clean the data. Our experimental results identify that an efficient data cleaning framework can be constructed using our interactive approach. The first contribution of the paper is a data cleaning framework that

correctsdata errors and ultimately achieves a balance between high quality data and low cleaning cost. The framework first identifies and links associated data; then it ranks them followed by a two phase data cleaning process. Our second contribution is a metadata generation algorithm. The metadata generator generates both structural metadata and descriptive metadata for different kinds of data (structured / semi-structured / unstructured data). The metadata generator is important because it can assist in identifying data items, types and uniqueness for all types of datasets in the proposed framework. Our third contribution consists of two schemas for object.

II. LITREATURE SURVEY

Title: Storing, Tracking, and Querying Provenance in Linked Data:

Authors: Marcin Wylot, Philippe Cudr´e-Mauroux, Manfred Hauswirth and Paul Groth

Publishing Year: 2017

Method: The proliferation of heterogeneous Linked Data on the Web poses new challenges to database systems. In particular, the capacity to store, track, and query provenance data is becoming a pivotal feature of modern triplestores. native RDF store to efficiently handle the storage, tracking, and querying of provenance in RDF data.

Dis advanatage:

Works with structure data with less parameters in imporating and processing of the data.

Advantage:

A reliable and understandable specification of the way results were derived from the data and how particular pieces of data were combined to answer a query. Subsequently, we present techniques to tailor queries with provenance data.

Title: DARE: Cleaning Framework for BigData ----ANINTERACTIVE APPROACH FOR DATA CLEANING:

Authors: Hong Liu, Ashwin Kumar TK, Johnson P Thomas, Xiaofei Hou

Publishing Year: 2016

Method: Data is a valuable resource. Proper use of high-quality data can help people make better predictions, analyses and decisions.Data cleaning can be complicated, timeconsuming, and expensive, but it is a necessary step in any data-related system since poor-quality data may not be suitable to achieve the intended purposes.

Dis advanatage:

Usage of the ETL tools makes lack in the perfomance of the data

Data Associations not performed with more prominance

Advantage:

Uniform framework that unifies the association and repairing process seamlessly based on context patterns, usage patterns, metadata, and repairing rules

Title: A study on data deduplication techniques for optimized storage :

Authors: E. Manogar ; S. Abirami

Publishing Year: 2014

Method: the explosion of the data such as text, image, audio, video, data centers and backup data lead to a lot of problem in both storage and retrieval process. The enterprises invest lot of money for storing the data. Hence, an efficient technique is needed for handling the enormous data. eliminating the redundant data in the storage system such as data deduplication and data reduction

Dis advantage: the disk usage and cost

Advantage:

Various storage optimization techniques, concepts and categories using data deduplication..

Title: An Efficient Versioning File System for Phase-Change Memory:

Authors: Lee Eunji, Jee E. Jang, Taeseok Kim, Hyokyung Bahn

Publishing Year: 2013

Method: Versioning file systems are widely used in modern computer systems as they provide system recovery and old data access functions by retaining previous file system snapshots.

Dis advanatage:

Systems do not perform well with the emerging PCM (phase-change memory) storage, because they are optimized for hard disks. Specifically, a large amount of additional writes incurred by maintaining snapshot degrades the performance of PCM seriously.

Advantage:

Designed for PCM, that reduces the writing overhead of a snapshot significantly

Versioning file systems that incur cascade writes up to the file system root, our scheme breaks the recursive update chain at the immediate parent level.

Quantitative Data Cleaning for Large Databases - Joseph M. Hellerstein

Data collection has become a ubiquitous function of large organizations – not only for record keeping, but to support a variety of data analysis tasks that are critical to the organizational mission. Data analysis typically drives decision-making processes and efficiency optimizations, and in an increasing number of settings is the raison d'etre of entire agencies or firms. Despite the importance of data collection and analysis, data quality remains a pervasive and thorny problem in almost every large organization. The presence of incorrect or inconsistent data can significantly distort the results of analyses, often negating the potential benefits of information-driven approaches. As a result, there has been a variety of research over the last decades on various aspects of data cleaning: computational procedures to automatically or semi-automatically identify – and, when

possible, correct – errors in large data sets. In this report, we survey data cleaning methods that focus on errors in quantitative attributes of large databases, though we also provide references to data cleaning methods forother types of attributes. The discussion is targeted at computer practitioners who managelarge databases of quantitative information, and designers developing data entry and auditing tools for end users. Because of our focus on quantitative data, we take a statistical view of data quality, with an emphasis on intuitive outlier detection and exploratory data analysis methods based in robust statistics [Rousseeuw and Leroy, 1987, Hampel et al., 1986, Huber, 1981]. In addition, we stress algorithms and implementations that can be easily and efficiently implemented in very large databases, and which are easy to understand and visualize graphically. The discussion mixes statistical intuitions and methods, algorithmic building blocks, efficient relational database implementation strategies, and user interface considerations. Throughout the discussion, references are provided for deeper reading on all of these issues.

ETL

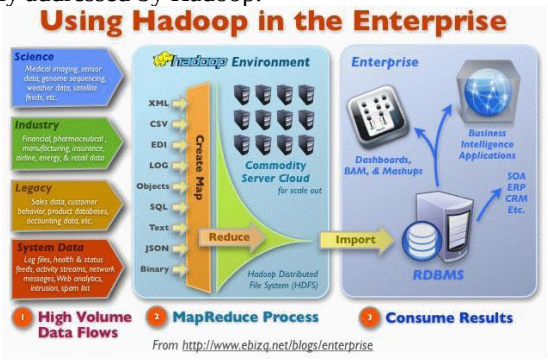
Hadoop's significance in data warehousing is progressing rapidly as a transitory platform for extract, transform, and load (ETL) processing. Mention about ETL and eyes glaze over Hadoop as a logical platform for data preparation and transformation as it allows them to manage huge volume, variety and velocity of data flawlessly. Hadoop is extensively talked about as the best platform for ETL because it is considered as an all-purpose staging area and landing zone for enterprise big data. To understand the significance of big data and hadoop for ETL professionals read this article to endorse the awareness on why is this the best time to pursue a career in big data hadoop for all data warehousing and ETL professionals.

The spurt of internet users and the adoption of technology by all the conceivable industries through the past two decades began generating data in exponentially expanding volumes. As the data kept growing, owners realized a need to analyze it and thus originated an entirely new domain of Data Warehousing. That laid the foundation for an entirely new domain of ETL (acronym for Extract Transform Load) – a field which continues to dominate the data warehousing to this date.

Data is the foundation of any Information Technology (IT) system and as long as we are prepared to manipulate and consume it, we will keep adding value to the organization. The modern technological ecosystem is run and managed by interconnected systems that can read, copy, aggregate, transform and re – load data from one another. While the initial era of ETL ignited enough sparks and got everyone to sit up, take notice and applaud its capabilities, its usability in the era of Big Data is increasingly coming under the scanner as the CIOs start taking note of its limitations.

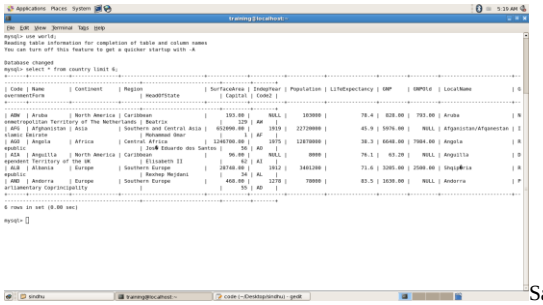
Hadoop for ETL platform

Extract, transform and load processes form the backbone of all the data warehousing tools. This has been the way to parse through huge volumes and data and prepare it for analysis. That notion has been challenged of late, with the rise of Hadoop. A number of Hadoop advocates argue that the only way to manage data in the future is to learn Hadoop. The conventional ETL software and server set up are plagued by problems related to scalability and cost overruns, which are ably addressed by Hadoop.



III. FUNDAMENTALS

In this work, we focus majorly on three types of functionalists data cleaning in terms of transforming the data by solving the issues in existing ETL tools, hive data loading, data analysis. We use the following data from mysql to carry our work foward.



Sample data from mysql

IV. DESIGN WORK FLOW

Hadoop for ETL platform

Extract, transform and load processes form the backbone of all the data warehousing tools. This has been the way to parse through huge volumes and data and prepare it for analysis. That notion has been challenged of late, with the rise of Hadoop. A number of Hadoop advocates argue that the only way to manage data in the future is to learn Hadoop. The conventional ETL software and server set up are plagued by problems related to scalability and cost overruns, which are ably addressed by Hadoop.

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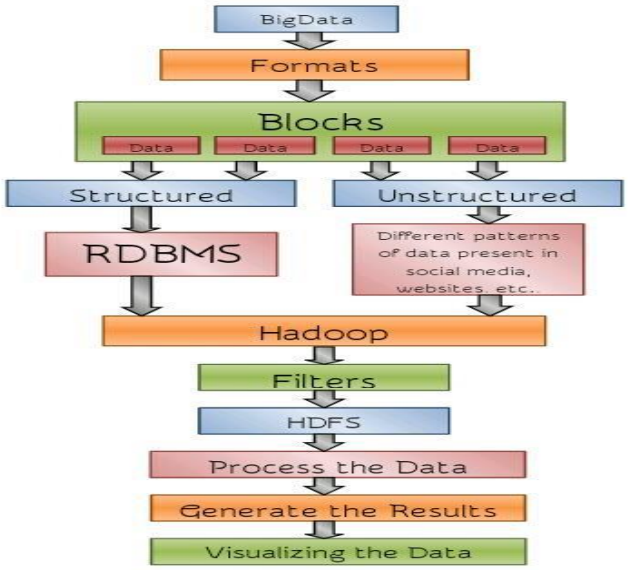
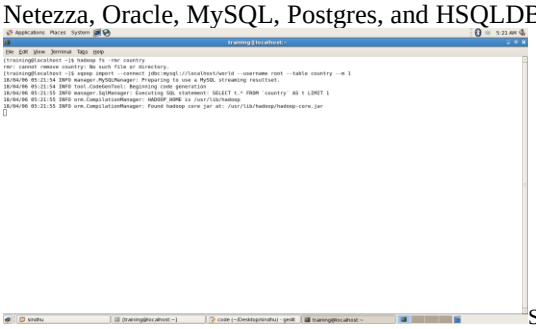
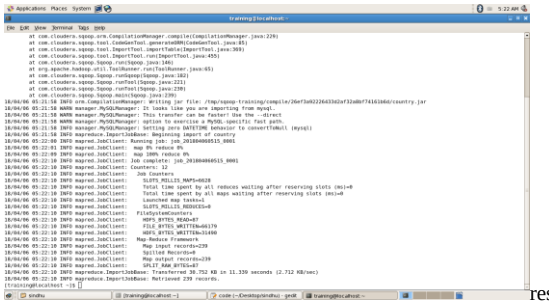


Sqoop

Apache Sqoop efficiently transfers bulk data between Apache Hadoop and structured datastores such as relational databases. Sqoop helps offload certain tasks (such as ETL processing) from the EDW to Hadoop for efficient execution at a much lower cost. Sqoop can also be used to extract data from Hadoop and export it into external structured datastores. Sqoop works with relational databases such as Teradata, Netezza, Oracle, MySQL, Postgres, and HSQLDB


Sqoop command for data import


results in the hadoop platform

V. IMPLEMENTATION METHODOLOGY

Algorithm model:

Start

1) make a working model of the mysql database

2) Now locate the ip address and the port address.

3) Make a directory in hdfs

4) Configure the location with Sqoop of hadoop using - sqoop import --connect jdbc:mysql://localhost/world --username root --table country --m 1

5) Perform the filtration using -> sqoop import --connect jdbc:mysql://localhost/world --username root --table city --m 1 --where "countrylanguage where IsOfficial = 'T' and Percentage > '75' "

6) If no results obtained then rmr directory and go to step 3

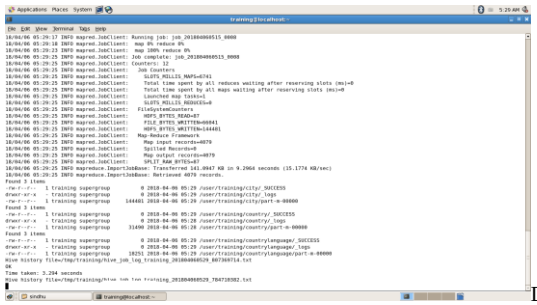
7) If results obtained pull the data to hive -> load data to hive '/user/location/directory/part-00000'

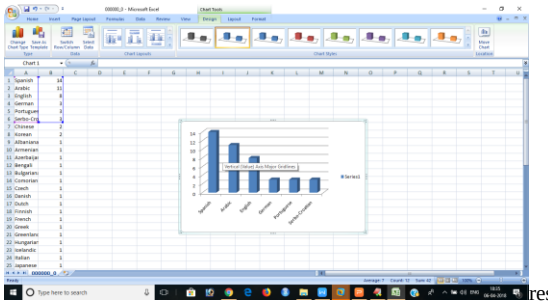
8) Analyse the data based on the transformed data.

9) Projects the results to the directory.

10) STOP

VI. EXPERIMENT RESULTS


Data from sqoop to hive


results after data filtration

VII. CONCLUSION

Data cleaning is the process of fixing or removing damaged or inaccurate data. This process is necessary and extremely important for Big Data, since incorrect data may lead to poor analysis and thereby yield unsatisfactory conclusions. We develop a data cleaning framework for big data that will improve data quality. In this paper we have i) generated both structural metadata and descriptive metadata for data items and datasets; ii) tracked data usage; iii) harnessed both data context and usage patterns to find similar data items and datasets from multiple data sources and iv) constructed a data association report that can benefit the subsequent data cleaning process and enrich data information in our proposed data cleaning framework. Our experimental results show that our algorithm is effective in improving data quality. Our main finding is that our proposed approach is able to identify data

items and associated datasets which can benefit the subsequent data cleaning process. As future work we intend to further develop our proposed data cleaning framework by building a ranking system which can provide priority based on the value of information and cleaning cost. Moreover, we will construct a cost-based model and interactive approach for data cleaning by using a combination of both machine learning algorithms and human intervention.

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Focal Point Analysis in Identifying the Expressions of Human Face

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Abstract— ***By splitting up the images material, the visual final examination construct can anticipate the idea of a image. People who transfer big numbers of accounts in casual organizations, now shifting, like Twitter, Face book, Google Plus and Flickr. These pictures have a key effect on the emotions of communication of customers to casual internet organizations. Consequently, the examination of the view was critical. Some study is focused on the feelings of the written material. The small examination was carried out to generate designs that anticipate the sensory structure's response. In this article, it offers a new graphic assessment framework that uses swap teaching to address predictions. It uses hyper-parameters derived from deep cellular structures in order to implement our process model to prevent overlap. It conducts large tastings on an internet image dataset and shows that the present working point is faster carried out by our model.***

Keywords— Image Analysis, Emotion, Image, Feature Extraction

I. INTRODUCTION

Focal Point Analysis in Identifying the Expressions of Human Face. The personal network online has become an essential component of our daily lives. Users share a bunch of textual and sensory content to convey their feelings and views. These images show the emotions and behaviours of thousands of individuals worldwide. The social networks provide various facilities for the communication and sharing of data by their customers. Users use these facilities to exchange views on various subjects and to demonstrate concern and help for buddies and community. By analysing the user content, we can comprehend and forecast customer conduct. The learning of this information from these technologies can profit several apps, such as predictive modelling, recommendation structures for products and services, internet advertising, etc. This tendency had been identified by researchers and many studies were undertaken to evaluate feelings and opinion mining.

Content from multiple social networks like Face book, Instagram, SnAP, Flickr and Twitter, etc. In recent years have become more popular than linear material. Visual content status or messages often involve a brief or no textual depiction. Thus, most customer feelings convey the graphic characteristics. The pictures are simpler to comprehend and can solve the language limits.

Although a lot of job has been performed to analyse the feeling of verbal material. The sensory feeling assessment study is still in its basic phase. The assessment of visual feelings includes a capacity for the item, image, behaviour and mental background to be recognized. The creation of handmade pictures in order to predict feelings calls for a great deal of personal endeavour and moment. On the opposite hand, monitored Deep teaching and optimization designs require a lot of practice information that is difficult to acquire for photos from various fields. Consequently, in the comparison with other item identification, and monitoring the mental elements of the images are relatively unexplored.

The architectures of deep learning demonstrated enormous success in machine sight field, which is called the Convolutional Neural Networks. In graphic identification, CNN designs approach human level efficiency.

It uses a hyper-parameter transmission teaching strategy. CNN performs better than before in a normal dataset than before.

In these days, it's essential to discover views on the goods, items or activities of any organisation, company, or company. Technology uses verbal material, but not graphic characteristics. Approximately 90-100% of internet personal network information linked to pictures. In the current situation, therefore, people's views or assessments were never regarded as a key aspect. It has 90% of the information on the industry. 60% of the information is in pictures, audios and pictures. This is the result. The unstructured data are not perfectly analysed. To introduce a range of pictures, there is no stronger strategy or technology.

A. Disadvantages of Existing System

The Images contain many feedback about the company or product, which we can't enter to know the reviews. Hadoop even operates with the pictures, but they usually encrypt the picture and send the information.

II. RELATED WORK

Hurricane Sandy is an instance of social media has a positive effect during disasters in 2012. Some instances of how personal communication works in catastrophic situations have been rescued, including Hurricane Irene, the gas crash in 2010. California. A feeling evaluation of personal media disaster-related messages helps to identify pictures which add to the consciousness of the situation and customers ' emotions and worries by defining the polarity of emotions experienced by customers during catastrophes.

Initial research on the assessment of graphic feelings concentrated on handcrafting. Siersdorfer used pixel rank characteristics to predict the feeling of the picture. Borth produced several adjective combinations that express various concentrations of feelings. Resulting pictures are regarded as intermediate characteristics to analyze the feeling of the picture.

III. PROPOSED SYSTEM

The current scheme works with customer feedback that geographically increases the company's output. It examines views and inspections from different locations of research and gathers them for data analysis in a r console. Visual content has become more popular in latest days than verbal content. In the scheme suggested, it presents a way to analyze pictures, such as imaging conduct, which concerns the item or the organization, which enables us to achieve more precise outcomes in the analysis of information.

IV. ADVANTAGES OF PROPOSED SYSTEM

The scheme helps to learn how satisfied customers are with the products. It assists us with brand enhancement. The company's revenues are affected automatically.

The social media text sentiment analysis is quite a challenge. Everyday consumers generate a lot of information in social networks in the age of large information. These information are structured in the shape of brief and an pictures and SMS mix. It is recommended that Hash tags are used for sentimental assessment with powerful favorable and bad views, with ASCII smiley and soft tags. An embedded emotional indicator and correlation system was created to forecast feelings by incorporating emotional cues. For sentimental analyses, a double-recurring neuro-neural network has been suggested to use an forward-looking neural network for Twitter sentiment analysis, created a hybrid model that includes Sustainable Vector Mechanics (SVM), Neural networks Naive Bays, Maximum Entropy and Feed Forward.

Features detection, function extraction and matching are combined in order to resolve common problems of Computer intelligence like item identification and identification, picture recollection in content, face detection and awareness and categorization of texture.

These pictures have multiple colours and pixels. View how the picture is recorded and take each pixel in the matrix as a cell. The cells comprise various strength data, responding to the red, green and blue colors. Thus a 3-D matrix for an RGB picture. The strength of the colours red, blue, and green is every amount.

The use of easy picture pixels in real pictures is not sufficiently descriptions. Two primary steams are to be followed, instead. One is the use of handmade extracting techniques for functions such as sparse coding, auto encoder, restricted Boltzmann machine, PCA, ICA, or K-means, such as SIFT, VLAD, HOG, GIST, LBP.

V. DESIGN OF THE WORKFLOW

Learn how to solve the lacking information issue via current scheme and methods. CNN approach functioned to predict good information by extracting business logic. Development and execution of architecture. The proposed architecture framework is shown in figure1 illustrates that describes the system's architecture by extracting the internet characteristics, Images, labels connecting to classifier and follows sentiment analysis.

VI. METHODOLOGY AND EXPERIMENTAL RESULTS

Download and import information for R. Data. I transform the information and execute the information queries. The plotted figure shown in figure.3 the allocation of information. Figure 2.illustrates that the x-axis represents a person’semotions and the y-axis indicated the emotion rate using gg-plot. Figure 3. Shows emotions such as rage, disregard, disgust, dread, joy, neutrality, and arrow.

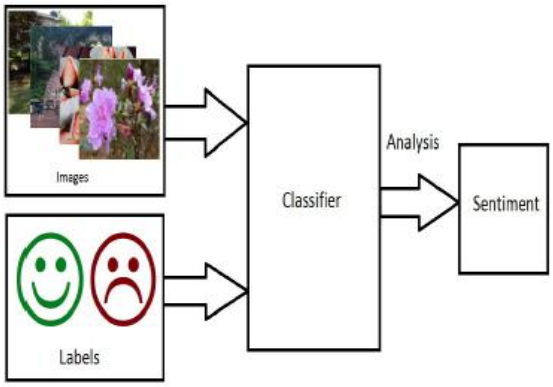

Fig. 1 Diagram of generic visual sentiment analysis framework

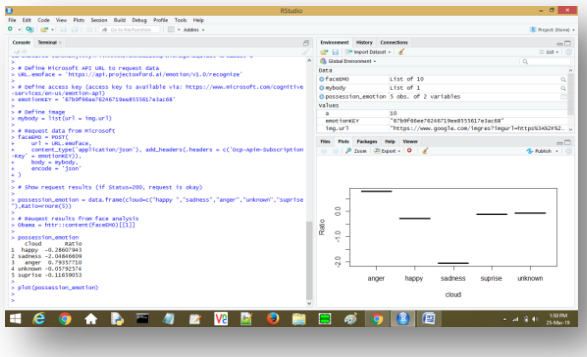

Fig. 2 Result displayed with gg-plot

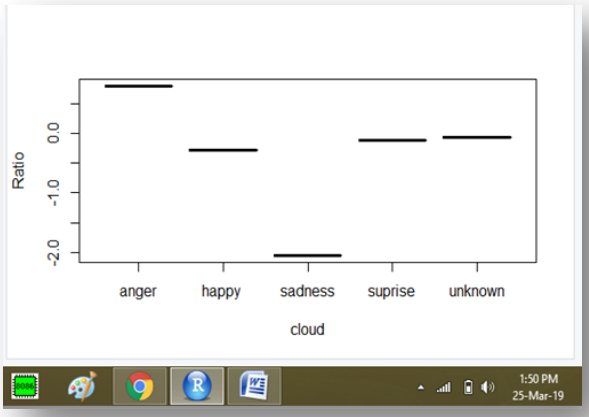

Fig. 3 Report of an Emotion

VII. FUTURE ENHANCEMENT

Addressing the ranking algorithms for extra dominances may also be a further step in this path. Additional limitations to enhance identification precision can be added to the classification algorithms suggested in this job.

VIII. CONCLUSION

Visual social network sentiment analysis can assist customer conduct understanding and provide helpful data analysis information. The article presents a new structure for graphic sense assessment using certain methods such as transition designs and bundles in R-Language, such as gg-plot. The R-Language system is developed with the huge characteristics it utilizes to map the production into a natural understanding. In order to understand customer feedback and publicity, our models can use to evaluate high-scale data-multimedia material. It can be helpful for the emotional surveillance of people with mental wellness problems. Our model is like using audio material sentiment analysis. Finally, it intends to study semi-monitored and unattended ways of deep learning architecture to predict the sensory information impression.

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Co-Occurrence of Keywords to Measure the Availability of the Data Terms in Big Data

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Abstract - *In the last decade, keyword search over relational databases has been extensively studied because it promises to know the users lacking with knowledge of structured languages with query or unaware of the relational database schema on to query the data set in an intuitive approach. The existing works related to about keyword search on the data sets proposed many different approaches and have also gain remarkable results in improvement. However, In most of these new approaches are designed in the centralized setting of where keyword search is used and processed by only the single server. In reality, the scale of data sets increases sharply and the centralized methods are hardly can able to handle keyword queries in and over these large databases. Moreover, processing keyword search over relational databases is a very time-consuming task, and the efficiency of the existing centralized approaches will degrade notably because there are single server which cannot provide enough in computation power for the analysis of keyword search over very huge and large data sets. To address these issues and challenges, we propose the distributed keyword search (DKS) as an approach with R Programming and this approach makes to be well deployed in onto any cluster of data servers to deal with keyword search over large databases in a parallel way..*

Keywords*: - Twitter, sentiment analysis, symbol analysis..*

I INTRODUCTION

The success of search engines on the web service has popularized the use of keyword search, with which untrained clients can find data of enthusiasm from tremendous accumulations of archives/Webpages. Over the previous decade, this achievement has propelled much enthusiasm for contemplating catchphrase seek over databases, and broad methodologies and models are proposed to take care of this issue.

As of late, an ever increasing number of methodologies [1], [2] to catchphrase look over databases receive the information chart to plan the pursuit calculation. These strategies model the database as an information chart , in which hubs compare to tuples and edges compare to essential remote key connections between the tuples. In a large portion of those methodologies, the issue of hunting down outcomes can be come down to finding the Steiner trees [1] that spread all or some of watchwords, which is known to be NP-hard [3]. This paper likewise centers around looking through the Steiner trees dependent on an information diagram to manage catchphrase seek over social databases

Most existing information diagram based works endeavor to plan an efficient brought together answer for the catchphrase seek over databases with the presumption that the entire information chart can fit in primary memory of a solitary server. Nonetheless, with enormous information rising in different fields of the general public, the size of the database is expanding significantly. For this situation, most existing methodologies scarcely can deal with watchword seek on the databases with tremendous volumes. The first reason is that volumes of substantial databases have surpassed the limit of one server and the information diagram for the most part can't fit in the primary memory. Furthermore, finding Steiner trees over the information diagram is a NP-difficult issue and it will devour much registering assets. On the off chance that the size of the database become bigger, the exhibition of existing techniques will corrupt eminently on the grounds that a solitary server can't supply enough calculation control for seeking Steiner trees over a huge information diagram.

To address this test, we propose DKS, a way to deal with circulated catchphrase seek over social databases with MapReduce instrument [4]. MapReduce is a commonplace parallel batchprocessingframeworkthathasbeenusedinso mefamous framework, (for example, HDFS). In any case, our concern can't be illuminated with just two essential tasks: map and diminish, hence we present two sorts of shuffle activities to develop an all-encompassing MapReduce structure that can well help DKS approach. The fundamental standard of DKS is utilizing numerous servers to all the while manage a similar watchword seek, subsequently every server just needs to look through a piece of the database in an appropriated example for decreasing the pursuit time. All the more specifically, we first model the database as an undirected information chart G and accept that G is an associated diagram. To quicken look process, we segment the information diagram G into various subgraphs without cover and allocate these subgraphs to various servers. For a given inquiry q, various servers will find the competitor Steiner trees that will most likely develop into Steiner trees from their neighborhood subgraphs all the while and afterward join the hopeful Steiner trees to produce the total Steiner trees. At last, a specified server will rank the Steiner trees and return the final top-k answers.

II RELATED WORK

Mining Top-k Co-occurrence Data Patterns across Multiple Streams :

FREQUENT Data pattern / itemset mining is a fundamental problem as analysis for many domains, thus has a number of applications, e.g., retail market analysis, bioinformatics, ecology, web click stream mining, network traffic monitoring, and so on. In the Bigdata and IoT era, objects in these applications are often generated in a streaming fashion. Therefore, data mining frequent data pattern/ itemset over data in filtering streams has been data extensively studied. This paper focuses on data as an environment of multiple data streams, and addresses the novel filteration problem of continuous mining of top-k closed data co-occurrence patterns filter across multiple streams.

EXAMPLE 1.2 (WEB USAGE PATTERN MINING). Given a set of click streams generated by multiple users, by mining

cooccurrence patterns, we can find (top-k) typical web search patterns and popular web sites with many users.

EXAMPLE 1.3 (E-COMMERCE). Item browsing and purchase sequences by the same user in an online shop constitute a stream. If a mechanism can detect itemsets appearing in many streams (i.e., users), the owner of the online shop can plot an effective promotion strategy.

EXAMPLE 1.4(ASSOCIATION MINING). Assume that smart phones consecutively generate tuples, each of which is represented by □app-id, loc□. Note that app-id is the identifier of the executed application and loc is the location where the application is executed. Some associations between applications and locations are mined from top-k co-occurrence tuples, since, if a given tuple is observed in many smartphone users, we can see an association between the application and the location.

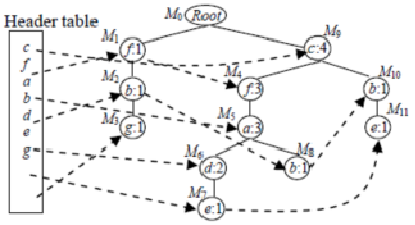


Figure 1. The Pi-Tree for Table 1

III DESIGN OF THE WORKFLOW:

In recent years, more and more approaches [1], [2] to keyword search over databases adopt the data graph to design the search algorithm. These methods model the database as a data graph , in which nodes correspond to tuples and edges correspond to primary-foreign-key relationships between the tuples. In most of those approaches, the problem of searching for results can be boiled down to finding the Steiner trees [1] that cover all or some of keywords, which is known to be NP-hard [3]. This paper also focuses on searching the Steiner trees based on a data graph to deal with keyword search over relational databases

IV METHODOLOGY

Create a dataset

Start working on dataset

Create a pattern for the data and divide the data with mean

kmeans(x, centers, iter.max = 10, nstart = 1,

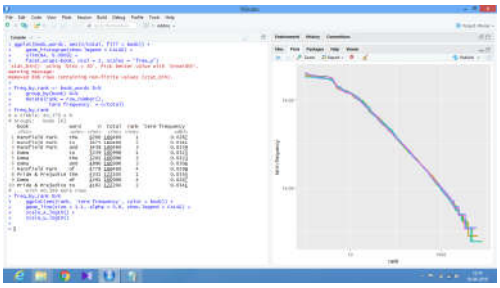
algorithm = c("Hartigan-Wong", "Lloyd", "Forgy", "MacQueen"), trace=FALSE)

S3 method for kmeans

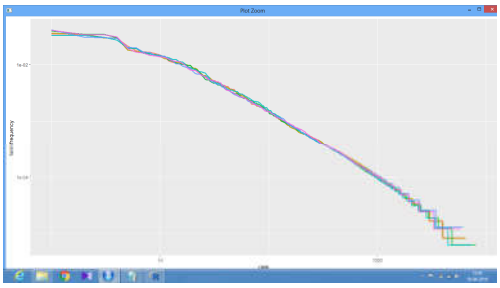
fitted(object, method = c("centers","classes"), ...)

V EXPERIMENT RESULTS

Data to console Pattern Matching Executing the MapReduce Partition Nth occur pattern Matching



Frequency Pattern- pattern Matching



word Frequency



Nth Keyword - Overall Nth keywords

VI CONCLUSION

Faced with very large databases, the existing methods to keyword search over relational databases with the centralized setting hardly can process the keyword queries effectively. To solve this problem, we propose DKS, a distributed data-graphbased approach to keyword search over relational databases with MapReduce. In this approach, we first partition the data graph into multiple subgraphs, and then employ a cluster of servers to search the CS-trees within each subgraph in the map operation. After combining the the CS-trees produced by mappers, the combined results will be processed by reducers in a parallel way to construct the Steiner trees. Finally, the top-k results can be found by merging Steiner trees sent by reducers.

VII FUTURE ENCHANCEMENT

In the further, we plan to study some more efficient pruning rules to beforehand cut down the CS-trees that cannot be connected into a Steiner tree in the reduce operation. Furthermore, we will continue to optimize the combine operation of DKS to reduce the cost of transmitting the CS-trees. At last, we will make the DKS approach be more general to distributed keyword search over various very large databases..

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SENTIMENT DISCOVERY IN TWITTER STREAMING DATA USING R-LANGUAGE

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Abstract -- In recent years, there has been a huge growth in the use of social networking sites. Currently, social networking sites produce a great deal of information. Millions of individuals convey their views and opinions on a broad range of subjects conveniently through micro blogging pages. In this job, Twitters, where the customer gives their opinions and opinions, is concentrated primarily on extracting feelings from a renowned micro blogging page. Take a feeling assessment of tweets that assist to predict company intelligence. For the handling of information we use R Programming and statistical language. This can be from any industry with the keywords associated to a hash tag #or@. It outcomes when we have attempted to analyze the outcomes in an implementation that continually alters the outcomes. The results of the facebook information feeling assessment will be shown as distinct parts with favorable, bad and neutral feelings.

1. INTRODUCTION

Analysis of the sensation is the method of determining the favorable, bad or neutral content of a reading item. In order to dine weighted tendencies within a phrase or phrase, the assessment structure for text investigations consolidates the distinctive language management of natural language processing (NLP), and artificial intelligence (AI) strategy.

Evaluation research enables informant researchers to verify overall results in comprehensive efforts, guide nuanced statistical surveys, product and product reputation, and to understand customer interactions. In addition, data testing organisations frequently integrate external sentiment investigations APIs with managers, internet networking or stages, so as to communicate useful data to their own customers.

The Internet era has altered the way people convey their views. It is currently performed via blog posts,

conversations about internet speeches, object audit locations, etc. Everything is dependent on this customer's drug. You will examines your polls internet before you take a decision when someone has to buy an object. For a typical customer, measuring the content created by the customer is unreasonably extensive. Various processes to investigate the assumptions are used to robotize this. The two main technologies used in angle inquiry are representative techniques or knowledge foundation approach and machine training processes. A vast database of pre-defined emotions and a competent data picture are needed for learning methodology to distinguish estimates. AI strategy uses an strategy that prepares a classifier of view to arrange ideas. Since the AI strategy does not require a predefined repository of whole emotions, it is preferably less complicated than the basic analysis of knowledge. Different techniques for organizing tweets were used in the current job. Typically, assumption testing is conducted in different sizes from crude to fine.

Comments, polls and important tasks to determine whether a specified population is satisfied with the object, administrations. It helps to anticipate the conclusion of a broad range of people on a particular time, such as the examination of a film, and their evaluation on various subjects which mingle with each other. This data is essential for the inquiry of the evaluation. In order to reach the overall outcome, information retrieval from outlets such as Twitter, Facebook are essential. Blogs. For the supposed inquiry, a tiny blogging interpersonal communication location, Twitter, was focused. Twitter produces enormous information which can not be physically processed to extract some precious data and the programmed characterisation components are therefore necessary.

The progress of Web2.0 and the electronics company has led to a significant quantity increase for the percentage of internet feedback. People should generate surveys of a few components of the stuff with certain critical tendencies and some of them pessimistic. These remarks are business-friendly for suppliers and customers. By the way, the wide range of match plans that are hard to track usually client assumptions. The test by Airtel Tweet utilizes Airtel hash marks on all tweets, and utilizes the twitterR library.

2. RELATED WORK

Titled: Big Data Analysis of Diffusion Information and Control in the Online Social Networks:

authors: 2017 **Method:** analysis and influence of the distribution of data: Kai Zhang, Jingjing Wang, Chunxiao Jiang, Zhongxiang Wei and Yong Ren

Publishing Year: The topological function of cultural forces has been analyzed specifically.

Disadvantage: The assessment of information was not entirely proven, focusing primarily on the system of data storage**.**

Advantage:

Defined Critical Information Capacity (CCP) and Heat Critical Information Point (HCP) to the model data dissemination. These critical results are verified and analyzed on the basis of the two real-world datasets.

Title: Information Diffusion in Online Social Networks: A Survey:

Authors: Adrien Guille, Hakim Hacid , Cécile Favre, Djamel A. Zighed

Publishing Year: 2013

Method: Problem statement Comprehensive evaluation of current attempts in social network data dissemination. To recognize projects already under way and to improve them.

Disadvantage:

The designs are not implemented.

Advantage:

Proposed a taxonomy that resumes state-of - the-art using distinct approaches (combining data dissemination with opinion identification) such as description and predictive techniques.

Title: Language-independent data set annotation for machine learning-based sentiment analysis:

Authors: P. B. Jensen, L. J. Jensen, and S. Brunak

Publishing Year: 2014

Method: Approach to generate basic feelings for a Twitter-based data set, Sensitive Sensitivity Analysis to gain insight into many aspects of life.

Disadvantage:

Multi - Language words neglected.

Advantage:

Feeling emoji lexicon and the recognized polarity of identity marks spread to neighbours in a chart. Overseen teaching to assess the correctness of feeling standards allocated to a corpus of tweets by our methods.

Title: Retrieving YouTube video by sentiment analysis on user comment.:

Authors: Hanif Bhuiyan; Jinat Ara; Rajon Bardhan; Md. Reschedule Islam

Publishing Year: 2017

Method:

Returning YouTube video through user review feeling assessment.

Disadvantage:

Fundamental information assessment with NLP is accomplished, no choice system or filtration system is implemented.

Advantage:

NLP focused sentimental assessment strategy on customer remarks. natural language processing (NLP). This assessment helps to discover YouTube's most significant and famous google clip.

By collecting tweets using Twitter API, they produced a Twitter inventory and commented on those tweets that use emojis. Using this corpus, a horizontal classifier was created, based on the multinominal Naive Bayes technology that uses features such as ngram and POS labels. The array they used was less efficient because it only includes tweets with emojis. The Naive Bayes bigram system and the Major Entropy model for tweetening have already been updated by Parikh and Movassate (2009) [2]. They discovered that the classification systems of Naive Bayes were far inferior to the Maximum Entropy system.

Go and L.Huang (2009)[3] suggested a response to the hypothesis test of email data through remote monitoring, which included emoji-filled tweets with noisy titles. They produce Naive Bay, MaxEnt and Support Vector Machines (SVM) designs. Its room element consists of unigrams, bigrams and POS. They argued that SVM was successful in various designs and that unigrams became more feasible as hints. The two phase programmed investigative evaluation strategy to purchase tweets was organized by Barbosa et al.(2010)[4]. They organised tweets as goal or concrete, after which they were called good or bad in the second phase. Retweets, Hash Tags, link, accentuation and outcry cards, such as the previous end of phrases or POS, were used for the element room. Twitter gushing data provided by Firehouse API was used by Befit and Frank(2010)[5], which provided all the customer emails that are constantly voluntarily available. They studied healthy multinomial bays, stubborn tendency, and the Hoeffding tree. They hit on the basis that the Stochastic Gradient Descent (SGD) system was the inferior to anything the remainder had been used when used with the appropriate teaching pace. Agarwal et al. (2011)[6] have developed a 3-way system to order beneficial, bad and impartial class assumptions. They attempted various stuff, such as the unigram model, a component model and a tree fragment model. They talked like a tree to tweets for a tree part model. The model includes 100 images and more than 10,000 parts are used by the uniconstruct model. They ended up with points that are of great importance and play a important part in the ordering process, joining previous phrases with their parts (pos-)labels. The model centered on the tree part defeated the two others.

Davidov et al., (2010)[7] suggested a method to cope to the use of tweet clients of Twitter described totems as an accentuation, single word, n-gram and sample sensation style structure as different kinds of components that are then combined as the final element vector. They used K-Nearest Neighbor methodology in the preparing and experiment range to assign points by creating a part vector for each model.

The Twitter API was used by Po-Wei Liang et.al.(2014)[6] to collect facebook. They have three distinctive classes (photo, motion-picture, mobile) for the preparing of their data. The data is indicated as favorable, bad and unassuming. Separated tweets comprising sensations. Unigram Naive Bayes model and the Naive Bayes assumption of liberty was performed. Additionally, the reciprocal information and chi square removal approach have provided us with inefficient hints.

Paul and. And. al.[7] showed Naive Bayes classification types for distinction of English tweets. In specific, Baseline (ready to label tweets as favorable, negative and impartial) and Binary (uses a language of extremity and commands as beneficial and bad) were produced two separate variants in Naive Bayes classification. The examples of the classificators were Lemmas (items, phrases, descriptors, verbs modifiers), Lexicons of polarity and multi-word from different perspectives and Valence Shifters. Turney et al.[1] used a sack of letters approach for an evaluation study, which did not take account of the links between phrases, and an archive was talked about simply as a collection of phrases. The concept for the whole study has been settled by assessing each term and adding these characteristics with certain complete capabilities.

Kemps et al[2] used WordNet's lexical database in multiple dimensions to determine a word's enthusiastic content. On WordNet, you built a separation metric and chose the semantical extremity of the descriptors. Xia et al.[3] used the sentiment classification collection scheme which was developed through the consolidation of various capacities and groupings. In their job they used two types of capacities (Part-of-Speech Data and Word Relationships) and three basic classification systems. They linked methods to collectivity like set mix, weighted mix and meta-classification for placing sensation and improved accuracy.

Luoet.-Luoet. Al.[14] had problems and efficient means of mining Twitter tweets ' feelings. Spam and furiously fluctuating vocabulary allows final retrieval within Twitter screening.

The word lexicon with feeling phrases is used in vocabulary[2] and is matched with data to determine the extreme. It gives an assessment of the sense statements that show how the word in the lexicon is positive, negative and objective. The wordings compiled rely mainly on methodologies relating to a sense of vocabulary, i.e., a collection of recognized and precompiled words, statements and even maxims, produced by the Opinion Finder dictionary for standard communication courses, for instance;

Word-based mention: it relies on the usage of physically collected and remarked conditions (plants). This collection is developed through the corresponding phrases and lexicon anthonyms. One example of the WordNet lexicon is used for the development of a SentiWordNet thesaurus.

Corpus-based: The corpus approach aims to give a specific region of lexicons. These lexicons are generated from a number of seed concluding concepts that are used to use descriptive and semanticized schemes by hunting for associated phrases.

The use of similar phrases, antonyms or links from thesaurus, for instance, based on semantic methods like WordNet, may also talk to an fascinating scheme.

According to the show projections such as the accuracy and review, we are examining current evaluation mining approaches including AI, vocabulary methods, cross-sectional and language methodologies, etc.

3. METHODOLOGY

The embedding techniques for studying feelings in this chapter. Describe the conventional neural network context-based techniques for term embedding teaching. Then enter our expansion to collect the polarity of sentiments in phrases before you present hybrid designs that encode data on both feeling and background basis. Then define term tier data inclusion for embedded teaching.

3.1 Notation

The significance of the factors used in this document have been noted. We are talking in specific about one phrase, the key of which I in a phrase is, these are background phrases of Wi, i.e. the embedding vector of Wi. In this job, the neural network methods were implemented with certain fundamental wireless levels, including search, hT, linear and smooth tmax. Olayer implies the input matrix for each cellular cell. These levels can be implemented at: www:/ir.hit.edu.cn / dytang.

The purpose of term depiction is to depict elements of the significance of the term. One easy way to use is the one-hot encoding of a term WI, whose vocabulary size is 1 in place and zeros elsewhere. However, such a warm term image codes only the index of phrases in a vocabulary, without the wealthy relationship framework of the lexicon. The use of word-clusters[2],[6] is a popular method to discovering resemblance between phrases. Each term is related to a discreet category and in some ways the phrases in the same category are comparable. This contributes to a warm image over a narrower vocabulary. The aim of numerous scientists to find a continuous and reliable vector for each term, also recognized as term embedding, is not to characterize similarities with an discrete variable depending on a clustering outcomes that corre-sponds with a smooth or harsh part of phrase range. In the existing embedding study algorithms, distributional hypotheses[3] are mainly focused on which terms have comparable significance in different situations. Many techniques of matrix factorization can be considered as term depictions. For instance, Late Semantic Indexing (LSI)[7] can be considered a direct embedding that utilizes a vector of "thermal text" stats, for instance, where each line is one word or phrase and each column is

a single text in a database. Hyperspace Analog to Language[2] uses a matrix of' term' s-statistics co-existing, in which both lines and columns match the term and the inputs indicate the amount of occasions that a term in the framework of anot/her phrase happens. Hellinger PCA[2] also investigates term embedding in coincidence statistics on "term-term." A rise of research research has brought about term embedding with cellular network with the reactivation of concern in profound teaching and cellular network[30],[1] and[2]. Bengio et al.[6] are giving a pioneering job in this area. They present a cellular probabilistic linguistic system, which at the same time teaches a constant phrase and term sequence description feature depending on the sentences displayed. Due to a phrase and its previous background phrases, the machine first links a mutual lookup chart to each background phrase for its constant matrix. Context term signals are then transmitted to a forward-looking wireless network with Softmax as an input element to forecast the next word's conditional probability. The neural network and the survey panel parameters are taught together with rear propagation. After the job of Bengio et al.[6], many ap-proaches are being suggested to accelerate instruction or capture greater semantic data. Bengio et al.[3] present sensory architectures by unifying background variables with the present term, and use selection of significance to optimize the system efficiently with the' favorable test' detected and "adverse specimens" selected. In order to decompose Morin and Bengio [4], hierarchy is developed

4. SENTIWORDNET:

The papers dealt with four distinct variants of SENTIWORDNET:

1. SENTIWORDNET 1.0 submitted and published for study reasons in (Esuli and Sebastiani 2006) ;

2. SENTIWORDNET 1.1, only discussed in a technical report (Esuli and Sebastian, 2007b) that never reached the publication stage;

3. SENTIWORDNET 2.0, Only addressed in the PhD Thesis of the second author (Esuli, 2008);,

4. SENTIWORDNET 3.0. The first presentation will be Since in commonly recognized official journals releases 1.1 and 2.0 have not been discussed, we will discuss the variations between variants 1.0 and 3.0. The principal distinctions are:

1. In variant 1.0 (including 1,1 and 2.0) the previous WORDNET 2.0 is annoted, and in variant 3.0 the latest WORDNET 3.0 is annoted.

2. The weak-supervised, semi-supervised teaching scheme for SENTIWORDNET 1.0 (and 1.1) adaptive annotation was held out. Conversely, the findings of this half monitored teaching algorithm for SEN-TIWORDNET (2.0 and 3.0) represent only the midway stage of the annotation method since they are supplied to an iterative and convergent random walking system. After convergence is

reached, the SENTIWORDNET (2.0 and) 3.0 is the random walk system function.

3. Version 1.0 (and 1.1) utilizes the WORDNET symbols glosses as visual depictions of the synsets when a semi-controlled method of classifying the (glosses) sunsets in classes Pos, Neg and Obj is mentioned. In variant 2.0, this is the initial phase; in the second step, not pure glosses but their automatically sensed ambiguous EXTENDEDWORDNET variants have been used in the random walk method stated previously (Harabagiu et al., 1999) In both SENTIWORDNET 3.0, we use individually disambiguated glosses from the Princeton WordNet Gloss Corpus 2 in the semi-supervised learning phase (1st phase) and random walking (2st phase), which we suppose to be more exact than the glow of EXTENDEDWORDNET.

Generating SENTIWORDNET 3.0

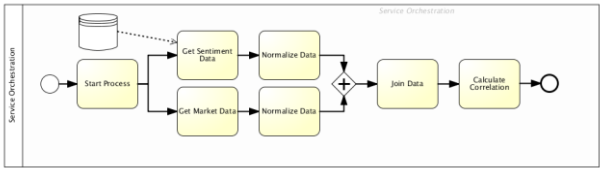
The instant annotation method under SENTIWORDNET 3.0 is hereby summarized in more depth. This is a two-step method: (1) a weak, semi-supervised, and random, teaching stage.

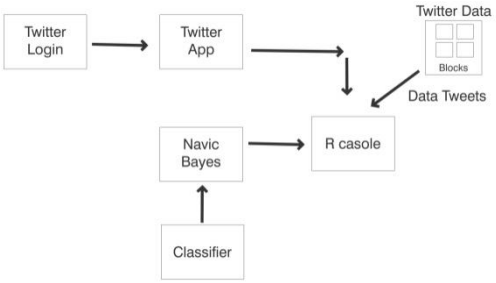
Rank	Positive	Negative
1	good#n#2 goodness#n#2	abject#a#2
2	better_off#a#1	deplorable#a#1 distressing#a#2 lamentable#a#1 pitiful#a#2 sad#a#3 sorry#a#2
3	divine#a#6 elysian#a#2 inspired#a#1	bad#a#10 unfit#a#3 unsound#a#5
4	good_enough#a#1	scrimy#a#1
5	solid#a#1	cheapjack#a#1 shoddy#a#1 tawdry#a#2
6	superb#a#2	unfortunate#a#3
7	good#a#3	inauspicious#a#1 unfortunate#a#2
8	goody-goody#a#1	unfortunate#a#1
9	amiable#a#1 good-humored#a#1 good-humoured#a#1	dispossessed#a#1 homeless#a#2 roof-less#a#2
10	gainly#a#1	hapless#a#1 miserable#a#2 misfortu-nate#a#1 pathetic#a#1 piteous#a#1 pitiable#a#2 pitiful#a#3 poor#a#1 wretched#a#5

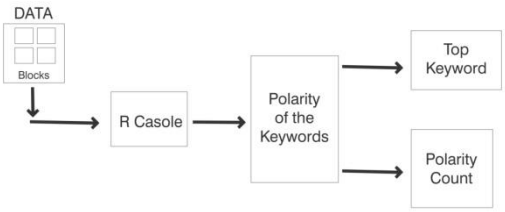
	Rankings	
	Positivity	Negativity
SENTIWORDNET 1.0	.349	.296
SENTIWORDNET 3.0	.281 (-19.48%)	.231 (-21.96%)

	Rankings	
	Positivity	Negativity
SENTIWORDNET 3.0-semi	.339	.286
SENTIWORDNET 3.0	.281 (-17.11%)	.231 (-19.23%)

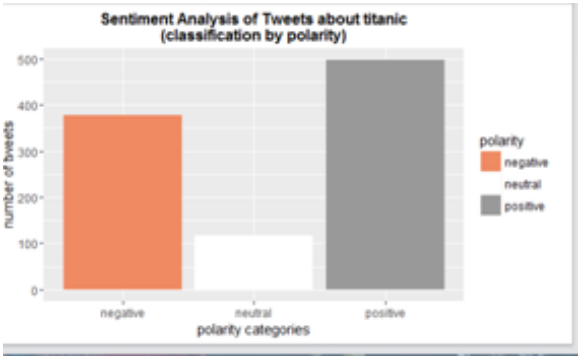
Design:







Results:



5. CONCLUSION

In this document we study feeling-specific term embedding (called feeling embedding). Unlike most exiting studies, which only encode language contexts in term embeddings, we make it easy to foster the ability to embed word in terms of feeling semántics when recording word similarity. In the sense-inbedroom the phrases can therefore be isolated with comparable backgrounds, but with the reverse feelings polarity-labels like "good" and "evil." In order to code background and feeling tier information efficiently, we bring several neural networks into phrase embedding concurrently in a single manner. Three sentiment analysis jobs empirically test the efficacy of feeling embedding. In the analyzes of feelings on a term stage, we demonstrate that feeling inlays are helpful in finding similarity between feeling phrases. Sensitivity embedding in the ranking of phrases helps to capture discriminatory characteristics to predict the feelings of phrases. For lexical tasks such as constructing a lexicon for feelings, embedding of feelings are helpful to measure similitudes between phrases. The finest artists on all three assignments are hybrid designs that collect both background and feeling data.

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Health Data Analysis over Machine Learning

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Abstract—***Due to huge information advance in biomedical and human services networks, exact investigation of restorative information benefits early malady acknowledgment, tolerant consideration and network administrations. At the point when the nature of therapeutic information is inadequate the precision of study is decreased. Besides, various areas show one of a kind appearances of certain territorial infections, which may brings about debilitating the forecast of illness episodes. In the proposed framework, it gives AI calculations to powerful forecast of different sickness events in illness visit social orders. It analyze the changed gauge models over genuine medical clinic information gathered. To beat the trouble of fragmented information, it utilize an inactive factor model to remake the missing information. It probe a local endless ailment of heart infections. Utilizing organized and unstructured information from medical clinic it use Machine Learning calculation. As far as we could possibly know in the territory of therapeutic huge information investigation none of the current work concentrated on the two information types. Contrasted with a few run of the mill gauge calculations, the figuring precision of our proposed calculation achieves 80% exactness with a union speed which is quicker than that of the irregular woodland malady chance expectation calculation.***

Keywords: Big data analytics, machine learning, healthcare.

I. INTRODUCTION

It is evaluated that over 70% of individuals in India are inclined to general body ailments like viral, flu, cough, cold and so forth, in like clockwork. Since numerous individuals don't understand that the general body maladies could be side effects to something progressively destructive, 25 % of the populace surrenders to death on account of overlooking the early broad body side effects. This could be a perilous circumstance for the populace and can be are disturbing. Thus distinguishing or anticipating the malady at the soonest is imperative to keep away from any undesirable losses. The presently accessible frameworks are the frameworks that are either devoted to a specific malady or are in research stage for calculations with regards to summed up sickness. The motivation behind this framework is to give forecast to the general and all the more regularly happening sickness that when unchecked can transform into lethal illness. The framework applies information mining methods and ID3 choice tree calculations. This framework will foresee the most conceivable malady dependent on the given side effects and careful steps required to evade the hostility of ailment, it will likewise enable the specialists to dissect the example of quality of infections in the general public. In this task, the infection expectation framework will complete information mining in its primer stages, the framework will be prepared utilizing AI and information mining.

II. RELATED WORK

With the development of enormous information examination gear, more dedication has been paid to infection desire from the view of huge information request, different investigates have been led by picking the highlights precisely from countless information to improve reality of threat arrangement as opposed to the previously chose physiognomies. In any case, those overall work for the most part estimated organized information. Along these lines, chance association dependent on enormous information investigation, the accompanying undertakings remain: How should the lost information be addressed? In what manner should the fundamental unending infections in a positive area and the primary essences of the malady in the district be abrasive? In what capacity can huge information investigation ability be utilized to gauge the sickness and create a superior strategy?

To tackle these issues, it see the organized and unstructured information in human services field to evaluate the danger of illness. To begin with, the framework use Decision tree map calculation to create the example and reasons for sickness. It obviously demonstrates the infections and sub sicknesses. Second, by utilizing Map Reduce calculation for apportioning the information to such an extent that a question will be dissected distinctly in a particular parcel, which will expand the operational proficiency yet decrease inquiry recovery time. Guide decreasing calculation is utilized for apportioning the therapeutic information dependent on the yield of Decision Tree map calculation. Contrasted with a few run of the mill expectation calculations, the forecast exactness of our proposed calculation increments.

The creators of this venture, Narender Kumar and Sabita Khatri [1], have looked into and made examinations of various calculations, for example, k-NN, Naïve Bayes, Random Forest, J48, utilizing execution estimates like ROC, kappa insights, RMSE and MAE in WEKA instruments, and furthermore thought about the classifiers on different precision measures. The end came to of this examination was that Random Forest has better exactness for constant kidney dataset that was utilized. In this venture the creators, Monika Gandhi and Dr. Shailendra Singh [2], have investigated various information mining calculations like Naïve Bayes, Neural system and choice tree calculations for their precision on forecast of Heart Disease. The creators Marija Sultana, Afrin Haider and Md.Shorif Uddin [3], have broke down calculations, for example, K-star, J48, SMO, Bayes Net and Multilayer Perceptron Network utilizing WEKA instruments for coronary illness expectation dataset. The presentation of these datamining strategies in obtained by mix of consequences of measures, for example, prescient precision, ROC bend and AUC esteem. The outcome acquired is the SMO and Bayes system show more ideal outcome than their other referenced partners. In this task, the creators Girija D.K, Dr. M.S. Shashidhara and M.Giri [4], utilize neural systems to make forecasts with respect to nearness of uterine fibroid ailment. The test results demonstrate an exactness of 98% utilizing the Multilayer perceptron neural system and information mining. This undertaking centers around the most widely recognized type of disease present in ladies for example Bosom Cancer and its repeat. The creators Uma Ojha and Dr. Savita Goel, in this venture have inquired about on numerous information mining calculations in both order and grouping types. They achieved a watched end that, C5.0 and Fuzzy C-implies give most astounding and least exactness among all the utilized calculations, individually. While C5.0 is most astounding with 81% exactness on the given information, Fuzzy C-implies is least with 37% precision. The other summed up end came to is that Classification calculations give better exactness over Clustering calculations [5]. Information mining has been utilized to reveal designs from the huge measure of put away data and hence used to manufacture prescient models. Restorative field contains enormous measure of information that are should have been handled. Information mining in restorative field improves the nature of patient consideration and the forecast of medicinal services designs. Information mining apparatuses encourages us to find obscure examples, bunch the related things and basic leadership of social insurance arranged issues. Restorative consideration is need; it gives patient and trust in a productive life. The gathered information when distributed is utilized for social causes without hurting the poise of the patients. Early location of illness can build the survivability of patients[1]. Information mining procedures, for example, order and expectation, grouping, affiliation principle mining and different mining strategies can be helpful to apply on restorative information. The gathered information as pictures can likewise be utilized to mine human services information. These days, many picture mining procedures improved the ailment forecast and medicinal services basic leadership task as most effortless. This paper introduces the use of information mining calculations in field of medication.

III. METHODOLOGY

Heart disease is an umbrella term for a confusion that influences the heart. Coronary illness implies equivalent to heart malady yet not cardiovascular infection. Cardiovascular infection alludes to clutters of the veins and heart, while coronary illness alludes to simply the heart. According to WHO (World Health Organization) and the CDC, coronary illness is the main source of death in the UK, USA, Canada and Australia [4]. The affiliation's 2015 Heart sickness and Stroke update aggregated by the American Heart Association, the Centers for Disease Control and Prevention, the National Institutes of Health and other government sources shows that Cardiovascular ailment is the main worldwide reason for death, representing 17.3 million passings for each year, a number that is required to develop to more than 23.6 million by 2030. From 2001 to 2011, the demise rate from coronary illness has fallen around 39 % – however the weight and hazard components remain alarmingly high. The hazard variables of coronary illness are smoking, overweight, cholesterol, hypertension, diabetes, unfortunate eating regimen and physical activity[5]. T. Revathi and S. Jeevitha [6] investigated the information mining calculations on forecast of coronary illness. The clinical information identified with coronary illness is utilized for investigation. The consequences of Neural Network, Naïve Bayes, and Decision Tree calculations are thought about, Neural Network accomplished great exactness. Devendra Ratnaparkhi, Tushar Mahajan and Vishal Jadhav [7] proposed a coronary illness forecast framework utilizing Naïve Bayes and contrasted the outcomes and Neural Network and Decision Tree calculations. As indicated by that technique, Naïve Bayes calculation gives great expectation.

IV. DATA TRANSFORMATION

In this progression, the dataset is investigated and fundamental information is chosen and the dataset is changed over into machine justifiable structure. Highlight Extraction - Feature extraction is the procedure to diminish the size of information in order to just take instructive, non-repetitive and significant information, in order to encourage resulting learning and speculation venture to procure better human elucidation. The ID3 calculation is utilized in this venture, for preparing of the illness forecast model. At the point when the calculation is connected, it produces a standard set dependent on the watched example of information. Based on this standard set, the framework preparing is done and the model is made.

A. Usage

Information Description: Factual Observation: Based on the informational collections, a measurable methodology is confined from the information. (Straight Regression). Preparing Dataset: From every one of the outcomes, we apply the irregular backwoods calculation in discovering all the conceivable choice trees and foresee the outcomes.

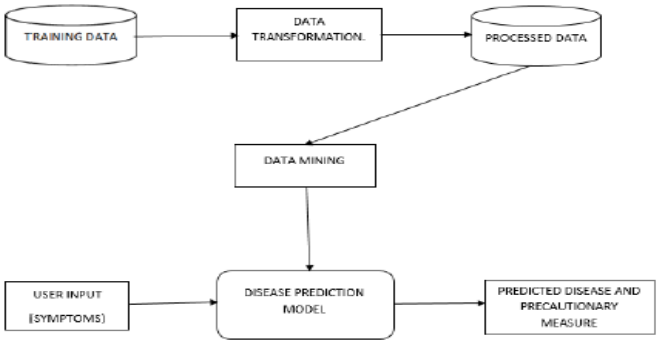

Fig.1 Data Transformation

B. Algorithm Steps

Linear Regression

1) Load the data to console
2) Check for any missing values
   If any missing values:
      Replace them with #999
      then step 1
   else:
   continue
3) Sort the combination columns
4) Correlation over the columns
5) Test the data

Logistic Regression:

6) Train the data on minimum dataset
7) Check the results
8) Apply on the complete dataset
9) Generate the results from the model.

Algorithms for Logistic regression and random forest:

Step 1: Train the data on minimum dataset.
Step 2: Check the results.
Step 3: Apply on the complete dataset.
Step 4: Generate the results from the model.

C. Reports: Form the above outcomes produce the reports as far as conduct of the information.

V. RESULTS AND DISCUSSIONS

The implementation is executed with the example information accessible from a nearby site. The information is first sorted and after that the centre parameters are been recognized from the dataset. The measurable examination of the information is executed. When the parameters are recognizable later we have actualized with strategic relapse model for the forecast of the heart sicknesses and contrasted our model and the Random timberland model for the precision computation. In this procedure the information is been ordered into testing information and preparing information and discovered the outcomes to be precise and discovered that the strategic model gave better outcomes thought about irregular woodland. The barplot depicts most affected sex for the given dataset. As appeared in the above barplot generally male is affecting the illness. Speaking to the precision barplot for preparing and testing dataset as appeared in the above figure, it depicts about the expectation exactness for preparing and testing datasets .It speaks to the expectation exactness for the dataset with various calculations which are performed at different interims of the dataset with preparing and testing information.

VI. CONCLUSIONS

A random forest model based multimodal ailment chance forecast calculation utilizing organized information from clinic. As far as we could possibly know, none of the current work concentrated on the two information types in the zone of medicinal enormous information examination. Examining the sickness elements dependent on the social insurance information. Missing qualities issue can be settled utilizing AI calculations. Malady forecast should be possible

dependent on kind of the sickness and sort of infection, locale and hazard dimension of the patient's ailment by the accessibility of the information.

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Analysis of Efficient Active Learning-based SVM approach for Unlabeled Data

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Abstract— ***Over the last century, keywords in relation documents have been thoroughly investigated as they promise that customers with a query-related application system absence organized language knowledge to consult data laid down for a approach will be understood. Current research of keyword searches for information collections has a number of distinct methods and significant advances. However, the majority of latest methods are distributed, where a keyword query by only one server has been utilized and handled. Additionally, it takes a lot of time to process keyword query in relation databases. In order to tackle the type of questions and problems, we suggest that Disparted Keyword Search (DKS) for any group of information servers is an R programming strategy that allows finding keywords easier to implement over big databases.***

Keywords— Classification, Clustering, Active Learning, Support Vector Machines

I. INTRODUCTION

The capacity of a computer to understand by itself is learning tools. With no human interface the device can accomplish tasks. Machine Learning is artificial intelligence software which automatically allows the user to benefit from clearly programmed knowledge and enhance it. ML relies on computer programs for teaching information access and use. In complicated supervised learning tasks [1], the instance is rare and expensive to achieve. Where it takes time and energy to obtain Zhu's real world labels, as is the case with language recognition, [2] indicating that it takes 10 times longer to get words than the duration of the address.

The most commonly-used computer training technique is regression with a wide range of apps, including sensation analysis, spam identification, danger evaluation and picture classification. Classification is the information category prediction method. Classes are referred to as objectives or classifications or marks. It is a predictive system that is used in order to approximate and map (f) from data entry (X) to separate factors in production (Y). Classification is part of the controlled teaching class where information were also included in the objectives.

K-means is among the most easiest and most common methods for clustering. The technique is called machine learning algorithms in uncontrolled techniques with k-means. Uncontrolled [3] models produce data collections that generally only use entry coordinates without knowing norlabel results. The main objective of the algorithm k-means is to find and examine models from a collection of the same information items. K-means testing for a certain amount (k) of nodes in a dataset to achieve this purpose. A group relates to the set of the aggregated information items because of certain differences.Decide the destination range k for the amount of centers the dataset needs. The nucleus of the fictional group is a centroid.

The designs used to enhance teaching efficiency by use of unstated cases are active learning [4] and semi-supervised learning [5]. Active training is also known as query learning [6], which allows the software to select "interesting" cases and then works faster. Synthesis methods [7], steam-based limited sampling of affiliation queries.

One of the least challenging and uncontrolled methods is clustering of k-means. Unmonitored calculations produce data sets inductions that only use data vectors without understanding or specifying the outcomes. To achieve an object, K- involves looking for an organizational fixed number (k) of a dataset. The K-includes calculation describing in distinct phrases the number of centroids to the nearest unit, while keeping the centroids fairly expected. The K-includes calculations.Using the self-learning method in the semicircular concept of teaching. For example: first use Some of the instances that have been labeled and select the most confident instances to enter a teaching concept.

II. RELATED WORKS

A. K-means based on Active Learning for Support Vector Machine

Unlabeled information is collected easily and cheaply from the destination, but it is quite difficult and costly to obtain a large number of labeled information. Therefore, for many real-world applications, the way marked and unlisted data are used to improve educational effectiveness. Active learning and semi-monitored learning and intensive research from different perspectives are the right approaches. The first says that the learner can control the entire data set simultaneously and constantly check the tags.

They used the helpful learning strategy of SVM (KA-SVM) in this document. K-means were used to build a pre-selection system centered on an hypothesis of the classes which would provide a subset of major teaching courses. SVM can then be taught on this portion instead of a whole sub-set optimally. The results demonstrate the excellent efficiency of this approach, these techniques and laboratory results.

B. A Sequential Algorithm for Training Text Classifiers

For the content analysis and information recovery, natural language processing, and for other activity containing partly or fully linear data, the ability to practice classifying texts cheaply is essential. A linear sample algorithm has been created and evaluated on a venture that categorizes content from wire media during the teaching of statistical classifiers.

III. ALGORITHM

A. K-means

One of the easiest and most commonly used systems could be clustered via k-means between any unattended training algorithm. In summary, k-means clustering tries to determine that every information location is assigned to the nearest center and to minimize the total gaps between such tasks.

Step 1: Initialization of the cluster core.

Step 2: Assign findings to the closest node centres.

Step 3: Cluster centres should be examined as an median of findings.

Step 4: Repeat steps 2 and 3 until they become convergent.

Steps on K-means

The algorithm K-means becomes an optimal local. The results of k-means are therefore not strictly the greatest. It is essential to initiate the core to detect the value of the alternative. There is a better K-means initialization technique, providing a more secure clustering alternative. The customer has to select a top of moment for the amount of nodes.

B. Support Vector Machine

The boundary with the closest observer is known as the optimal hyper-plane. It guarantees that the design is suitable and robust. Use the previous formula to locate the optimal hyper aircraft.

a.x+b=0.

A.x+b=0.

where, a.x= sum of a andx scalar.

The two previous criteria must be met in this equation.

• The A and B categories must be very good so that the f(x) = a.x+b function is poor only if x is A.

• F(x) < = 0 if only B is x.

It is feasible (robustness of the model) from every observation. Hyperflight therefore relies on the sources of support known as the closest points. With reduced support points, the SVM generalization capacity is increasing.

IV. DESIGN OF WORK FLOW

Figure 1 shows the method of analysis by classifying data into data provision and data preparation. First, the data is collected and then a linear regression system is used for information and the row combination is discovered. For example: If we need students in schools who earn more than 70 per cent of points in the last semester. The pupil numbers are three hundred.

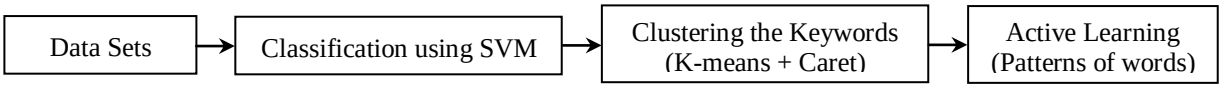

Fig. 1 Architecture for Searching the Word

A. Dataset:

Dataset is a mixture of the corresponding information products, which can be viewed or handled as a whole or separately or together.

B. Data Classification:

The most effective and efficient method of information categorization is information classification. We have used information classification techniques to divide them into 2 components. Security requirements after the classification scheme for each class has been created. The information are split into two phases.

C. Support Vector Machine:

An SVM is a classifying classification that is officially described by a separate hyperplane. The algorithm provides an ideal hyperplane that categorizes fresh instances thanks to labeled training data. The AnSVM model shows instances of the classifications separated by a certain cluster as broad as feasible. The first stage rejects most of the unwanted data, since it is completely underneath.

D. Clustering the keywords:

Data is more than 50 times in the second phase. It could have used and outdated information in these information. Thus the second phase K-means applicable. More than 70% of students can be calculated easily.

Iterate trough products for a certain amount of iterations:

i. Find the closest way to the item.

ii. Specify the mean object. Medium = 70 attribute

iii. Mean update.

iv. Repeat phase 3.

Repeat the method for a few iterations and we have our nodes.

E. Caret

Training in classification and regression is a series of features that aim to simplify the predictive model creation method. Now more than 70% of students have the information. These learners can finally relocate to the university.

V. EXPERIMENTAL RESULTS

Here, the "word cloud" library stores all the related which user wants by using "janeastenr" library. Figure 2 is showing that all the related words for a search word "miss." All these words are built in the library called "word cloud."

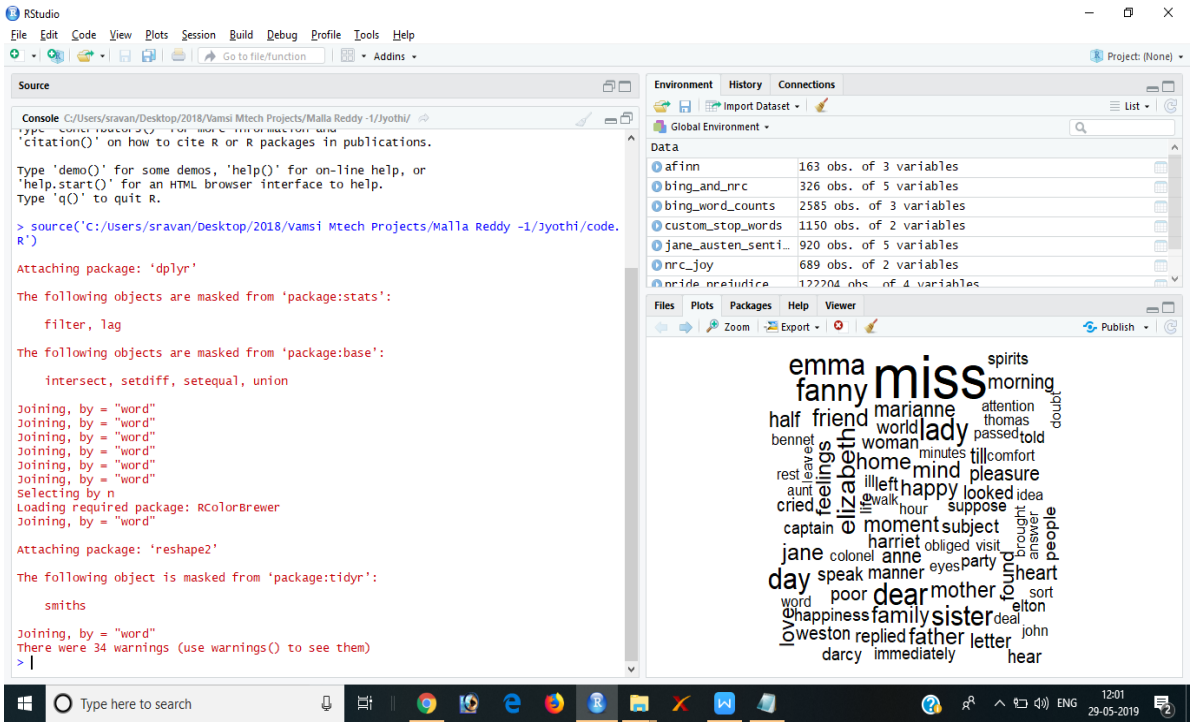

Fig. 2 Showing related words to miss

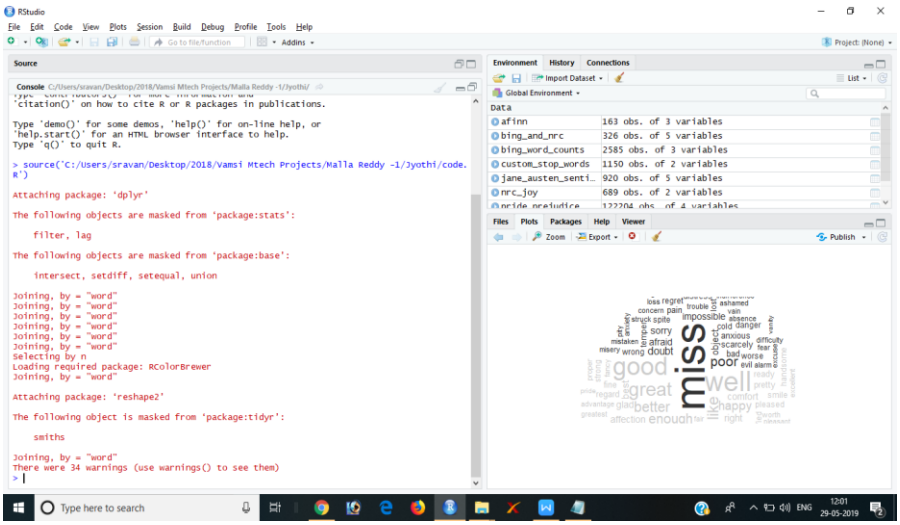

Fig. 3 Differentiating the word “miss”

Figure 3 is showing the results after applying k-means and SVM algorithms. First, it classified the data by using “tidytext” and “tidyr” libraries. And then, unstructured data has found. So, it applied “janeastenr” library. The janeastenr library is having an unstructured data which is used for analyzing. At last, we get the results for searching the word “miss” in black color. The eliminated or duplicate words are in another color.

VI. CONCLUSIONS

The K-means and SVM algorithms have been used. The k-mean model is centered around the theory of a group where SVM is a ranking method. K-means were also used for the construction of classifications on the basis of an active vector mapping training (KA-SVM). The customer wishes to send an e-mail container.

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A Scalable Framework for Stylometric Analysis on a Speech Data

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Abstract— ***Stylometry is a region of research where the examination can be connected on the client discourse investigation, recognizing the conduct of the speaker. Stylometric additionally incorporates the investigation of the creator distinguishing proof dependent on the vocabulary correlation from creator to creator. Here we present 'Stylometry with R' (stylo), a flexible R bundle for the abnormal state complex investigation of content accumulations. This bundle unequivocally looks to further add to the ongoing improvement in the field towards a further developed degree of replicability and benchmarking in the field. We speak to the writings as high dimensional vectors and we envision the similitudes between them utilizing multidimensional scaling. We presume that the length of writings is a factor that influences the oppressive limit of the stylometric factors. We additionally discovered that there are sure factors that are superior to others to distinguish explicit creators and explicit content types.***

Keywords— Stylometry, Data Analysis, Speech, Behavior Analysis.

I. INTRODUCTION

Stylometry is the investigation of etymological style, this implies taking a gander at examples in language to diagram standards or qualities of the subject of study. Stylometry is frequently used to decide origin to unknown compositions, yet the standards of Stylometry can likewise be utilized in different regions, for example, the investigation of music. Stylometrists look for a reasonable quantifiable quality that can be utilized to make authoritative determinations about a creator. It is conceivable, notwithstanding, that such a component does not exist. Notwithstanding, as the inquiry advances, analysts discover factual properties and create devices that, when utilized related to one another, enable solid ends to be attracted origin questions.The nuts and bolts of stylometry were built up by the Polish savant Wincenty Lutoslawski in 1890. Previously, this control was exceptionally restricted on the grounds that people needed to physically play out the majority of the information examination on the writings they were considering. With the approach of PCs, be that as it may, specialists are liberated from information examination jobs to concentrate on the hypothesis fundamental the information connections. Stylometry picked up fame from renaissance dramatization creation questions. This enthusiasm for deciding creation in renaissance works set up stylometry's believability in the territory of origin attributions. A basic idea in any case in stylometry is the possibility of the author invariant. This is a composition trademark that has a place with a particular creator. The thought is that, the writer of an archive has highlights of his or her composition which are reliable over all reports composed and that all writers have their own interesting invariants. Subsequently, recognizable proof of this credit can figure out who composed an archive. It is concurred that these sorts of qualities do exist between creators, yet inconvenience exists in recognizing which parts of the content ought to or ought not to add to this invariant. There are three unique classifications which general stylometry can be broken into. These are: origin attribution, portrayal, and check. Origin attribution is deciding the right creator out of a little gathering of creators. Origin Characterization includes deciding the physical characteristics of an author such as age, gender, or race. Authorship verification is determined if a document was written by a specific individual. The differences between verification and attribution are much nuanced. If the reader wishes to learn more about the differences, the paper Authorship verification for short messages using Stylometry (Computer, Information and Telecommunication Systems (CITS), 2013 International Conference on. IEEE, 2013.) by Brocardo is a good start. Most research in stylometry falls into the category of attribution, with verification being the least developed, having been studied almost exclusively in the context of plagiarism.

Stylometric tests are generally targeted at long documents being unreliable on short documents. A long document is a fairly general term often dependent upon the study. Short documents are more easily described as documents one or two paragraphs in length. The ability of Stylometry to analyse these short documents is a

developing interest area. Stylometry's success on works such as novels and plays has raised interest in its merits in modern contexts where online document length is much shorter. Examples of the focus of modern stylometry are email or forum posts. These document sources provide additional challenges beyond their length because they are often poorly structured or written. This is an important area of development because reliable stylometric tools for short online documents can be useful in criminal cases giving law implementation more devices to arraign hoodlums. These new applications for stylometry have raised protection worries that keep on being examined. In the event that the peruser is keen on getting familiar with the security worries around Stylometry.

II. RELATED WORKS

R contents can be depended on for doing the entire work themselves, from controlling writings (ordinarily, to create word records) right to charting the outcomes (and that in an extraordinary assortment).

These abilities were put to use in the investigation of Delta's reliance on concentrated writings' sizes (Eder 2010), and on the conduct of Delta at an assortment of interims in the word recurrence rank records in an assortment of dialects (Rybicki and Eder 2011). The R condition allowed us to cover immense measurements at exceptional rates (regularly a great many Delta emphases every hour in corpora of a hundred full-estimate books). It likewise allowed us to utilize other factual strategies, for example, PCA, CA or MDS, or those once in a while utilized so far in this field –, for example, bootstrap accord trees dependent on an investigation of Papuan dialects by Dunn et al. (2005, cited in Baayen 2008: 143-47). Likewise, the whole investigation – from stacking writings to conclusive outcomes in numeric and realistic structure – can be practiced with a solitary content. Our Delta content, for instance, did fundamentally everything: it took care of electronic works to make a summary of the extensive number of words used in all compositions pondered, with their frequencies in the individual compositions; institutionalized the frequencies with z-scores (if proper); picked words from communicated repeat ranges for examination; played out additional frameworks that (regularly) improve attribution, for instance, Hoover's customized dropping of individual pronouns and isolating (modified removal of words absurdly trademark for individual works); took a gander at the results for individual works; played out an arrangement of multivariate examinations; showed the comparable qualities/detachments gained in tree graphs; finally, made the recently referenced accord tree – another chart that joined many tree diagrams for a collection of parameter regards. It was our plan to build up a general stage for multi-emphasis attribution tests; for example, substitute content created heat maps to demonstrate the level of Delta's accomplishment in attribution at different interims of the word recurrence positioning rundown. Stylometry: Recognizing creators of writings utilizing R: Barely any individuals anticipate that government officials should compose each word they express themselves; dependence on speech specialists and talked people is a since a long time ago settled political practice. All things considered, it's intriguing to know which articulations are really the government official's own words, and which are driven basically by counsels or influencers. By taking a gander at the parts of semantic style (word/sentence length, recurrence of word pairings, utilization of accentuation, and so on.) of the talks we can able to find out the behaviour of the person.

A Stylometric Approach to Identity-Level Identification and Behaviour Detection. Lexical features describes the semantics of the words used by the author. Vocabulary richness and word-length distributions are classic examples. Syntactic features: Such kind of features rely on an analysis of typical sentence structure considering elements like function words, punctuation, and part-of-speech tags. Structural features: Structural feature targets the actual composition of the text discussing its organization and layout. Due to the short extracts without any further information, this seems not applicable here. Content-specific features: This type of features based on an analysis of essential keywords and phrases on specific topics like in scientific publication. Like the feature set before not applicable in our context.

III. PROPOSED WORK

Stylometry or the investigation of quantifiable alternatives of (artistic) vogue, similar to sentence length, vocabulary extravagance and various frequencies (of words, word lengths, word shapes, and so on) has been around at least since the focal point of nineteenth century, and has discovered arranged reasonable applications in origin attribution examination.

The examination in most recent couple of decades on use of language factual investigation is developing in a quick manner. Present day stylometry pulls in vigorously on the assistance of PCs for measurable examination just as the computerized reasoning and furthermore giving access to the developing corpus of content archives open through the Internet. Our primary objective is to exhibit and break down the discourse by the despot's vocabulary and after that investigating the information so as to extend the factual examples. Stylometry to distinguish if moves in elaborate examples are seen crosswise over different talks, utilizing computational instruments. The pivotal examination with stylometry is this: There exist propensities for every individual, framed unwittingly, concerning words and Language use. These decide the despot's structure, decent variety, and word decision in every individual's works, shaping a Stylistic mark.

Stylometry became out of before procedures of examining writings for proof of credibility, authorial character and builds the vocabulary wealth. Applying the stylometry to the discourses of the speakers in examining the discourse conveyed to the group of spectators. To assess the productivity in examining the discourses, we contrast and required strategies. Breaking down the discourse content by means of huge archives. These huge scale reports help us to find out about the speaker from his discourse or the vocabulary utilized and the method for his methodology over the discourse conveyances. To exhibit and break down the conduct of the despot. Research dependent on the examination of writings may assist the researchers with gaining full control of the conduct of the person. The term stylometry draws the conduct of the client from every one of the addresses conveyed by the speaker. The proposed framework gives the factual items from the speaker information, for example, positive negative and enthusiastic terms. The conduct of the individual speaker could be investigated from the feelings dependent on the specific discourse information. Utilizations of the customary articulation make the data characterization a great deal well disposed and bring progressively proficient outcomes. Utilizations NLP Algorithms can be executed on any sort of information.

IV. IMPLEMENTATION

Stylometric investigation errands can be sorted out into two kinds, creation distinguishing proof and composing style closeness identification. Each assignment is comprise of two stages (i) finding proper stylometric highlights (ii) framing productive ways to deal with apply on these highlights. The target of creation recognizable proof errand is to analyze question writings against the composition tests of the hopeful writers. An outstanding case of creation distinguishing proof is the Federalist papers in which 12 debated/unknown expositions were looked at against composing tests of Alexander Hamilton and James Madison. Since, all hopeful creators (conceivable classes) are known an earlier, the initiation recognizable proof errand can utilize regulated or unsupervised order procedures. Stylometric highlights are composing style-markers or traits that are compelling discriminators of creation. A huge range of stylometric highlights have been proposed so far including lexical, syntactic and basic. Lexical highlights are character based and word-based factual proportions of lexical varieties. These incorporate word and character lengths, sentence lengths. Syntactic highlights incorporate capacity words, grammatical feature label n-grams. Auxiliary highlights incorporate the style-markers identified with the format and association of content. For instance, number of words in sentence and number of words in passage. Existing examinations utilized the equivalent size of the content to look at for origin recognizable proof. This is a test in genuine datasets. This is on the grounds that, a database of understudy assignments may contain records with various lengths composed by a wide range of understudies. In this examination we use creator bunch level stylometric highlights to make our framework altogether quicker than existing procedures with sensible precision. In this work, we utilize 56 stylometric highlights which are ordered into three kinds: lexical, syntactic and auxiliary. The lexical highlights can be further subcategories into 14 character-based and 13 word-based highlights. We utilize 27 syntactic highlights, which incorporate capacity words, grammatical form. There are 2 auxiliary highlights, the quantity of words in sentence and the quantity of words in passage.

Behavior analysis is a characteristic science that tries to comprehend the conduct of people. That is, conduct investigators think about how natural, pharmacological, and experiential variables impact the conduct of people and nonhuman creatures. Perceiving that conduct is something that people do, conduct experts place uncommon accentuation on contemplating factors that dependably impact the conduct of people, an accentuation that functions admirably when the objective is to secure versatile conduct or improve issue conduct. The study of conduct examination has made disclosures that have demonstrated valuable in tending to socially significant conduct, for example, speaking, medicate taking, good dieting, work environment wellbeing, instruction, and the treatment of unavoidable formative handicaps (e.g., mental imbalance).

This field of science is worried about portraying, understanding, foreseeing, and evolving conduct. They look for answers by taking a gander at the organic and ecological components, in spite of the fact that they are principally inspired by the job of condition in conduct change. There are three principle branches to the field: Conceptual Behavior Analysis, Experimental Behavior Analysis, and Applied Behavior Analysis. The Conceptual branch centres around the philosophical, hypothetical, chronicled, and methodological issues that underlie the field. Trial Behavior Analysis includes essential research expected to add to the assemblage of information about marvels that control and impact conduct. Connected Behaviour Analysis is centred on the utilization of the standards of conduct to the requirements of people to advance conduct change and improve personal satisfaction. The engineering portrays the idea of examining the discourse reports from the essential advances. The principal way is we gather the reports, separate the words, apply the extremity feeling to keep an eye on the words, and after that at long last produce the conduct out from the information.

A. Identify Parameters:

At First the information is taken into the R support. At that point the information is shown with the view strategy in the R language. The size of the information might be 1 Gb or 1Tb. Ideally the unstructured information is taken. In this module we use KNN calculation for characterizing the watchwords with assistance

of normal articulations. The customary articulations encourage to expel the pointless information, for example, stop words or blaw words. Presently the stemming is finished once and the KNN is connected subsequently to remove the spaces between the words, to make one report. The Term-Document Matrix is utilized to outline the arranged words into the report and this is the place we apply the stemming for the words.

B. Stemming

Stemming is a system of lessening words. To the specific content record we apply stemming procedure to evacuate the spaces, punctualities, stop words. At that point the archive with the positive and negative terms is acquired. After this procedure a proper report is shaped.

C. Steps for KNN Algorithm:

Step 1: Determine the parameters K=numbe of nearest neighbours. k = how many keywords – one, two, three words.

Step 2: Calculate the number of keywords between the query-instance and the data.

Step 3: Sort all the keywords and determine the count of the keywords.

Step 4: Gather all the categories of the keywords.

Step 5: Use simple majority of the category of keywords as the prediction value of the query instance.

D. Classify Keywords

In view of the consequences of the watchwords from the principal module, and after that apply the bayes calculation according to the necessity. The catchphrases got subsequent to applying KNN is named as preparing informational collection. Gather all the catchphrases to a variable. Apply the bayes calculation and sort the watchwords according to positive and negative terms. When catchphrases are arranged, order the feeling of words in the particulars of glad, miserable, dread, terrible. Undertake the outcomes according to the grouped words.

E. Steps for Naïve Bayes Algorithm

Step 1: Collect all the key words to a variable.

Step 2: Apply the bayes algorithm and categorise the keywords as per positive and negative terms.

Step 3: Once keywords are categorised.

Step 4: Classifying the emotion of the words as happy, sad, fear, bad.

Step 5: Project the results.

F. Behaviour Analysis

Conduct examination is a characteristic science that looks to comprehend the conduct of people. The study of conduct examination has made revelations which have been demonstrated valuable in tending to socially significant conduct, for example, talking, sedate taking, smart dieting, working environment security, culture, and the treatment of inescapable formative incapacities (e.g., mental imbalance).

There are three principle branches to the field: Conceptual conduct examination, test conduct investigation, and connected conduct examination. The calculated branch centres around the philosophical, hypothetical, authentic, and methodological issues will underlie the field. Trial conduct investigation includes essential research expected to add to the assemblage of learning about marvels that control and impact conduct. Connected conduct investigation is centred around the use of the standards of conduct to the requirements of people to advance conduct change and improve personal satisfaction. From all the above prerequisites we investigate the information utilizing the stylo techniques for anticipating the conduct of the information. Presently to whole informational index apply stylo strategies. Computing the feelings from past module, this strategy demonstrates the conduct of the speaker. In the wake of finding the conduct we get the outcome as reports that bring about the conduct investigation.

G. Stylo:

The third program to encourage stylometry that is examined was the R stylometry bundle: This toolset works inside the R programming condition and highlights a GUI for clients who might not want to utilize the programming backing of R. For clients that desire to exploit R's capacity, Stylo incorporates extra capacities and approaches to join them into different projects. Stylo likewise highlights support for AI which underlines the extent of the toolset. Since stylo works inside R, setting it up and utilizing the essential highlights turns out to be marginally increasingly hard for clients unversed in programming dialects. When arrangement is finished, be that as it may, stylo incorporates a GUI to help armature examination. The stylo manual was complete and strolled through the majority of the various parts and how they work.

V. EXPERIMENT AND RESULTS

The execution is made with the ten unique addresses from an individual and numerous speaker and the found that the outcomes are the depicting the conduct of the speaker at the best to the connected strategies. The outcome manages distinguishing the catchphrases, unigram, bigram, trigram words from the discourse record. At that point later creates the extremity from the watchwords and the feelings are been ordered from the discourse content. At long last the conduct of the speaker over the crowd has been ordered and discovered that outcomes were precise and explanation is distinguished. A model content report to break down the conduct of

the speaker. Here Pakistan president commented on discourse archive is taken. Speaking to the quantity of lines alongside words in an archive recognizing two parameters from the content record. At first we locate the quantity of words in the content report. There are around 1929 words and 75 lines in the content archive the specific content archive is partitioned into single words. Indeed, even it recognizes how often a specific word is repeated. Representing the expressions of unigram list. The archive is separated into single words then the stemming procedure is connected. At that point it evacuates the superfluous words, spaces and so on. Presently the archive contains just positive terms and negative terms. Speaking to the extremity (arranging into positive and negative terms) after the correlation between the positive and negative words, a different rundown of positive and negative words is ordered.

Characterizing feelings from positive and negative words, in the wake of getting the rundown of positive and negative words, feelings are arranged from the words. Speaking to the conduct from the feelings, the conduct of the individual is gotten from the feelings. In this way we can locate the conduct classification of the individual.

VI. CONCLUSION

Stylometry is connected to discover the conduct of the speaker through his speech. Results help us in examining the conduct of the speakers and their vocabulary. The discourse is taken in the content organization. Hence the conduct of the specific speaker through his discourse is dissected by distinguishing watchwords and next the feeling of got words must be found. Later the feeling will be disregarded the stylo, in grouping the conduct of the individual. We will investigate the conduct dependent on the feeling. From the ongoing after effects of extremity and the feelings from the discourse information, we presently arrange the outcomes to work out the conduct of the speaker dependent on the passionate class. Arranging the feelings dependent on the sort of extremity, we can recognize the conduct of individual.

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Sentiment Analysis of Emoji Tweets in Context with Twitter Data

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Abstract— ***Sentiment analysis of text is a valuable tool used to identify and classify bodies of text for various purposes, including public sentiment detection in political campaigns, spam detection and threat assessment. In this paper, we examine the effectiveness of incorporating Emoji data for Twitter data emotion classification. We conducted experiments using Multinomial Naïve Bayes (MNB) and Support Vector Machine (SVM) classification methods, with automatically labeled Twitter data. We compare the accuracy of these classification methods with and without the Emoji data included over varying vocabulary sizes. We find that MNB outperforms SVM on the data for large vocabulary sizes, and both classifiers perform slightly better with the Emoji data included.***

Keywords—Sentiment analysis, Twitter, Emoji, Supervised Learning.

I. INTRODUCTION

Natural language processing (NLP) is a field within artificial intelligence that overlaps heavily with linguistics and focuses on understanding data from raw text. It relies heavily on statistical measures to evaluate sources of information and understand text. NLP is employed throughout software today for various purposes, including syntax and spelling evaluation for word processors, human-computer interaction and automatic language translation. With the growing use of the Internet, a largely text based communication media, NLP has grown in interest for security and management solutions, such as spam detection in emails and identification of improper languages in social media postings.

Sentiment analysis, closely related to natural language processing. attempts to identify sentiment (positive, negative, neutral) or emotion from texts and/or social media. It is a challenging task for machines and can even challenge humans occasionally. The structure of the English language, combined with sarcastic tones and ambiguous grammar, can often be misleading for those without an intuitive understanding of the language. Interest in emotion/sentiment detection, however, has grown alongside the field of artificial intelligence, particularly with the increase in emotional communication over the Internet. The advent of social media in the past decade has led many more individuals than ever before to communicate about personal and emotional matters, social and political viewpoints through both private and public messaging platforms. The social media thus has become a rich source of information about public sentiments in many aspects of the society. Developing automated methods for sentiment detection can provide valuable tools for many useful applications, including public sentiment detection for political campaigns such as the US presidential election, and automated detection of abusive communications on social media that is highly desired by social media companies such as Facebook.

II. RELATED WORK

A. Sentiment Analysis

The process of sentiment analysis typically follows a common framework: collect raw data, preprocess the data to remove noise, represent the cleaned textual data in suitable form (typically in a feature vector) for computation, label the data for training purposes, and then feed the data to train a classifier. Preprocessing is necessary due to the ambiguity inherent in language and human tendency to deviate from standard grammatical structures. This results in very noisy data that is difficult to classify. The cleaning process removes some of this noise, resulting in data that is easier to work with. This can involve removing certain punctuation, trimming words of their various endings to result in only root words (stemming), or filtering the data points by keywords or length. Data representation typically takes the form of a vector of features, with the most common feature being the frequency count of a word. This is often called "Bag of Words"(BoW) representation. Most classification relies on supervised learning, where training is required to teach the system how to recognize the various classes. This requires labeling data with class labels prior to training the system. The labeling process can be done manually by a human to ensure maximum accuracy, though this is slow and subjective. Other methods involve identifying the most prevalent keywords in text and labeling them, though these automatic

methods must then be verified by a human to be accurate. If the dataset itself is not labeled accurately, any classification will also be inaccurate.

B. Classification

Sentiment analysis of texts essentially amounts to classifying textual documents into sentiment/emotional classes. Various types of classifiers have been used for text classification. The two most commonly used classifiers for text are the Naïve Bayes classifier and the Support Vector Machine (SVM). Both rely on supervised learning, being trained on one dataset with the data points labeled with proper classes and then tested on a disjoint dataset with the class labels withheld. Both classifiers learn the features that define each class and then attempt to find which class fits the unlabeled data of the testing dataset. Space consideration limits. In recent years, use of deep learning neural networks for text classification. In this study we intend to keep the classifiers simple and thus we do not consider using deep learning neural networks here. But we intend to investigate the use of deep networks for sentiment/emotion analysis in the near future. The Naïve Bayes classifier considered in this study is based on the Bayes' theorem of probability, and the Naïve Bayes Assumption which assumes that the features of an object are conditionally independent, given the class label of the object. There are many variations on the model, such as the Multinomial Naïve Bayes, the Gaussian Naïve Bayes and the Bernoulli Naïve Bayes, all of which operate on the probability of the occurrence of words in the text. By comparison, SVM is a non-probabilistic classifier. A linear SVM is a binary classifier that aims at finding the maximal margin hyper plane that separates the data points in one class from the data points in the other class such that the "margin" is maximized. This ensures the greatest margin of error for the hyperplane and thus the lowest misclassification rate.

Documents into sections that can be identified by their opinions, allowing for observing how sentiment changes throughout a document [6], or classifying individual phrases by their positivity and negativity [13]. In this way, sentiment analysis can be used for summarizing reviews for products in a comparable manner, detecting whether a given user review is positive or negative for a product. Other work has been done to identify the subjectivity of documents, and whether they should be classified as fact or opinion [5]. In the last decade research has increased involving social media, resulting in many experiments on mining political and subjective opinions from blogs and news articles [4, 8]. There has also been other research into the use of Twitter as a source of data [7, 10], and how sentiment analysis can be executed to accurately identify emotion through these short statements [1, 3]. This is like our work, though we include Emoji data in the tweets that is typically unaddressed in these works.

III. METHODOLOGY

A. Data Collection

The first step of sentiment analysis is acquiring a large corpus of high quality textual data for training and testing. The advent of social media in the past decade has brought a new source of highly emotional human text. Many individuals use Facebook, Twitter, or other social media sites every day and post emotional information or opinions. Studies show that upwards of 80% of individuals in the United States with internet access have Facebook accounts, while between 2530% of these individuals have accounts on various other media websites (Pinterest, Twitter and Instagram for example) [2]. These sites act as an aggregator for this emotional information that researchers can then access and use for experimentation.

For our study, we collected data purely from social media. Specifically, we collected "tweets" from Twitter, which are usually short (less than 140 characters) messages posted by individuals that contain various opinions and emotions. Twitter provides an API for programmers to access their data, requiring a Twitter developer account. We used a package for Python called "twitter" [9] to utilize the API Twitter offers to access their databases and collect the raw tweet data. In this data, all personal identifying information is removed. To collect specific tweets, we chose to follow the model of Wang et al [11], who tested the viability of tagged tweets as auto-classified textual data. On Twitter, many people use these "hashtags" to mark their tweet as pertaining to a certain topic. For instance, during the 2016 presidential election, many people tagged tweets in favor of candidate Hillary Clinton with "#ImWithHer." This allows for tweets to be grouped and viewed by their tags to quickly access information, and allows for easy classification of tweets. Our tweets were collected from seven broad emotional classes: Sad, Angry, Happy, Scared, Thankful, Surprised, and Love. For each class, we define a set of key words that are indicative of the emotions in that class. For example, for the "Happy" class, the set includes key words such as "joy", "pleased", "glad", "happy", etc. Then in collecting tweets, a tweet is selected if it contains at least one hashtag for a key word from one of the seven emotion classes.

Emoji Data The non-standard characters however are of interest for our study due to the recent inclusion of "Emoji" characters in social media. These characters display as certain faces, as seen in Fig 2. Their primary use is to display various emotions such as happiness, anger, sadness and love. Typically the use of these Emoji characters provides very direct and strong suggestions of the emotion included in the text, even though they are commonly thrown away. This is like the case for punctuation, which is often trimmed in many applications except for sentiment analysis, where question marks and exclamation points can provide insight into the

emotions of the writer. The purpose of our experimentation here is thus to investigate the influence that including Emoji data within text can have on the accuracy of emotion classifiers.

TABLE I: DISTRUBITION OF CLASSES AFTER CLEANING

Class	Number of Viable Tweets
Sad	23121
Angry	7672
Happy	7710
Scared	4791
Thankful	4525
Surprised	2167
Love	4075
Total	54061



Fig. 2 Sample of Emoji Characters

These Emoji characters are represented in the text as various Unicode values. Web browsers then map these Unicode sequences into the associated images to display. The same process can also be used when collecting the purely textual data – collect the Unicode values and map them to the correct Emoji faces. An example of the Emoji encoding scheme is shown below in Fig 3. For example, the Unicode sequence U+1F600 results in a smiling face, while U+1F622 results in a crying face. Instead of mapping the Unicode back into an image, since our plan is to work solely with textual data, we can map the Unicode sequences into specific textual sequences, such as <ANGRYFACE> for a mad face and so forth. This allows us to capture the Emoji data in a human recognizable form in text.

IV. RESULTS AND DISCUSSIONS

- For each of the experimental cases, measured the classification accuracy of the system using the given vector size by running each trial ten times and averaging the accuracy to remove variation.
- It represent how this code will generate the results from the last lines in the image we can identify the scores of positivity and negativity and more number of emoji's used in the data to describe the customer emotion.
- It describes about predefined code which is written for identifying the smileys and analysing them.

V. CONCLUSIONS

Micro-blogging like twitter nowadays became one of the major types of the communication. The large amount of information contained in these web-sites makes them an attractive source of data for opinion mining and sentiment analysis. Most text based methods of analysis may not be useful for sentiment analysis in these domains. To make a significant progress, we still need novel ideas. Using twitter names and hash-tags to collect training data can provide better results. Also adding symbol analysis using emoticons and emoji characters can significantly increase the precision of recognizing of emotions. The most successful algorithms will be probably integration of natural language processing methods and symbol analysis.

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Creating an ICO with Smart Contract Technique on Ethereum using ERC-20 Token

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Abstract— ***Bitcoin was improving its market share and struggling with real currency in the actual world. In this sense, there is the amount of applications developed for the cryptocurrencies and general applications that can be able to worn in a disseminated situation is increasing. The cryptocurrencies used in blockchain, such as Bitcoin, also has become popular for other apps. The website like Ethereum's got its assistance for creating apps of this kind. In this document, Bitcoin focuses on cryptocurrency and failure scrutiny on economic information. It is suggested that an algorithm should have a regression analysis. The document also offers the dynamics of Bitcoin with the aim of using it as a cryptocurrency. It also sheds light on the opinion of software growth using Ethereum. Ethereum is a scheme to generate distributed applications where millions of pcs and customers can engage in safe interactions. The conclusion indicated that the Ethereum system was helpful and the failure study showed the efficiency dynamics discovered in the monetary information.***

Keywords— Cryptocurrency, security, ethereum, cryptography, ethereum applications.

I. INTRODUCTION

The statement currency has two wide definitions. They are a material currency in the shape of coins or notes measured in, for instance, Euros and electronic money that are not tangible in nature. unconventional currencies are dissimilar forms of electronic currency other than physical currency. Bitcoin has appeared as moreover electronic currency or electronic cash. It is a decentralized digital legal tender that does not have need of a central bank or a governing body. In other phrases, bitcoin is a unmarked type of cash with an advanced payment network. Many variables influence the trade rate of physical currencies such as the euro. These variables embrace rise, political stability, financial circumstances, recession and trade levels. The objective of this thesis is to look at the hypothesis that "the variables influencing traditional macro-finance do not guide the charge of Bitcoin." To this conclusion, a methodology is residential with an abstract structure desirable to finish the study. From the evaluation of the results of the studies, it is recognized that Bitcoin rates are not linear as they are in the situation of conventional currencies. Its existence in the digital shape is lone of the fundamental reasons why the Bitcoin legal tender is not influenced by variables that influence the normal currency. Another significant remark in the explore is that there are various other variables, for instance press, talk of hand and advertising, affecting the charge of Bitcoin. The remaining of the document offers more in sequence on Bitcoin and cryptocurrency and offers failure study in count to the scheme of creating distributed applications by means of the Ethereum engine. Crypt currency has turn out to be a truth with many instances, such as Bitcoin. It is not comparable to the established currency, the presence of which is not physical and is not controlled by governments. However, it is highly thought as Bitcoin competes with the established currency on the stock markets as well. Cryptocurrency has well-built protection assistance with Blockchain technology. Blockchain technology offers a centralized ledger that retains all operations as a sequence of chunks. This can assist mine and figure out whether operations are performed out credibly. Blockchain technology and cryptocurrency have drawn several studies in this field. In this document, we provide significant perspectives into the cryptocurrency and the Ethereum development environment that could be used to construct cryptocurrency apps.

II. RELATED WORKS

This subdivision offers a outline of the appropriate cryptocurrency literature and associated plays.

The theory of substitute currency According to Levy & Glimcher [8], the speech "supplementary or alternate monetary" is primarily used to indicate any money that is used as a unchanging choice to the corporate or dominant domestic monetary scheme. Patel et al. [10] acknowledged that substitute currencies are over and over again generated by a corporation, an individual or an organization. Moreover, this category of currency can be developed by moreover local or state governments [11]. Luther and White [9] argued that an substitute currency scheme could evolve obviously when individuals imagine using a precise service as a currency. Modern prose offers many argumentative reasons for the perception of substitute currency. Levy & Glimcher [8] argued that an extra or

supplementary currency could behave like a firm means of return (replacing additional cash for the conventional euro and vice versa) which is certainly not a recognized monetary of the country. However, it is believed of or regarded as a currency scheme that promotes the count of national currencies.

However, according to Levy & Glimcher [8], the additional exchange is rarely regarded as a legal instrument. A lawful tender is a deposit tool that is acknowledged by the lawful system and is generally applicable transversely to the nation. For illustration, euro loose change or banknotes are measured to be legal tenders in the European amalgamation. The implementation of the supplementary currency shall be governed by an arrangement between two separate parties which may authorize the exchange of currency. Luther and White [9] insisted on the view of the conception of complementary currencies to boost, safeguard or guide the nation's economy. Substitute currency is regarded to be an instrument used to promote any particular monetary, artistic and political objective (Burnside, Eichenbaum & Rebelo, 2016). Experts such as Patel and others [10] have identified several interchangeable definitions used to denote options monetarily. One such instance would be the word "group monetary or local currency." Several specialists often find more than a few classified currencies to be alternative currencies, most of which are published by different personal companies. Kim & Dilts [8] argued that fresh taxation is largely inserted into the environment for a plethora of reasons. Besides, Luther and White [9] illustrated several such reasons in their study process. The specialist argued that substitute currency must be issued when a country intends to increase its economic safety and stability [8]. Xiao et al. [11] championed the use of substitute currency in circumstances where a country or a specific society has no proper connections to specified financial capital. Cryptocurrency details, for instance Bitcoin, are further reviewed in [12]-[20]. The upper row is that Bitcoin has turn out to be popular as a cryptocurrency.

III. PROPOSED WORK

Thorough knowledge of interchange Currency is desirable to discover the outcome of substitute currency and its end product on the economic sector. The innovation, arrival, and impact of currencies for instance bitcoin and other forms are explored in aspect in this section. Bitcoin is coupled with substitute currency and has attracted focus to a whole host of areas, from cryptography to economics and mainframe knowledge, as well as economic aspects [3].

Bitcoin is lone of the the majority successful cryptocurrencies in the globe. It was first brought to the orb by the genius psyche of Nakamoto[5], who used the' linear organizational design' for this purpose[3]."The main issue with standard cash is all the confidence that is considered necessary to create it function. The innermost bank must be instructed not to lower the currency, but the past of fiat currencies is inclusive of violations of that trust."[5] The aim of the bitcoin is its decentralized philosophy. It is an evolving skill that attacks standard trading currencies. Bitcoin is one of the opening forms of cryptocurrency to emerge, slowly altering the ways of wealth. Currency at its initiation in 2008 to its present shape in 2018 has urbanized to reach astounding facts of roughly $330 per bitcoin. It is therefore crucial to concentrate on the investigate of this transaction currency swapped for fiat currencies[5]. There are quite a few elements to this distinctive currency. First and foremost, the digital legal tender had its past. But the distinction that Nakamoto[5] has made to this legal tender is that the distinctive notion of' public-key cryptography' has been worn to compose these electronic cryptocurrencies [5]. The aim of Bitcoin, for Nakamoto, was to separate currency schemes from government influence and consequently decentralization that is far distinct from the' statutory currencies' worn by innermost banks in the in attendance scheme. The ideology is to create' confidence' flanked by the bitcoin industry respondents all through the phase of building block system engineering using two main outputs–(A) Cryptography techniques and (B) Hash features. The fruition of this scheme has extended theoretical study in this knowledge and is evolving as a sophisticated level of PC learning[5]. Although Nakamoto's continuation is wearing a veil in privacy, his white paper has been tested for a moment, and Bitcoin remains to be a cryptocurrency scenario[3]. Nakamoto acknowledged in his seminal job,' Bitcoin: Peer-to-Peer Electronic notes System,' that the key characteristic of this legal tender is the exercise of the Ledger system for payments finished in the approach of a blockchain. The main elements of Bitcoin as suggested by Nakamoto are 1) Blockchain or Ledger for all operations (2) Mining–the skill of the decentralized agency to authenticate operations. This scheme is commonly referred to as mining records [3].

A. Legalization by Users

The principle taken for the intent of validation is the opinion of' mining.' Users will start by validating the creation and its validity before introducing it to the blockchain. The validation scheme is very costly, as it includes encryption and the use of complicated alphanumeric buttons. As shortly as the customer, who is as well called the miner, conducts the validity inspection of all operations and connects them to the blockchain, the patron will conduct the pulling out operation. These efforts are rewarded by the BTC legal tender and thus the bitcoin or legal tender is created or the records are generated [3].

Bitcoin Enabling Technology; the swap over tempo is gritty by fiat currencies. Bitcoin rates are in the connection connecting the real exchanges as well as the Bitcoin exchanges. The distinction is therefore in the industry for bitcoin and the legal tender markets. Since Bitcoin is a practical currency and depends on blockchain techniques, factors or financial sizes E, Velocity V and the facility of the Bitcoin industry, B is closely linked where business variables are measurable. They are seized from the Blockchain system. Thus, if P is the cost level

of products and facilities, it can be determined horizontally by captivating into description the worldwide macro-economic indexes in real time[4]. Hence the value of Bitcoin (PB) = PE (Price in financial size)/VB or Bitcoin flow speed[4].PB = PE/ VB

Blockchain; devolution is the appearance that cryptocurrencies follow and is contrary to the fiat currencies that are appreciated by the innermost banks. A debate on decentralization sets away the preceding target structure on (1) the submission register must be retained and controlled (2) the authority to make lawful operations must be treated at the appeal of the purchaser (3) The expansion of fresh bitcoin ought to be controlled. The rejoinder to these objectives was discovered only in blockchain technology[4]. The finances that are produced in the blockchain are therefore immediately affianced in the trading and advance of bitcoin. They are immediately exaggerated by Bitcoin's deliver and command. Thus, blockchain technologies associated to the Bitcoin bazaar are a pattern of how to toil seamlessly between high-level cryptography and market economy[1]. The key to the above objectives is to include the participant as fraction of the Bitcoin system itself. The person will offer the required hardware funds through his laptop. These are referred to as' managed schemes.' The relay or the allocation and act of cash is addressed by P2P networks. The blockchain then registers the background of trading and is then communicated on the set of connections. The full background of the prior action is then checked by each network member. The device is also called the' bank' and will provide every scale of the recent operation and the nearly all significant hash value. This score is extracted from the' prior block' and the effort is made to produce irreversible in order that operates with the attribute and suggests the subsequently block[4]. The fundamental assumption of blockchain expertise is the validation by customers themselves, thus eliminating the necessitate for third parties or governments to remotely corroborate the batch of currency. Instead, each patron has already validated the invent or the delivery or spring of life of the coin. The benefit of bitcoin is that it enables the set-up member to conduct the pulling out method. Each operation then becomes a further node or block where further activities are conceded out and a decentralized stage is established. Actions or events are autonomous and transmitted separately or from both person in the association to each other on the arrangement. This method will carry on until all operations are distributed transversely to the system. The blockchain is thus cloned or transmitted to all the respondents in the net and becomes a' complete node' separately from recording each record [3].

IV. IMPLEMENTATION

Ethereum is a scheme to easily form decentralized apps. Such apps have distributed architecture and perform particular aims. These apps offers for associations between distinct sides. It promotes the API worn by Bitcoin and BitTorrent to include peer-to-peer networks that be able to be worn by customers transversely the globe. Ethereum also promotes black-chain expertise that can be worn to safeguard financial and other apps during a dispersed setting. Ethereum Virtual Machine (EVM) is a shared implicit mechanism in which millions of pcs can engage. It promotes two types of records, namely external records (EOAs) and agreements. The contracts can serve different purposes like maintaining a figures store, serving as an account, manage Contracts can join distinct aims, such as keeping a data store, acting as an email, managing associations between many customers, and providing library features. In a betting implementation, the sides concerned may have secure communication by means of the Ethereum implementation as revealed in Figure 1.

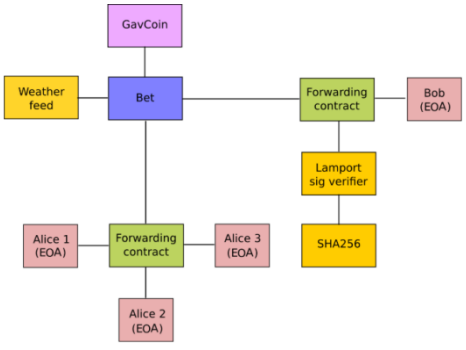

Fig. 1 Distributed relationships during the software Ethereum

As revealed in Figure 1, here are safe associations among distinct sides in the order of the orb in a betting implementation. The Ethereum implementation can assist to accomplish such complicated relationships through the establish of safety. Bitcoin dealings are a complicated method. As revealed in Figure 2, nearby is a contract between Bob and Alice. Bob is a merchant who takes the bitcoins as payment while Alice is a purchaser of goods or services and agreeable to forfeit the bitcoin amount. Bob and Alice are also desired to comprise Bitcoin wallets in their scheme. Wallets are effectively machine documents that refer to various bit signatures references. A bitcoin email is produced out of bed of words and numbers. Each email represents the equilibrium of the bitcoin (Jain & Paras, n.d).

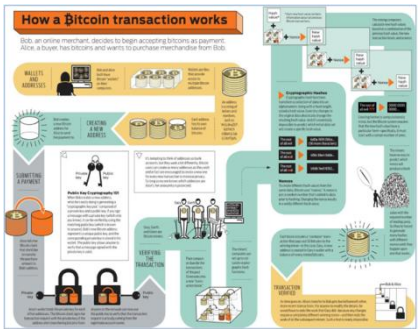

Figure 2: Procedure followed in a Bitcoin contract

To start operations, Bob is starting to create a unsullied Bitcoin financial credit for Alice to obtain a deposit. Alice then tells its Bitcoin client that it has decisive to submit the necessary buy quantity to Bob's Bitcoin email. Alice's wallet is linked to a concealed key. The BitCoin Client utilizes a private key to register a payment application. Any consumer on the Bitcoin network can now verify the payment application to understand whether it comes from a lawful proprietor fresh application block is created accessible to other internet customers to assist them mine accounts. Computers that mine are capable of computing cryptographic hash functions. Bitcoin consumers can generate many addresses that are used to perform operations. Cryptographic hash functions provide data in a transformed form that can not be attacked by opponents. Bitcoins use the notion of nonces or random digits for greater safety. A fresh application block is created accessible to other internet customers to assist them in my accounts. Computers that mine are capable of computing cryptographic hash functions. Bitcoin consumers can generate several addresses that are used to perform operations. Cryptographic hash functions provide data in a transformed form that can not be attacked by opponents. Bitcoins use the notion of nonces or random digits for greater safety. Mining machines can produce fresh hash values that can be used to mix with prior hash values in an attempt to have a fresh application row (Jain & Paras, n.d).

Creating hashes is computationally insignificant, but for hashes, Bitcoin requires a particular shape. There's no data to miners about it. As a result, miners need to produce various hashes from which one can operate. Each bank has a coin foundation operation that charges 50 bitcoins to a miner's winnings. A fresh email is thus established in Gary's wallet, which contains freshly minted bitcoins. Transaction verification requires position and ancient operations are placed under old ones and therefore the payments are not irreversible (Jain & Paras, n.d).

A. Bitcoin Mining Process

Bitcoin can be mined with distinct hardware accessible on the industry. It also requires software programs that can assist with mining and benefits. However, the mining method is distinct for each accessible cryptocurrency. Figure 3 demonstrates the Bitcoin mining method.

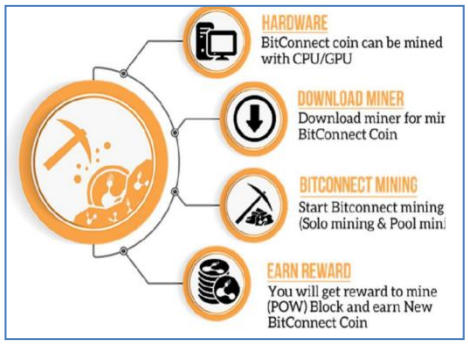

Figure 3: Illustrates the Bitcoin mining method (Kalyani, 2018)

The method used to mine the Bitcoin currency is shown. There is some hardware needed for the mining method. You can buy it from e-Commerce websites like Amazon. The mining method can be performed either by CPU or GPU. After hardware acquisition, it is essential to have the software needed for the mining method. The software requires to be purchased for the Bitconnect coin mining operation. There are two processes in place, such as single mining and tube mining. Once the mining is done, the award will be provided to the miners. Miners are therefore getting fresh BitConnect currency (Kalyani, 2018).

V. EXPERIMENT AND RESULTS

A. Data Used for Regression Analysis

Data has been collected from http://fundforpeace.org/fsi/ that contains the price details of Bitcoin besides the Fragile States Index. The data reflect different attributes like Year, Bitcoin Price, USD/EUR/ and GoldUSD. It also

provides other attributes related to fragile states index for countries like the USA, Kuwait, Latvia, United Kingdom, and Switzerland. An excerpt of the data collected is presented in Table 1.

TABLE 1: SHOWS DATASET USED FOR REGRESSION ANALYSIS

Year	Bitcoin	USD/EUR	GoldUSD	USA	Kuwait	Latvia	United Kingdom	Switzerland
2014	854.0	1.4	1292.0	35.4	59.0	48.0	34.3	23.3
2015	229.0	1.1	1150.0	35.4	57.5	48.5	33.4	22.3
2016	409.0	1.1	1339.0	34.0	58.5	47.4	32.4	21.8
2017	1197.0	1.1	1318.0	35.6	58.5	46.4	33.2	21.1
2018	9521.0	1.2	1316.0	37.7	58.5	46.4	33.2	21.1

The information reflects the characteristics mentioned above for the years 2014 to 2018. The information demonstrates how Bitcoin value increased from 2014 to 2018. It also demonstrates the efficiency of GoldUSD over the years. The USD / ERU proportion is also expressed in the information.

Regression Analysis The regression analysis was conducted to analyze Bitcoin and Euro prices and the factors that drive the same prices or exchange rates. Data from some nations are regarded for the assessment of information as indicated above. Various variables affecting the fiat currency, such as the euro, are analyzed. In the same way, Bitcoin yields are guided by certain variables. For Bitcoin, the factors that influence the euro may not be the same. This is the component of the hypothesized model that has been tried in this section. Gold prices are also regarded for stronger assessment. The predictability of the fiat currency and the unpredictability of Bitcoin according to the hypothesized model are assessed. Irrational behavioral hypothesis, as mentioned in the literature, is used to cope with variables that cause Bitcoin's cost. The rationale behind this is that, according to the literature, Bitcoin is affected by various variables such as press, fame, and the use of technology and the customer population. The statistical modeling method recognized as the Regression Analysis is used to forecast or assess the connection between distinct factors. If there is a statistically significant connection between variable pairs, it can be identified by regression analysis. In other phrases, the connection between the factors is modeled using regression analysis. It uses the notion of independent variables and dependent variables. Independent variables are considered to be predictors. Reveals the adjustments in the valuation of the dependent variable when the independent variables are subject to change. The model used for independent variables is called a regression function. As a result, it enables predict important interactions or forecasting, in other terms.

The regression analysis requires the correct training of the information that is made the care of in this thesis. The information described in Table 1 is used properly in the regression analysis. The regression analysis instrument is used in the spreadsheet application recognized as Microsoft Excel. The regression analysis uses formulas linked to the total of numbers, the degree of liberty, the average square, the F function, and the importance or the P-value. Based on the P-value, it is feasible to understand how two series of factors are considerably linked. The sum of the squares is computed as, the degree of freedom is computed as m-1, the mean square is computed as SSB / m-1, the F value is computed as (SSB /m-1)/(SSE /n-m) and finally the meaning is computed where m is the number of columns, while n is the number of reactions considered. There is a notion between organizations and organizations regarded externally for regression analysis. The matrix R and the adapted matrix R are measured as in the Eq. Well, 1 and Eq. 2 and 2 respectively.

$$R^2 = \frac{F*(m-1)}{(n-m)+(F*(m-1)} \quad (1)$$

$$\text{Adjusted } R^2 = 1 - \frac{(n-1)(1-R^2)}{(n-m)} \quad (2)$$

In the process of regression analysis mean and standard deviation are computed as in Eq. 3 and Eq. 4.

$$\text{Mean } \mu = \frac{\text{Sum of values}}{\text{the total number of elements}} \quad (3)$$

$$\text{Standard Deviation } \sigma = \sqrt{\frac{(x_i-\mu)^2}{N}} \quad (4)$$

B. Result Analysis

TABLE 2: PROVIDES RESULTS OF REGRESSION ANALYSIS

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.1629234
R Square	0.026544
Adjusted R Square	-0.297941
Standard Error	4529.036
Observations	5

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	1677968	1677968	0.081804	0.793481
Residual	3	61536501	20512167	-	-
Total	4	63214468	-	-	-

ANOVA								
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-66616	241458.9	-0.27589	0.800546	-835046	701814.1	-835046	701814.1
Kuwait	1182.5	4134.425	0.286013	0.793481	-11975.1	14340.09	-11975.1	14340.09

VI. CONCLUSION

During this document, we concentrated on knowing Bitcoin and its developments and dynamics in the genuine orb. It sheds light on the distinct elements connected with the legal tender of the crypt. They include Bitcoin, BlockChain, and Ethereum. Bitcoin is a practical currency produced using cryptography technology. Its activities are shielded by Blockchain in collaborative peer-to-peer settings. Ethereum is worn to construct distributed applications so as to use safety primitives that are worn in Bitcoin and BitTorrent as integrated P2P apps to Bitcoin. It is recognized that Bitcoin is like a cryptocurrency technique has been progressively developed straight commencing its beginnings. The empiric research also disclosed the effectiveness of the Ethereum system for constructing P2P integrated apps that provide safe associations between many customers in the region of the globe. During the future, we propose to operate on the edifice of an Ethereum implementation. An algorithm is suggested and applied to carry out a failure study of financial information linked to blockchain skill that can be worn to protect biomedical records in a dispersed multi-user situation.

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Predicting and Analysing Banking Sector Data With Machine Learning Models

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Abstract-Irregular backwoods technique is a standout amongst the most generally connected grouping calculations at introduce. From the genuine huge information scene and prerequisites, the utilization of arbitrary backwoods technique in the huge information condition to direct inside and out investigation. Because of the huge information requirements to process countless in the meantime, and the information design changes always after some time, the exactness of a arbitrary woodland calculation without self-recharging and versatile calculation will steadily decrease after some time. Going for this issue, examination on the qualities of arbitrary woodland strategy, exhibits how to understand the self-adjustment capacity with irregular timberland technique in comparative circumstances, and checked the attainability of the new technique for utilizing the genuine information, and examination and discourse of how to additionally inquire about and enhance the arbitrary woods strategy in huge information condition.

***Keywords*— Decision tree, Random Forest, Big Data**

I. INTRODUCTION

Big Data is one of the major challenges of statistical science and has numerous consequences from algorithmic and theoretical viewpoints. Big Data always involve massive data but they also often include online data and data heterogeneity. Recently some statistical methods have been adapted to process Big Data, like linear regression models, clustering methods and bootstrapping schemes. Based on decision trees combined with aggregation and bootstrap ideas, random forests were introduced by Breiman in 2001. They are a powerful nonparametric statistical method allowing to consider in a single and versatile framework regression problems, as well as two-class and multi-class classification problems. Focusing on classification problems, this paper proposes a selective review of available proposals that deal with scaling random forests to Big Data problems. These proposals rely on parallel environments or on online adaptations of random forests. also describe how out-of-bag error is addressed in these methods. Then, we formulate various remarks for random forests in the Big Data context. Finally, we experiment five variants on two massive datasets (15 and 120 millions of

observations), a simulated one as well as real world data. One variant relies on subsampling while three others are related to parallel implementations of random forests and involve either various adaptations of bootstrap to Big Data or “divide-and-conquer” approaches. The fifth variant is related to online learning of random forests. These numerical experiments lead to highlight the relative performance of the different variants, as well as some of their limitations.

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Random forests or random decision forests are an ensemble learning method for classification, regression and other tasks that operates by constructing a multitude of decision trees at training time and outputting the class that is the mode of the classes (classification) or mean prediction (regression) of the individual trees. Random decision forests correct for decision trees' habit of overfitting to their training set.

The first algorithm for random decision forests was created by Tin Kam Ho[1] using the random subspace method,[2] which, in Ho's formulation, is a way to implement the "stochastic discrimination" approach to classification proposed by Eugene Kleinberg.

An extension of the algorithm was developed by Leo Breiman and Adele Cutler, who registered "Random Forests" as a trademark (as of 2019, owned by Minitab, Inc.). The extension combines Breiman's "bagging" idea and random selection of features, introduced first by Ho[1] and later independently by Amit and Geman in order to construct a collection of decision trees with controlled variance.

The general method of random decision forests was first proposed by Ho in 1995.[1] Ho established that forests of trees splitting with oblique hyperplanes can gain accuracy as they grow without suffering from overtraining, as long as the forests are randomly restricted to be sensitive to only selected feature dimensions. A subsequent work along the same lines concluded that other splitting methods, as long as they are randomly forced to be insensitive to some feature dimensions, behave similarly. Note that this observation of a more complex classifier (a larger forest) getting more accurate nearly monotonically is in sharp contrast to the common belief that the

complexity of a classifier can only grow to a certain level of accuracy before being hurt by overfitting. The explanation of the forest method's resistance to overtraining can be found in Kleinberg's theory of stochastic discrimination.

The early development of Breiman's notion of random forests was influenced by the work of Amit and Geman who introduced the idea of searching over a random subset of the available decisions when splitting a node, in the context of growing a single tree. The idea of random subspace selection from Ho[2] was also influential in the design of random forests. In this method a forest of trees is grown, and variation among the trees is introduced by projecting the training data into a randomly chosen subspace before fitting each tree or each node. Finally, the idea of randomized node optimization, where the decision at each node is selected by a randomized procedure, rather than a deterministic optimization was first introduced by Dietterich.

II RELATED WORK

Title: An Ensemble Random Forest Algorithm for Insurance Big Data Analysis

Problem Statement:A sampling approach combined with the ensemble learning algorithm on the large-scale insurance business data mining

Solution: An ensemble random forest algorithm that uses the parallel computing capability and memory cache mechanism optimized by Spark

Advancement: Exploring the proposed algorithm to different types of big data analytic, combining deep learning into the proposed algorithm to improve the accuracy of prediction based on big data analysis

Disadvantages:A lot imbalances in the data as discussed in paper, for which we can propose model with linear regression.

Title: Data Mining based on Random Forest Model to Predict the California ISO Day-ahead Market Prices

Problem Statement: In this paper,an ensemble learning model,namelythe random forest (RF) model, is used to predict both the exact values as well as the class labels of 24 hourly prices in the California Independent System Operator (CAISO)’s day-ahead electricity market

Solution:AThe focus is on predicting the prices for the Pacific Gas and Company (PG&E) default load aggregation point (DLAP). Several effective features, such as the historical hourly prices at different locations, calender data, and new ancillary service requirements are engineered and the model is trained in order to capture the best relations between the features and the target electricity price variables

Advancement: The future research would be on introducing the new efficient features to capture the price characteristics in the hour with high price fluctuations more appropriately

Disadvantages: It is also interesting if Consider the impact of other features, such as temperature and fuel prices, on exact value prediction as well as on the classification.

Title:ENSEMBLE CLASSIFIER WITH RANDOM FOREST ALGORITHM TO DEAL WITH IMBALANCED HEALTHCARE DATA

Advancement:work can be extended by combining Random Forest algorithm and various multiclassifier algorithms such as OVA (One-Vs-All) randomization algorithm to get higher performance

Disadvantages:A lot imbalances in the data as discussed in paper, for which we can propose model with linear regression.

Introduction of Random Forest Method

Random Forest strategy is a mix order technique proposed by Breiman in 2001. Utilizing sacking technique, irregular backwoods strategy will draw various preparing test sets that are not quite the same as each other. Each and every example set forms a choice tree with haphazardly chosen attributes[9].

Irregular timberland utilizes CART calculation for building trees. Thinking about the extensive number of manufactured trees, irregular backwoods technique is portrayed with great capacity to oppose clamor and extraordinary execution in the arrangement ability.

Random forest method is defined as a set of decision trees $\{h(x,\theta k),k=1,\ldots\}$, where $h(x,\theta k)$ is a meta-classifier, namely, a unpruned decision tree created using CART calculation; x fills in as the info vector, while $\{\theta k\}$ is an autonomous and indistinguishably dispersed arbitrary vector.

They decide the development procedure of every choice tree. As per the info information, every choice tree will give a result; joining of numerous outcomes will give the last yield of an irregular woodland. In the irregular woodland, the development procedure of a solitary choice tree is as per the following:

1. For the first preparing sets, packing technique is used to choose irregular information with substitution and in this manner shape preparing sets with contrast.

2. The highlights are likewise chosen utilizing examining approach. On the off chance that it is expected that an informational collection has N highlights, at that point M highlights will be examined from N, where M<<N. For each removed preparing set, just haphazardly chose M includes as opposed to all N highlights will be utilized for hub part in building trees.

3. All fabricated choice trees will develop openly without pruning.

The last outcome can be incorporated utilizing straightforward larger part voting strategy (for arrangement issues) or numerical normal strategy (for relapse issues) performed among the aftereffects of the choice trees.

Advantages of Random Forest Method

Random Forest technique can be regarded as a consolidating classifier calculation or a blend of choice trees. It joins the benefits of stowing and irregular element determination [10]:

1. Packing can evaluate not just the significance of each component yet additionally speculation mistake;

2. The trees of irregular timberland strategy are fabricated utilizing Truck calculation, which is perfect with the treatment of nonstop traits and discrete properties;

3. Irregular timberland strategy can successfully settle the issue of uneven grouping;

4. Arbitrary woodland strategy has astounding clamor resistance what's more, high grouping precision.

With regards to huge information condition, arbitrary woods technique is additionally portrayed with following favorable circumstances:

1. From the point of view of the enormous measure of huge information, the irregular timberland strategy can be skillful;

2. The moderately straightforward choice trees created by arbitrary woodland technique encourages business examiners to decipher its importance;

3. Arbitrary woodland technique is reasonable for circulated and parallel condition, demonstrating a decent adaptability;

4. The straightforward classifier made by choice trees can process information productively, which is pertinent to the attributes of fast information revive rate in the huge information condition.

Disadvantages of Random Forest Method

In spite of the previously mentioned favorable circumstances, arbitrary woods strategy is additionally confronting new difficulties in the mode of enormous information:

To begin with, in the enormous information condition, the information refresh rate is quick, so are the refresh rates of information attributes what's more, modes covered up in information.

Choice trees in view of preparing sets information will end up outdated and less exact in ordering information after a specific timeframe.

This requires calculations in the enormous information condition to have information versatility. In the interim, this capacity ought to additionally be immediately reflected in the classifier, while the typical lead of business or the stream-shape entry of information through the classifier ought not be influenced.

Furthermore, the choice tree, truth be told, is an insatiable calculation that effectively prompts unsteadiness and over fitting. Tackling this issue has an incredible importance for enhancing the exactness of choice tree. Thirdly, the backwoods scale built up by arbitrary timberland has not been unmistakably characterized; larger than average scale may result in repetition and hence lessen the productivity and exactness of characterization.

III METHODOLOGY / FRAMEWORK

Accuracy and Pruning of Decision Trees

With a specific end goal to address the issues in the enormous information condition, enhanced calculation ought to have the accompanying qualities:

1. It can rapidly produce a classifier on a given information preparing set;

2. The subsequent classifier can rapidly order new spilling information;

3. A calculation ought to be of flexibility to react to the adjustments in information modes and certification its exactness;

4. It should restrain the scale, to be specific, the quantity of trees, which will, from one perspective, guarantee the productivity of the calculation, while then again, will likewise ensure its precision.

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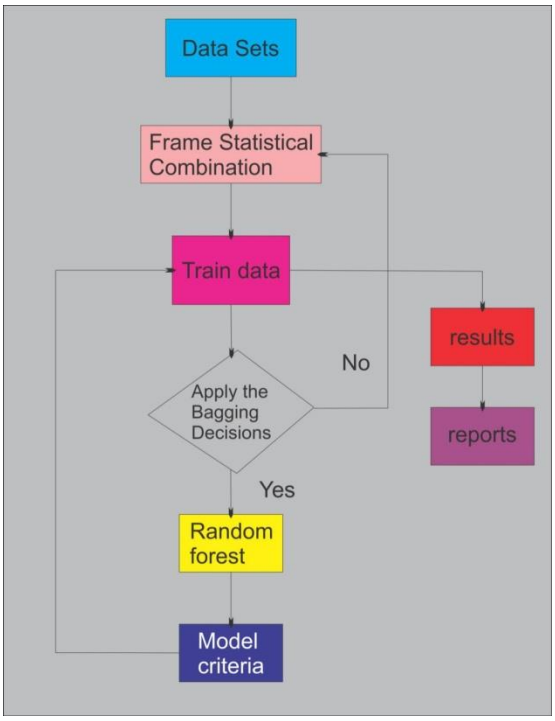

IV. RESULTS AND ANALYSIS

Testing Data Set

Informational indexes utilized in the test are begun from genuine client information of money related industry. The information sum represents 200,000 pieces with around 10,000 bits of information from each quarter, which was inspected from a bigger unique 5-year informational index.

The informational index contains an objective class and 16 include characteristics, which incorporates both the persistent numerical characteristics and discrete properties. Irregular woodland unit in R dialect form was utilized in the test.

So as to confirm the viability of previously mentioned changes, we utilized 10000 bits of information of the first quarter in the main year as the instated preparing set and utilize them to set up the underlying irregular woodland, where the number of trees levels with 100.

Data Inventory: The data is taken from a source and the same is loaded to the r console. This helps us to understand more about the data and how to analyze it.

Training Data: The second step is to find the combination out from the data so like which combinations can provide us the best results for prediction

Data Bagging: Number of decision trees is framed for the training data for the analysis. From this we will take the best possible combinations of the decision trees for the prediction

Results: from the above decision tress we frame a model which works for the prediction

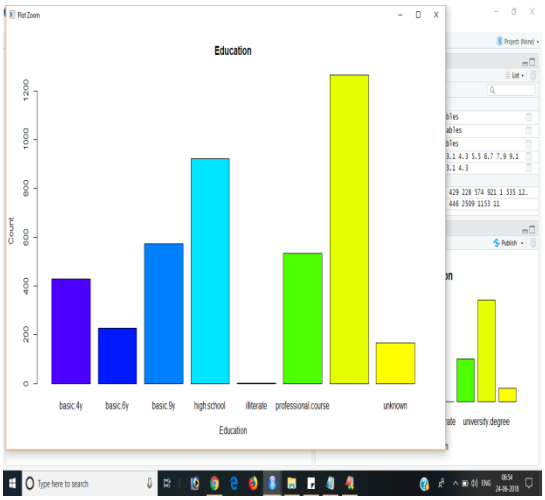

Fig 7.5 Education

- The graphs representing the education of the clients whose data has been considered for the analysis.
- Based on their qualification of the person the loan is issued.

V. CONCLUSION & FUTURE WORK

In light of the first arbitrary backwoods technique, this article proposed another enhanced model for the calculation. After change, it works well in the present enormous information mode. Particularly, its information examples will likewise change continuously with time, which enables it to give a superior play in the enormous information situations.

In the respect of process, the enhanced technique needs not to check the prepared information once more. Rather, it as it were requires to record the preparing consequences of every choice tree when utilizing classifier for handling information and to record the wrongly handled example information when creating the last outcomes. It has better practicability and possibility because of this variety and its low required capacity and calculation costs.

The enhanced strategy likewise has a decent execution in confirmation by utilizing genuine budgetary industry information. In any case, it ought to be noticed that it requires inside and out investigation on different angles. For instance, regardless of whether can it be embraced to different kinds of informational collections? Regardless of whether can the pruning choice capacities be made strides? What is the proper extent of the new choice trees? All of these inquiries should be additionally investigated in consequent contemplates.

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Data Extraction in Malignant Environments

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ABSTRACT

Deliberate or inadvertent escape of classified data is undoubtedly one among the premier extreme security dangers that associations look inside the advanced period. The risk right now stretches out to the private lives: an abundance of private information is out there to interpersonal organizations and great telephone providers and is in a roundabout way exchanged to undependable outsider and fourth gathering applications. amid this work, a bland data genealogy structure LIME (Data Lineage in the Malicious Environment), is utilized for data stream over different elements that take two trademark, guideline parts (i.e., proprietor and buyer). It characterizes the exact security ensures required by such a data heredity component toward recognizable proof of a blameworthy substance, and decide the disentangling non-denial and trustworthiness suspicions. At that point create and break down a totally special dependable data exchange convention between two substances among noxious surroundings by expanding upon unmindful exchange, solid watermarking, and mark natives. At long last, an exploratory investigation to exhibit the helpfulness of convention what's more, apply structure to the important data run projections of learning outsourcing and the informal organizations. In general, LIME(Data Lineage in the Malicious Environment),lineage structure for information exchange, to be a key advance towards accomplishing responsibility by plan.

Keywords: Classified Data, LIME, Trademark, Malicious Environment, Micro Benchmarking, Pairing Based Cryptography, GNU

I. INTRODUCTION

Data Extraction avoidance is the type of solutions which can help an institute to apply control for the prevention of unwanted, unintentional or leakage of specific information to illegal entities inside or outside the institute. Here specific information may refer to the institute's internal processing of documents, tactical business plans, academic property, economic statements, security policy, network architecture, blueprints etc.

In the past few decades there has been an exponential growth in technology in which the major part was the revolution of computers. This revolution has taken upon every aspect both resourcefully and individually, this growth has surely changed our lives by making it much easier. In the process of this growth there has been a severe risk which everyone may not be conscious of which is data extraction. Data extraction is basically a scenario where any intruder will access our personal data and make the extracted data public or the intruder might use it for any other intentions. Today we have a huge access of smartphones and gadgets which makes data

extraction much easy as the impostor can now easily transfer the data.

We as a consumer find many apps on internet and we knowingly handle our data to the respective organizations but is our data really safe in the hands of the organization, what if any employee of the fellow organization decides to make a step that ruins the organizations name, what if any employee wantedly access your data and misuses it. The answer to that problem is represented in the following work which will determine the guilty entity with proof and held for explanation if any data extraction occurs. There are few safety mechanisms such associate secret writing of valuable data, however it's a proactive measure that cannot verify the info leak once it happens. Once the intruder decrypts the information then there's no potential live which will prevent the info leak of the personal data and business data by any desired measures. Following are few measures that we often see and there are a number of situations where the event is determined.

1. We should take facebook for instance wherever we can see assortment of outsiders that approaches our insight, if any outsider is experienced in learning spill it winds up impractical to call attention to or see that wherever extremely the data was misused as there square measure a few outsiders advertised.
2. Consultancies have all the valuable data of representatives/applicants caning to seek out work which outsider contracts another outsider then all the three organizations will right now approach the individual information then it may turn out to be horrendously difficult to undeniably relate one the three partnerships for learning spill, in each the circumstances witnesses can either don't target the exact learning safety or the intruder may attentively reveal classified data which cannot be tied to any of the handlers. At times there comes experience the explanatory procedures however it's horribly expensive and it also doesn't create a terribly sensible outcome .Amid this distribution the prerequisite for general answerability instrument in learning exchange is demonstrated which may specially go with confirmable measures and control the condemn blameworthy. This philosophy of identification is named as learning root. Endeavors are made by numerous associations to utilize learning source inside the type of watermarking or including of false information or data in specially appointed way has not been that flourishing.

II. EXISTING SYSTEM

In the digital era, data outflow during intentional exposures, or un-intentional damage by untruthful staff and harmful external entities, always provide serious threats to organizations. it's not laborious to believe that this is simply the edge of an iceberg, as in most cases information of knowledge outflow go unreported thanks to concern of loss of client confidence or restraining penalties huge amount of digital data can be derived at nearly no price and might be unfold through the net in terribly short time to boot, the risk of obtaining or getting caught for information outflow or the extraction is very low, as there square measure presently nearly no answerableness mechanisms. For these reasons, the matter of information loss has reached a replacement dimension these days.

2.1 Disadvantages

Even with access management mechanisms, wherever access to sensitive information is restricted, a malicious approved user will publish the valuable information as soon as he receives it. Primitives like coding provide protection solely as long because the info of interest is encrypted, however once the recipient decrypts a message, nothing will stop him from publication the decrypted content. Therefore it looks not possible to stop information outpouring proactively.

2.2 Proposed System

In this work, the requirement for a general answerability mechanism in information transfers is got wind. This answerability are often directly related to demonstrably detective work a transmission history of information across multiple entities ranging from its origin. This can be called information place of origin, information lineage or supply tracing.

Here the matter is dignified of practically associating the problem to the extraction, and work on the information lineage methodologies to unravel the matter of knowledge leak in numerous leak situations. This system defines LIME, a generic information lineage framework for information flow across multiple entities within the malicious atmosphere.

Here it's observe that entities in information flows assume one amongst 2 roles: owner or shopper and introduce an extra role within the sort of auditor, whose task is to see a problem for any data extraction, and summarize the accurate properties for communication between these roles.In the process Associate in nursing non-mandatory non-repudiation assumption created between two house owners, Associate in nursing and non-mandatory trust (honesty) assumption created by the auditor concerning the house owners.

The second contribution, associate in nursing responsible for information transfer protocol to provably and securely transfer valuable information between the two parties is bestowed. It deals with associate in nursing and untrusted sender, associate in nursing and untrusted receiver situation related to data transfer between any two customers, the protocol we use is an interesting combination of the sturdy watermarking, oblivious transfer, and signature primitives.

2.2.1 Advantages of Proposed System

The key advantage of this representation is that it applies answerableness right from design; i.e., it drives the system designer to contemplate doable information leakages and also the corresponding answerableness constraints at the look stage. This helps to beat the prevailing state of affairs wherever most lineage mechanisms ar applied solely once an escape went on.

III. MODULES

3.1 Data Owner

In this module owner uploads their pictures with their contents data to the net server. For the safety purpose to the information, owner assigns the digital sign and stores it inside the internet and in addition performs the subsequent operations to transfer image with its digital signature with supported title, description

Below are the few operations an Owner can perform

1 .Upload image or a file,

2. Verify image or file details

3. View Consumer requests and

4. Deleted image details

3.2 Web Server

The Web service supplier manages an internet to supply information storage service. And performs the subsequent operations reminiscent of Storing all image files with their signature, read all image Files with its details, view all image comments, and view all information house owners and Users, read all attackers.

A web server will be monitoring the system held responsible for a secure login including analyzing of all the data that has been transferred between two entities

The basic operations that are performed by the web server are as follows

1. View Owner and consumer Details

2. View all the files details
3. View the attacked files
4. View Download history

3.3 Auditor

Auditor has capability to access, manage or monitor the transferred knowledge or data beneath the entrustment of information of owner, auditor has experience and capabilities that a standard user doesn't have, for occasionally auditing the outsourced knowledge. This audit service is considerably necessary for digital forensics and credibleness in Web and performs the subsequent operations

1.View image/file details
2. View Attacked files
3. Block or unblock an attacker
4. View messages from a consumer

3.4 Data Consumer

The net user of an Organization encompasses a great quantity of data to be stored in servers and have the permissions to access and manipulate and keep image and its data.

The consumer can search information and accessing the image data if he's approved and performs the subsequent operations

1.View all the files
2. Download a file
3. Send download request
4. Send message to the auditor

IV. TECHNIQUES USED

4.1 Micro Benchmarking

The execution of the convention is done in as a proof-of-idea and to determine its result. For the unaware exchange sub-convention is executed to the convention utilizing the PBC library, which itself makes utilization of the GMP library. For marks BLS plot is executed, likewise utilizing the PBC library. For symmetric encryption a usage of AES from the Crypto++ library is utilized. For watermarking a usage of the Cox calculation is utilized for vigorous picture and set the negative factor, which decides the quality of the watermark, to a estimation of 0.1.Now execute the explore different avenues regarding diverse parameters to examine the execution. The sender and beneficiary piece of the convention will be executed in a similar program, i.e., don't break down system sending, yet just computational execution.

4.2 PBC (Pairing Based Cryptography)

Blending based cryptography is a generally youthful territory of cryptography that rotates around a certain capacity with exceptional properties.

The PBC (Pairing-Based-Cryptography) library is a free C library based on the GMP library that plays out the numeric activities and fundamental matching based on cryptosystems.

The PBC library is planned to be the foundation of executions of matching based cryptosystems, in this manner speed and portability are key objectives. It provides schedules by comparing it to the elliptic bend era, elliptic bend number juggling and blending calculation. Due to the GMP library, in spite of being composed in C, pairings times are shabby. On a 1GHz Pentium III:

- Fastest matching is 11ms
- Short matching is 31ms

The API is sufficiently dynamic that the PBC library will be used despite of the fact that the associated researcher has exclusively a rudimentary comprehension of pairings. There’s no must be constrained to get some answers concerning elliptic bends or a significant measure of collection hypothesis. (The base necessity is a few information of cyclic gatherings and properties of the blending.)

The PBC library can likewise be utilized to construct customary cryptosystems.

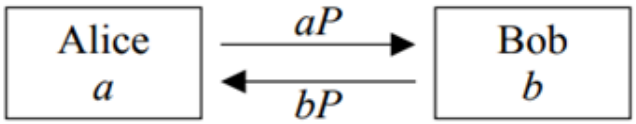

Fig 1. Two party one round key agreement protocol

3.3 The GNU Multiple Precision Arithmatic Library

GMP is attentively designed to be fast for small operands as well as for large operands. The speed is accumulated by use of adequate words as basic arithmatic type, by use of quick algorithms, with immensely advanced assembly code for the most familiar inner loops for a lot of CPUs, by a general insistence on speed.

GMP could be a free library for subjective accuracy number juggling, in task on marked whole numbers, objective numbers, and gliding point numbers. there's no sensible cutoff to the accuracy aside from those verifiable by the available memory inside the machine GMP keeps running on. GMP highlights a made arrangement of capacities, and furthermore the capacities have a regular interface. The fundamental target applications for GMP are cryptography applications and investigation, web security applications, unadulterated science frameworks, process unadulterated arithmetic examination, and so forth.

GMP is thoroughly intended to be as brisk as feasible, each for little operands and for huge operands. The speed is accomplished by exploitation full words in light of the fact that the fundamental number juggling sort, by exploitation brisk calculations, with to a great degree enhanced gathering code for the principal regular inward circles for loads of CPUs, and by a general weight on speed. The primary GMP unharness was made in 1991. it's consistently created and kept up, with a substitution unharness concerning once every year. Since variant about six, GMP is appropriated beneath the twin licenses, wildebeest LGPL v3 and wildebeest GPL v2. These licenses make the library freed to utilize, share, and enhance, and allow you to kick the bucket the outcome. The wildebeest licenses offer flexibilities, however conjointly set firm limitations on the use with without non programs. GMP's primary target stages are Unix-type frameworks, reminiscent of GNU/Linux, Solaris, HP-UX, waterproof OS X/Darwin, BSD, AIX, and so on. It is additionally celebrated internationally to figure on Windows in each 32-bit furthermore, 64-bit mode.

3.4 BLS Scheme

In cryptography, the Boneh– Lynn– Shacham (BLS) signature topic allows a client to confirm that an endorser is bona fide. The subject uses a straight blending for confirmation, Associate in nursing marks square measure segments of an elliptic bend group. working in Associate in Nursing elliptic bend bunch gives some safeguard against list math assaults (with the proviso that such assaults square measure still achievable inside the objective bunch of the matching), allowing shorter marks than FDH marks for an indistinguishable level of security. Marks made by the BLS signature subject square measure normally talked as short marks, BLS short marks, or just BLS marks. The mark subject is undeniably secure.

3.5 Cox Algorithm

The Cox– Zucker machine is a calculation made by David A. Cox and Steven Zucker. This calculation decides whether a given arrangement of areas gives a premise (up to torsion) for the Mordell– Weil gathering of an elliptic surface E → S where S is isomorphic to the projective line. The recipe was introductory uncovered inside the 1979 paper "Crossing point quantities of segments of elliptic surfaces" by Cox and Zucker and it totally was later

named the "Cox– Zucker machine" by Charles Schwartz in 1984.

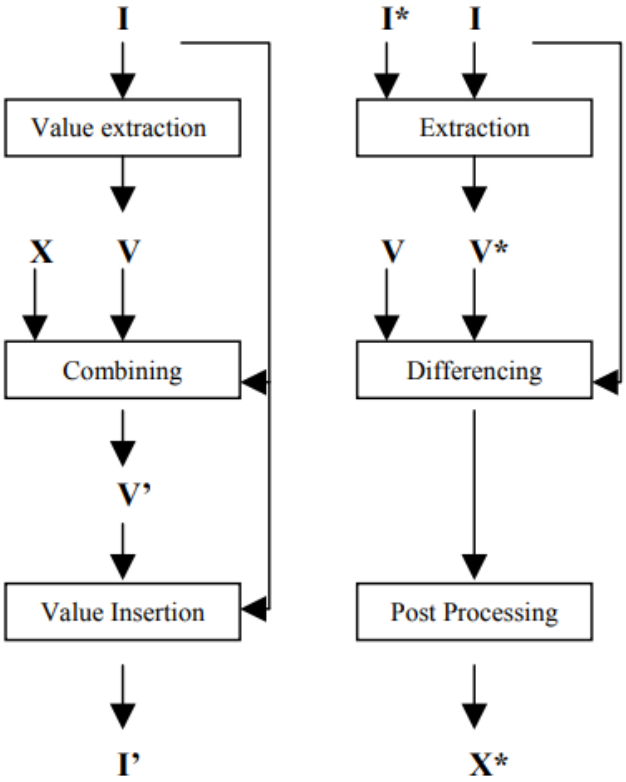

Fig 2. Working of cox algorithm

3.6 Possible Data Distortion

Here a simple cacophonic algorithmic program is utilized. Here the picture is spilt into n similarly estimated squares. In any case, once utilized a powerful watermark for the modest components (that will be that the - issue used by the Cox algorithmic program is zero.5), varieties between neighboring components ended up noticeable in spite of the way that the one watermarks zone unit in cognoscible.This outcome turns out to be considerably more grounded when numerous emphases as decided. Now and again, this bending would potentially affect the ease of use of the record. The Cox algorithmic program is utilized with relates alpha issue of zero.1 and no mutilation is noticeable. It would entrance to examine if this drawback are regularly dodged by exploitation extra detailed cacophonic calculations. As most watermarking plans assemble utilization of the nearness of information inside the archive, this can be not an inconsequential assignment.

V. RESULTS

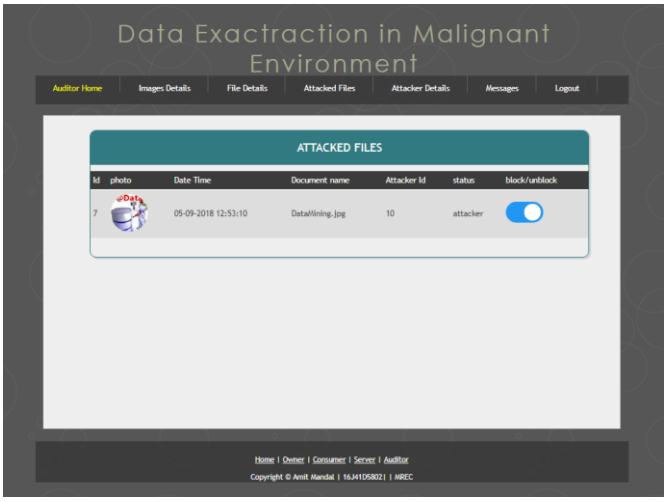

Fig 3. file for auditor

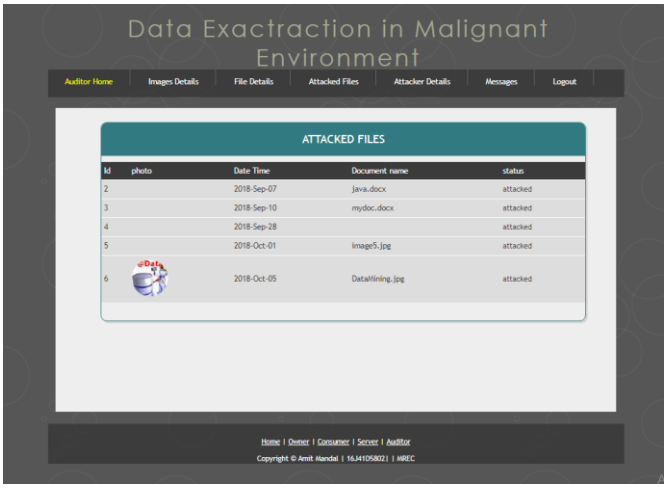

Fig 4.web server



Fig 5. consumer download page



Fig 6. Attacker being detected and blocked

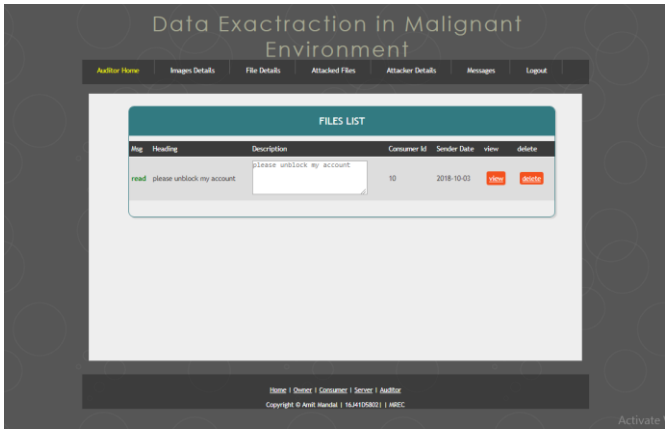

Fig 2. A message request from a non guilty consumer

VI. CONCLUSION AND FUTURE ENHANCEMENT

We are blessing LIME, a model for capable data exchange over different elements. We tend to plot teaming up parties, their interrelationships and give a solid inner portrayal for a data exchange convention utilizing a novel blend of negligent exchange, strong watermarking and computerized marks. We have a tendency to demonstrate its rightness and show that it's feasible by giving little seat checking comes about. By introducing a general relevant structure, we have a tendency to present answerableness as right on time as inside the style area of a data exchange foundation. Despite the fact that LIME doesn't effectively prevent data release, it presents responsive answerableness. Along these lines, it'll deflect vindictive gatherings from unseaworthy individual reports and can energize legitimate (however reckless) gatherings to create the predefined assurance for touchy data. LIME is adaptable as we have a tendency to separate between beyond any doubt senders (typically proprietors) and untrusted senders (generally buyers). Inside the instance of the beyond any doubt sender, a dreadfully simple convention with next to no overhead is achievable. The untrusted sender needs a considerable measure of modern convention, however the outcomes don't appear to be bolstered put stock in presumptions furthermore, along these lines they should be prepared to change over an unbiased substance (e.g. a judge). Our work conjointly rouses any investigation on data release recognition procedures for differed report sorts furthermore, projections. To Illustrate, it'll be a propelling future examination heading to style a certain ancestry convention for determined data.

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Defended Data Transmission Using Attribute Based Encryption In The Recoverable-Storage Cloud

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Abstract— Cloud computing gives an adaptable and advantageous route for information sharing, which brings different advantages for both the general public and people. Be that as it may, there exists a characteristic resistance for clients to specifically outsource the common information to the cloud server since the information regularly contain important data. Accordingly, it is important to put cryptographically upgraded get to control on the common information. Identity-based encryption is a promising cryptographical primitive to assemble a pragmatic information sharing framework. Nonetheless, get to control is not static. That is, the point at which some client's approval is terminated, there ought to be a component that can expel him/her from the framework. Thus, the renounced client can't get to both the beforehand and along these lines shared information. To this end, we propose an idea called revocable-capacity identity-based encryption (RS-IBE), which can give the forward/in reverse security of ciphertext by presenting the functionalities of client disavowal and ciphertext refresh all the while. Besides, we exhibit a solid development of RS-IBE, and demonstrate its security in the characterized security show. The execution examinations show that the proposed RS-IBE conspire has points of interest regarding usefulness and proficiency, and in this manner is plausible for a viable and practical information sharing framework. At last, we give execution aftereffects of the proposed plan to exhibit its practicability.

Index Terms—Cloud computing, data sharing, revocation, Identity-based encryption, ciphertext update, decryption key exposure.

1 INTRODUCTION

CLOUD computing is a worldview that gives huge calculation limit and tremendous memory space requiring little to no effort [1]. It empowers clients to get expected administrations independent of time and area over numerous stages (e.g., cell phones, PCs), and hence conveys extraordinary comfort to cloud clients. Among various administrations given by cloud computing, cloud stockpiling administration, for example, Apple's iCloud [2], Microsoft's Azure [3] and Amazon's S3 [4], can offer a more adaptable and simple approach to share information over the Internet, which gives different advantages to our general public [5], [6]. In any case, it likewise experiences a few security dangers, which are the essential worries of cloud clients [7].

Right off the bat, outsourcing information to cloud server suggests that information is out control of clients. This may cause clients' wavering since the outsourced information more often than not contain profitable and delicate data. Also, information sharing is frequently executed in an open and unfriendly condition, and cloud server would turn into an objective of assaults. Far more detestable, cloud server itself may uncover clients' information for illicit benefit. Thirdly, information sharing is not static. That is, the point at which a client's approval gets lapsed, he/she should never again have the benefit of getting to the already and thusly shared information. Hence, while outsourcing information to cloud server, clients likewise need to control access to these information with the end goal that exclusive those right now approved clients can share the outsourced information.

A characteristic answer for overcome the previously mentioned prob-lem is to utilize cryptographically upheld get to control, for example, identity-based encryption (IBE). Besides, to defeat the above security dangers, such sort of identity-construct get to control put in light of the mutual information should meet the accompanying security objectives:

Data confidentiality: Unapproved clients ought to be kept from getting to the plaintext of the common information put away in the cloud server. What's more, the cloud server, which should be straightforward yet inquisitive, ought to likewise be dissuaded from knowing plaintext of the common information.

In reverse mystery: Backward mystery implies that, when a client's approval is lapsed, or a client's mystery key is bargained, he/she ought to be kept from getting to the plaintext of the thusly shared information that are still encrypted under his/her identity.

Forward mystery: Forward mystery implies that, when a client's power is terminated, or a client's mystery key is traded off, he/she ought to be kept from getting to the plaintext of the mutual information that can be beforehand gotten to by him/her.

The particular issue tended to in this paper is the means by which to build a major identity-based cryptographical instrument to accomplish the above security objectives. We likewise take note of that there exist other security issues that are similarly critical for a viable arrangement of information sharing, for example, the genuineness and accessibility of the mutual information [8], [9], [10], [11], [12]. Be that as it may, the exploration on these issues is past the extent of this paper.

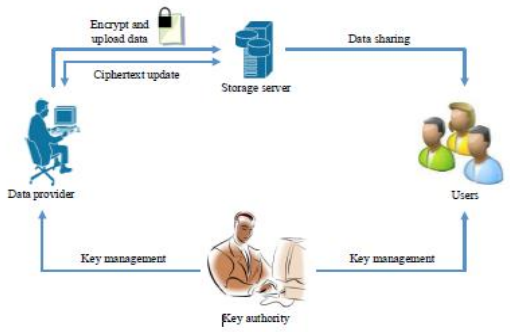


Fig. 1. A natural RIBE-based data sharing system
Clearly, such an information sharing framework can give privacy and in reverse mystery. Besides, the strategy for decrypting and re-encrypting all the mutual information can guarantee forward mystery. In any case, this brings new difficulties. Note that the procedure of decrypt-then-re-encrypt fundamentally includes clients' mystery key data, which makes the general information sharing framework helpless against new assaults. As a rule, the utilization of mystery key ought to be constrained to just regular decryption, and it is ill advised to refresh the ciphertext intermittently by utilizing mystery key.

Another test originates from effectiveness. To refresh the ciphertext of the mutual information, the information supplier needs to habitually complete the system of download-decrypt-reencrypt-transfer. This procedure brings incredible correspondence and calculation cost, and accordingly is unwieldy and undesirable for cloud clients with low limit of computatio and capacity. One strategy to stay away from this issue is to requirethe cloud server to straightforwardly re-encrypt the ciphertext of the mutual information. Be that as it may, this may present ciphertext extension,namely, the measure of the ciphertext of the mutual information is direct in the quantity of times the common information have been refreshed. What's more, the strategy of intermediary re-encryption can likewise be utilized to vanquish the previously mentioned issue of proficiency. Tragically, it additionally obliges clients to associate with the cloud server so as to refresh the ciphertext of the mutual information.

1.2 Related work

1.2.1 Revocable identity-based encryption

The possibility of identity-based encryption was exhibited by Shamir [13], and supportively instantiated by Boneh and Franklin [14]. IBE takes out the necessity for giving an open key system (PKI). Despite the setting of IBE or PKI, there must be an approach to manage disavow customers from the system when fundamental, e.g., the master of some customer is slipped by or the puzzle key of some customer is revealed. In the standard PKI setting, the issue of repudiation has been particularly mulled over [15], [16], [17], [18], [19], and a couple of techniques are for the most part supported, for instance, revelation foreswearing list or fastening authenticity periods to confirmations. In any case, there are only two or three focuses on disavowal in the setting of IBE.

Boneh and Franklin [14] first proposed a trademark revocation course for IBE. They added the present period to the ciphertext, and non-denied customers once in a while got private keys for every day and age from the key expert. Grievously, such an answer is not flexible, since it requires the key expert to perform straight work in the amount of non-repudiated customers. In addition, a protected channel is fundamental for the key master and non-revoked customers to transmit new keys. To conquer this issue, Boldyreva, Goyal and Kumar [20] familiar a novel approach with fulfill beneficial denial. They used a matched tree to manage identity to such a degree, to the point that their RIBE scheme reduces the multifaceted design of key denial to logarithmic (instead of direct) in the most outrageous number of structure customers.

1.2.2 Forward-secure cryptosystems

In 1997, Anderson [28] presented the thought of forward security in the setting of mark to restrict the harm of key presentation. The center thought is isolating the entire lifetime of a private key into T

discrete eras, with the end goal that the trade off of the private key for current day and age can't empower a foe to create legitimate marks for past eras. In this manner, Bellare and Miner gave formal meanings of forward-secure mark and exhibited functional arrangements.

2 PRELIMINARIES

In this segment, we first quickly display the fundamental ideas onbilinear matching and decisional ℓ-BDHE suspicion. At that point, a calculation used to perform productive disavowal is presented.

2.1 Bilinear pairing and complexity assumption

Definition 1 (Bilinear pairing). *Let G_1 and G_2 be two cyclic groups with prime order q, and g be a generator of G_1. A bilinear pairing is a map $e : G_1 \times G_1 \to G_2$ with the following properties:*

- *Bilinearity: $e(u^a, h^b) = e(u,h)^{ab}$ for all $u, h \in G_1$, $a, b \in \mathbb{Z}_q^*$.*
- *Non-degeneracy: $e(g,g) \neq 1$.*
- *Computability: There exists an efficient algorithm to compute $e(u,h)$ for any $u, h \in G_1$.*

Definition 2 (Decisional ℓ-BDHE Assumption). *The decisional ℓ-BDHE problem is formalized as follows. Choose a group G_1 with prime order p according to the security parameter λ. Select a generator g of G_1 and $a, s \xleftarrow{R} \mathbb{Z}_p$, and let $f_i = g^{a^i}$. Provide the vector $\boldsymbol{f} = (g, g^s, f_1, ..., f_\ell, f_{\ell+2}, ..., f_{2\ell})$ and an element $D \in G_2$ to a probabilistic polynomial-time (PPT) algorithm $\mathcal{C}$, it outputs 0 to indicate that $D = e(g^s, g^{a^{\ell+1}})$, and outputs 1 to indicate that D is a random element from G_2.*

The advantage of $\mathcal{C}$ solving the decisional ℓ-BDHE problem in G_1 is defined as follows:

$$\mathbf{Adv}_{\mathcal{C}}^{\ell\text{-dBDHE}}(\lambda) = \left|\Pr[\mathcal{C}(\boldsymbol{f}, D = e(g^s, g^{a^{\ell+1}})) = 0] - \Pr[\mathcal{C}(\boldsymbol{f}, D \xleftarrow{R} G_2) = 0]\right|.$$

We say that the decisional ℓ-BDHE presumption holds in G1 gave that no PPT calculation can take care of the decisional ℓ-BDHE issue with a non-insignificant favorable position.

2.2 KUNodes algorithm

Our RS-IBE conspire utilizes a similar parallel tree structure presented by Boldyreva, Goyal and Kumar [20] to accomplish proficient repudiation. To portray the repudiation component, we initially display a few documentations. Indicate by ε the root hub of the twofold tree BT , and Path(η) the arrangement of hubs on the way from ε to the leaf hub η (counting ε and η). For a non-leaf hub θ, we let θl and θr remain for its left and right youngster, separately. Given a day and age t and disavowals list RL, which is included the tuples (ηi, ti) demonstrating that the hub ηi was repudiated at day and age ti, the calculation KUNodes(BT ,RL, t) yields the littlest subset Y of hubs of BT with the end goal that Y contains a progenitor for every hub that is not denied before the day and age t.

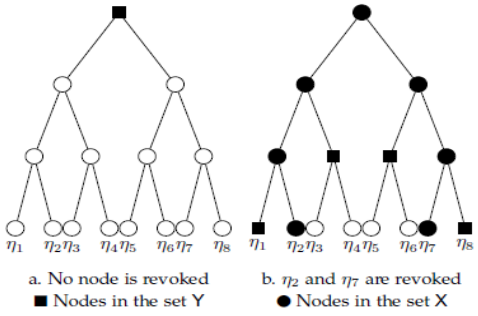


Fig. 2. An instance of the algorithm KUNodes

Casually, to recognize the set Y, the calculation initially denotes every one of the predecessors of denied hubs as repudiated, at that point yields all the non-renounced offspring of disavowed hubs. For instance, we exhibit two cases of the calculation KUNodes in Figure 2. The formal portrayal is given underneath.

Algorithm 1 KUNodes($\mathcal{BT}, RL, t$)

```
X,Y ← ∅
for all (η_i, t_i) ∈ RL do
    if t_i ≤ t then
        Add Path(η_i) to X
    end if
end for
for all θ ∈ X do
    if θ_l ∉ X then
        Add θ_l to Y
    end if
    if θ_r ∉ X then
        Add θ_r to Y
    end if
end for
if Y = ∅ then
    Add the root node ε to Y
end if
return Y
```

3 DEFINITION AND SECURITY MODEL OF RS-IBE

In this segment, we initially give the formal meaning of RSIBE, and afterward give the relating security display.

3.1 Syntax of RS-IBE

Definition 3 (Revocable-Storage Identity-Based Encryption).
A revocable-stockpiling identity-based encryption conspire with message space M, identity space I and aggregate number of eras T is involved the accompanying seven polynomial time calculations:

• Setup(1λ, T,N): The setup calculation takes as information the security parameter λ, the time bound T and the most extreme number of framework clients N, and it yields people in general parameter PP and the ace mystery key MSK, related with the underlying renouncement list RL = ∅ and state st. PKGen(PP,MSK, ID): The private key era calculation takes as info PP, MSK and an identity ID ∈ I, and it creates a private key SKID for ID and a refreshed state st. • KeyUpdate(PP,MSK,RL, t, st): The key refresh calculation takes as information PP,MSK, the present denial list RL, the key refresh time t ≤ T and the state st, it yields the key refresh KUt. • DKGen(PP, SKID,KUt): The decryption key era calculation takes as info PP, SKID and KUt, and it creates a decryption key DKID,t for ID with era t or an image ⊥ to outline that ID has been already disavowed.

• Encrypt(PP, ID, t,M): The encryption calculation takes as information PP, an identity ID, an era t ≤ T , what's more, a message M ∈ M to be encrypted, and yields a ciphertext CTID,t.
• CTUpdate(PP,CTID,t, t′): The ciphertext refresh calculation takes as information PP, CTID,t and another day and age t′ ≥ t, and it yields a refreshed ciphertext CTID,t′ .

• Decrypt(PP,CTID,t,DKID,t′): The decryption calculation takes as information PP, CTID,t, DKID,t′ , and it recoups the encrypted message M or a recognized image ⊥ showing that CTID,t is an invalid ciphertext.

• Revoke(PP, ID,RL, t, st): The repudiation calculation takes as info PP, an identity ID ∈ I to be renounced, the present repudiation list RL, a state st and denial day and age t ≤ T , and it refreshes RL to another one.

3.2 Security model

Definition 5 (IND-RID-CPA). A RS-IBE conspire is INDRID-CPA secure gave that to any PPT foe An, it has immaterial preferred standpoint in the accompanying security diversion between a challenger C and the enemy A:

• Setup. C performs Setup(1λ, T,N) → (PP,MSK) and sends PP to A;

• Phase 1. A makes the accompanying inquiries in a versatile way:

a. OSK(ID): C performs PKGen(PP,MSK, ID) → (Slide, st) and returns SKID to A;

b. OKU(t): C runs KeyUpdate(PP,MSK,RL, t, st) → Ut and returns KUt;

c. ODK(ID, t): C runs PKGen(PP,MSK, ID) → (Slide, st) and DKGen(PP, SKID,KUt) → DKID,t, at that point advances DKID,t to A;

d. ORV (ID, t): C refreshes the present disavowal list RL by running Revoke(PP, ID,RL, t, st) → RL and returns the refreshed RL to A;

• Challenge. A signs the inquiry is finished and sends (M0,M1, ID∗, t∗, st) to C subject to the limitation that M0,M1 ∈ M and |M0| = |M1|. At that point, C picks an arbitrary piece β R ←− {0, 1} and restores the tested ciphertext CTID∗,t∗ ← Encrypt(PP, ID∗, t∗,Mb) to

A;

• Phase 2. A starts another inquiry stage as stage 1;• Guess. A yields a bit β′ as a figure of β; The confinements expressly made on A's questions in the amusement are as per the following:

1) OKU(t) and ORV (ID, t) must be questioned in a consecutive request in time. That is, the time t ought to be more prominent than or equivalent to the season of all past questions;

2) ORV (ID, t) can't be questioned if OKU(t) was questioned;

3) If OSK(ID∗) was questioned then ORV (ID∗, t) must be questioned, where t ≤ t∗;

4) ODK(ID, t) can't be questioned before OKU(t) was questioned;

5) ODK(ID∗, t∗) can't be questioned

.

The adversary A's advantage in the above game is defined as

$$\mathbf{Adv}^{\text{IND-RID-CPA}}_{\text{RS-IBE},\mathcal{A}}(\lambda,T,N)=\left|\Pr[\beta'=\beta]-\frac{1}{2}\right|$$

Remark 1. In the security game above, we do not provide a query oracle for the ciphertext update algorithm **CTUpdate** since the adversary can run it to a ciphertext just by using the public parameter PP.

4 RS-IBE RESISTANT TO DECRYPTION KEY EXPOSURE

In this segment, we initially introduce a solid development of RSIBE impervious to decryption key introduction, and after that examine its security and execution.

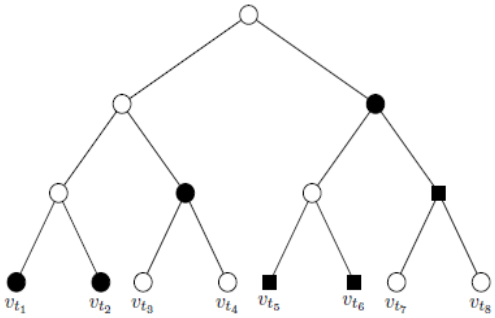
4.1 Construction

Our development includes two parallel trees BT and T to oversee identity and day and age, separately. More

accurately, for identity renouncement, we take after Boldyreva et al's. [20] methodology. That is, given an identity ID, we arbitrarily store it in a leaf hub η of BT , and produce the relating mystery key SKID = {(θ, SKID,θ)}θ∈Path(η) as in past RIBE plans [20], [24]. On the off chance that the client ID is not denied at day and age t, there exists a hub θ ∈ Path(η) ∩ KUNodes(BT ,RL, t). Subsequently, given the refresh key KUt = {(θ,KUt,θ)}θ∈KUNodes(BT ,RL,t), the client

a hub v of T , let bv ∈ {0, 1}≤ℓ be the twofold grouping

relating to the way from the root hub of T to v, where 0 and 1 show that the way goes through the left and right offspring of the parent hub, individually. On the other hand, given a string b ∈ {0, 1}≤ℓ, let vb be the hub that has a way b from the root hub to it. Moreover, mean by bv[j] and ti[j] the j-th bit of bv and ti separately, and |bv| the length of bv. What's more, for each leaf hub vt of the paired T , we characterize the accompanying set: Tt = {v|Parent(v) ∈ Path(vt), v/∈ Path(vt)} ∪ {vt}, where Parent(v) signifies by the parent hub of v. As exhibited in [34], such a set components the accompanying property:



l Nodes in the set Tt1 n Nodes in the set Tt5

Fig. 3. An example of T with depth 3

Property 1. Given two eras t and t′ with the end goal that t < t′, for every hub v′ ∈ Tt′ , there exists a hub v ∈ Tt to such an extent that bv is a prefix of bv′ . At the end of the day, there exists a string b′ ∈ {0, 1}l with the end goal that bv′ = bv||b′, where l = |bv′ | − |bv|.

As displayed along these lines, the above property empowers us to refresh the ciphertext from eras t to t′. For logical reason, we give a twofold tree with profundity 3, which implies that the aggregate number of era is 8. As appeared in Figure 3, the furthest left and furthest right leaf hubs vt1 and vt8 relate to the strings 03 and 13 separately. The sets Tt1 = {v1, v01, vt2 , vt1} and Tt5 = {v11, vt6 , vt5}.

We introduce the solid development underneath

• Setup(1λ, T,N): Given a security parameter λ, the

add up to number of eras T = 2ℓ, the most extreme number

of clients N, this calculation executes as takes after:

1) Choose bilinear gatherings (G1,G2) with prime request p > 2λ and the comparing bilinear guide e : G1 × G1 → G2.

2) Select gathering components g, g2 R ←− G1 and a number α R ←− Z∗ p, and set g1 = gα. Moreover, pick two

random vectors $\boldsymbol{u} = (u_0, u_1, ..., u_n) \in G_1^{n+1}$ and $\boldsymbol{h} = (h_0, h_1, ..., h_\ell) \in G_1^{\ell+1}$, and for each $ID \in \mathcal{I} = \{0,1\}^n$ and $t \in \{0,1\}^\ell$, define the following two functions[3]:

$$F_u(ID) = u_0 \prod_{i=1}^{n} u_i^{ID[i]}, \quad F_h(t) = h_0 \prod_{j=1}^{\ell} h_j^{t[j]}.$$

Here, ID[i] is the ith bit of ID.

3) Let the ace mystery key be MSK = gα 2 , and instate the state st with a double tree BT of profundity log(N) and the repudiation list RL = ∅.

4) Publish the general population parameter as

• PKGen(PP,MSK, ID): For an identity ID ∈ I, this calculation creates its mystery key as indicated by the accompanying way

4.3 Performance discussions

In this segment, we talk about the execution of the proposed RS-IBE plot by contrasting it and past

works as far as correspondence and capacity cost, time many-sided quality and functionalities, which are compressed in Table 1, Table 2 and Table 3.

From Table 1 we can see that the sizes of private key and refresh enter in plans [22], [24] and our plan are all upper limited by O(r logN/r), since these plans all use parallel information structure to accomplish repudiation. Then again, Liang et al's. [26] plot includes a communicate encryption plan to appropriate refresh key with the end goal that their plan has consistent sizes of private key and refresh key. Moreover, by appointing the era of re-encryption key to the key expert, the ciphertext size of their plan likewise accomplishes steady. In any case, to this end, the key specialist needs to keep up an information table for every client to store the client's mystery key forever periods, which brings O(T)τG1

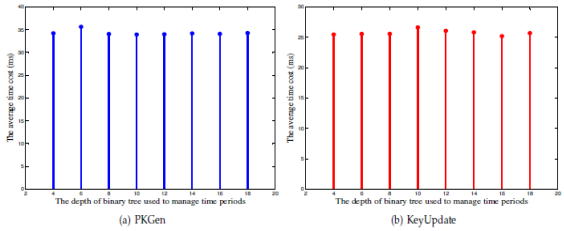


Fig. 5. The time costs of the algorithms **PKGen** and **KeyUpdate**.

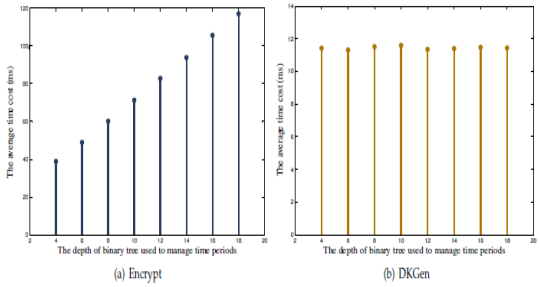


Fig. 6. The time costs of the algorithms **Encrypt** and **DKGen**.

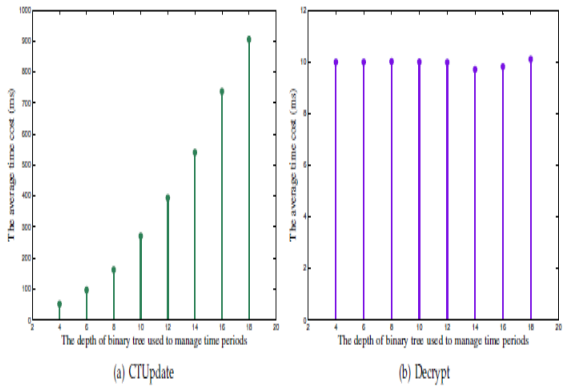


Fig. 7. The time costs of the algorithms **CTUpdate** and **Decrypt**.

capacity taken a toll for the key specialist. On the other hand, the ciphertext size of our plan is recently direct in log(T)2. Moreover, we take note of that in every recorded plan, the private key generator needs to occasionally create a refresh key, it must be on the web if each era is fairly short, e.g., 60 minutes. Be that as it may, from the point of view of useful applications, the recurrence of refreshing clients' decryption keys ought not be too little. A day and age like seven days, a large portion of a month or a moth is more alluring. As a result, the private key generator simply needs to create a refresh key for the following time frame when the present day and age is finished. In this manner the PKG does not should be constantly on the web. Another restriction of these recorded plans is that the produced ciphertext has the size direct with the quantity of collectors. To defeat this issue, a characteristic way is to develop a comparable plan in the setting of communicate encryption.

4.4 Implementation

To demonstrate the useful materialness of the proposed RSIBE conspire, we additionally actualize it utilizing codes from the Pairing-Based Cryptography library variant 0.5.14 [39]. In particular, we utilize the symmetric supersingular bend y2 = x3 + x, where the base field measure is 512-piece and the installing degree is 2. The usage is gone up against a Linux-like framework (Win7 + MinGW) with an Intel(R) Core(TM) i5 CPU (650@3.20GHz) and 4.00 GB RAM. In the usage, we set the quantity of clients to be N = 8 and the denied uses to be R = 4 (the hubs η2, η3, η4, η7 in Figure 2 are repudiated). In Figure 5, Figure 6 and Figure 7, we display the running time of the fundamental calculations, i.e., PKGen, KeyUpdate, DKGen, Encrypt, CTUpdate and Decrypt, for various decision of the aggregate number of eras T ∈ {24, 26, 28, 210, 212, 214, 216, 218}. To produce the exploratory

outcomes, we execute as the accompanying system: create the private key and encrypt a message

5 CONCLUSIONS

Cloud computing brings incredible accommodation for individuals. Especially, it consummately matches the expanded need of sharing information over the Internet. In this paper, to manufacture a financially savvy and secure information sharing framework in cloud computing, we proposed an idea called RS-IBE, which bolsters identity disavowal and ciphertext refresh at the same time with the end goal that a repudiated client is kept from getting to already shared information, and in addition in this manner shared information. Besides, a solid development of RS-IBE is exhibited. The proposed RS-IBE conspire is demonstrated versatile secure in the standard model, under the decisional ℓ-DBHE supposition. The examination comes about show that our plan has points of interest as far as effectiveness and usefulness, and along these lines is more achievable for down to earth applications.

ACKNOWLEDGEMENTS
We thank the anonymous reviewers for their helpful comments and suggestions.

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STYLOMETRIC ANALYSIS OF ANNOTATED SPEECH TO STUDY BEHAVIOUR OF THE SPEAKER

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Abstract- *Stylometry is an area of research where the analysis can be applied on the user speech analysis, identifying the behaviour of the speaker. Stylometric also includes the analysis of the author identification based on the vocabulary comparison from author to author. Here we introduce 'Stylometry with R' (stylo), a flexible R package for the high-level stylistic analysis of text collections. This package explicitly seeks to further contribute to the recent development in the field towards a more advanced level of replicability and benchmarking in the field. Stylometry is a multidisciplinary research endeavor, attracting contributions from divergent scientific domains, which include researchers from Computer Science – with a fairly technical background as well as experts from the humanities who might lack the computational skills which would allow them easy access to the state-of-the-art methods in the field.*

Keywords:- *Stylometry, Data Analysis, Speech, Behaviour Analysis.*

I INTRODUCTION

Stylometric contemplates, in the entirety of their assortment of material and technique, share two basic highlights: the electronic writings they examine must be urged by one way or another to yield numbers, and the numbers themselves must be handled with factual programming. In some cases, the two activities are two free pieces of a given report. To give the least difficult precedent, one bit of programming is utilized exclusively to aggregate word recurrence records; at that point, one of the numerous business measurements bundles takes over to separate significance from this mass of words, draw diagrams and so forth.

This methodology works if standard factual systems are connected to the information. For multivariate word-recurrence based creation attribution, for example, when free AntConc produces word records with frequencies, costly (yet regularly college authorized) SAS, SPSS or Statistica can be utilized to deliver relative frequencies and relationship grids thereof, and one of their numerous modules can thus deliver Principal Components (PCA), Cluster (CA), or Multidimensional Scaling (MDS) investigations. This is now an entirely agreeable circumstance when contrasted with what Burrows needed to depend on in his fundamental work on Jane Austen's style (Burrows 1987).

However, as stylometrists have started to create factual strategies for their own – to give some examples, Burrows' Delta, Zeta and Iota (Burrows 2002, 2006) and their changes by different researchers (Argamon 2008, Craig and Kinney 2009, Hoover 2004a, 2004b) – business programming, regardless of its wide exhibit of available techniques, progresses toward becoming

something of a straitjacket. This is the reason various devoted stylometric arrangements have showed up, focusing on the particular examinations much of the time utilized in this network.

Hoover's Delta, Zeta and Iota Excel spreadsheets are a spearheading and great case of this methodology (Hoover 2004b). Always created since somewhere around 2004 (when one of the writers of this introduction got a CD-ROM with an early form), they have no less than two noteworthy resources: they do precisely what the stylometrist needs (with a few discretionary methods) and they just require spreadsheet programming that has progressed toward becoming (regardless) the standard on most PCs on the planet today. This has been particularly useful for utilizations in authority workshops and study halls; the understudy just needs extra (and, frequently, free) programming to create word recurrence records and he/she is prepared to go. However Excel forces one confinement: it is pointless excess regarding memory use, which results in the gradualness of its preparing. Likewise, the two-organize nature of the procedure (a different bit of programming gets ready word records that can be later naturally brought into the spreadsheet) may be something of an issue basically in light of the fact that it would take an accomplished Visual Basic software engineer to make Excel arrange the word records themselves.

II RELATED WORK

R contents can be depended on for doing the entire work themselves, from controlling writings (ordinarily, to create word records) right to charting the outcomes (and that in an extraordinary assortment).

These abilities were put tu use in the investigation of Delta's reliance on concentrated writings' sizes (Eder 2010), and on the conduct of Delta at an assortment of interims in the word recurrence rank records in an assortment of dialects (Rybicki and Eder 2011). The R condition allowed us to cover immense measurements at exceptional rates (regularly a great many Delta emphasess every hour in corpora of a hundred full-estimate books). It likewise allowed us to utilize other factual strategies, for example, PCA, CA or MDS, or those once in a while utilized so far in this field –, for example, bootstrap accord trees dependent on an investigation of Papuan dialects by Dunn et al. (2005, cited in Baayen 2008: 143-47). Likewise, the whole investigation – from stacking writings to conclusive outcomes in numeric and realistic structure – can be practiced with a solitary content. Our Delta content, for example, did basically everything: it handled electronic writings to make a rundown of the considerable number of words utilized in all writings contemplated, with their frequencies in the individual writings; standardized the frequencies with z-scores (if appropriate); chose words from expressed recurrence ranges for investigation; played out extra systems that (typically) improve attribution, for example, Hoover's programmed cancellation of individual pronouns and separating (programmed expulsion of words unreasonably trademark for individual writings); looked at the outcomes for individual writings; played out an assortment of multivariate examinations; displayed the similitudes/separations acquired in tree charts; at long last, created the previously mentioned accord tree – another diagram that joined many tree outlines for an assortment of parameter esteems. It was our plan to build up a general stage for multi-emphasis attribution tests; for example, a substitute content created heatmaps to demonstrate the level of Delta's accomplishment in attribution at different interims of the word recurrence positioning rundown.

Stylometry: Identifying authors of texts using R:

Few people expect politicians to write every word they utter themselves; reliance on speechwriters and spoke persons is a long-established political practice. Still, it's interesting to know which statements are truly the politician's own words, and which are driven primarily by advisors or influencers. By looking at the aspects of linguistic style (word/sentence length, frequency of word pairings, use of punctuation, etc.) of the speeches we can able to find out the behaviour of the person.

A Stylometric Approach to Identity-Level Identification and Behaviour Detection:

Lexical features: Lexical features describes the semantics of the words used by the author. Vocabulary richness and word-length distributions are classic examples.

Syntactic features: Such kind of features rely on an analysis of typical sentence structure considering elements like function words, punctuation, and part-of-speech tags.

Structural features: Structural features targets the actual composition of the text discussing its organization and layout. Due to the short extracts without any further information, this seems not applicable here.

Content-specific features: This type of features based on an analysis of essential keywords and phrases on specific topics like in scientific publication. Like the feature set before not applicable in our context.

Idiosyncratic features: Individual usage anomalies like misspellings and grammatical mistakes are taken into consideration. After the editing process of all the texts, it is unlikely that any valuable results remain.

Title: A Scalable Framework for Stylometric Analysis Query Processing:

Authors : Sarana Nutanong Chenyun Yu Raheem Sarwar Peter Xu Dickson Chow

Publishing Year: 2016

Method: Stylometry is the statistical analyses of variations in the author's literary style. The technique has been used in many linguistic analysis applications, such as, author profiling, authorship identification, and authorship verification.

Dis advanatage:

However, these studies are generally limited to (i) a small number of candidate authors, and (ii) documents with similar lengths.

Advantage:

larger number of documents of different lengths written by a larger pool of candidate authors with a high accuracy

Title: A survey of modern authorship attribution methods:

Authors :E. Stamatatos, JASIST

Publishing Year: 2009

Method: The main idea behind statistically or computationally-supported authorship attribution is that by measuring some textual features we can distinguish between texts written by different authors. The first attempts to quantify the writing style go back to 19th century, with the pioneering study.

Dis advanatage:

computational requirements and settings rather than linguistic or literary issues.

Advantage:

authorship attribution studies

text representation and text classification.

Title: Overview and Comparison of Plagiarism Detection Tools :

Authors : Asim M. El Tahir Ali, Hussam M. Dahwa Abdulla

Publishing Year: 2011

Method: An overview of effective plagiarism detection methods that have been used for natural language text plagiarism detection, external plagiarism detection, clustering-base plagiarism detection and some methods used in code source plagiarism detection

Dis advanatage:

Comparision Models with all softwares.

No development of the models

Advantage:

Author citing on the articles made easy.

user intendation over the articles are accessed easly and secured over the authors.

Title: Does size matter? Authorship attribution, small samples, big problem:

Authors : Maciej Eder.

Publishing Year: 2013

Method: find such a minimal size of text samples for authorship attribution that would provide stable results independent of random noise.

Dis advanatage:

method of sampling: contrary to common sense, randomly excerpted 'bags of words' turned out to be much more effective than the classical solution, i.e. using original sequences of words ('passages') of desired size.

Advantage:

k-NN applied to most frequent words, character 3-grams, character 4-grams, and parts-of-speech-tag 3-grams.

III Proposed Work:

Stylometry or the study of measurable options of (literary) vogue, like sentence length, vocabulary richness and numerous frequencies (of words, word lengths, word forms, etc) has been around a minimum of since the center of nineteenth century, and has found assorted sensible applications in authorship attribution analysis.

The research in last few decades on usage of language statistical analysis is growing in a rapid way. Modern stylometry attracts heavily on the help of computers for statistical analysis as well as the artificial intelligence and also providing access to the growing corpus of text documents accessible via the Internet. Our main goal is to demonstrate and analyse the speech by the dictator's vocabulary and then analyzing the data in order to project the statistical patterns. Stylometry to identify if shifts in stylistic patterns are observed across various speeches, using computational tools. The crucial analysis with stylometry is this: There exist habits for each person, formed unconsciously, in regards to words and Language usage. These determine the dictator's structure, diversity, and word choice in each person's writings, forming a Stylistic signature.

Stylometry grew out of earlier techniques of analyzing texts for evidence of authenticity, authorial identity.

Increases the vocabulary richness.

Applying the stylometry to the speeches of the speakers in analyzing the speech delivered to the audience.

To evaluate the efficiency in analyzing the speeches, we compare with required methods.

Analyzing the speech text via large documents.

These large scale documents help us to know more about the speaker from his speech or the vocabulary used and the way of his approach over the speech deliveries.

To demonstrate and analyze the behaviour of the dictator.

Research based on the analysis of texts might help the scientists to gain full control of the behaviour of the individual.

The term stylometry draws the behaviour of the user from all the speeches delivered by the speaker.

The proposed system provides the statistical objects from the speaker data such as positive negative and emotional terms.

The behaviour of the individual speaker could be analyzed from the emotions based on the particular speech data.

Usages of the regular expression make the information classification a lot friendly and fetch more efficient results.

Uses NLP Algorithms can be implemented on any kind of data.

IV IMPLEMENTATION

Stylometry

Stylometric investigation errands can be sorted out into two kinds, creation distinguishing proof and composing style closeness identification [1]. Each assignment is comprise of two stages (I) finding proper stylometric highlights (ii) framing productive ways to deal with apply on these highlights. The target of creation recognizable proof errand is to analyze question writings against the composition tests of the hopeful writers. An outstanding case of creation distinguishing proof is the Federalist papers [12] in which 12 debated/unknown expositions were looked at against composing tests of Alexander Hamilton and James Madison.

Since, all hopeful creators (conceivable classes) are known an earlier, the initiation recognizable proof errand can utilize regulated or unsupervised order procedures. Stylometric highlights are composing style-markers or traits that are compelling discriminators of creation. A huge range of stylometric highlights have been proposed so far including lexical, syntactic and basic. Lexical highlights are character based and word-based factual proportions of lexical varieties. These incorporate word and character lengths, sentence lengths [6]. Syntactic highlights incorporate capacity words [12], grammatical feature label n-grams [2]. Auxiliary highlights incorporate the style-markers identified with the format and association of content. For instance, number of words in sentence and number of words in passage.

Existing examinations utilized the equivalent size of the content to look at for origin recognizable proof [3], [2]. This is a test in genuine datasets. This is on the grounds that, a database of understudy assignments may contain records with various lengths composed by a wide range of understudies. In this examination we use creator bunch level stylometric highlights to make our framework altogether quicker than existing procedures with sensible precision. In this work, we utilize 56 stylometric highlights which are ordered into three kinds: lexical, syntactic and auxiliary. The lexical highlights can be further subcategories into 14 character-based and 13 word-based highlights [6]. We utilize 27 syntactic

highlights, which incorporate capacity words [1], grammatical form [2]. There 2 auxiliary highlights, the quantity of words in sentence and the quantity of words in passage.

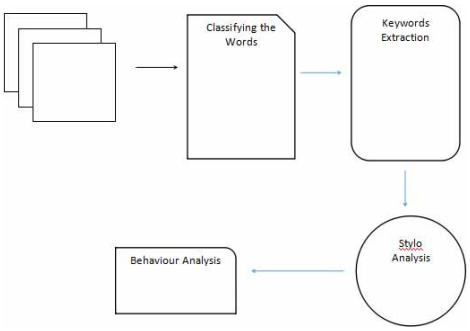
Behavior Analysis:

Behavior analysis is a characteristic science that tries to comprehend the conduct of people.

That is, conduct investigators think about how natural, pharmacological, and experiential variables impact the conduct of people and nonhuman creatures. Perceiving that conduct is something that people do, conduct experts place uncommon accentuation on contemplating factors that dependably impact the conduct of people, an accentuation that functions admirably when the objective is to secure versatile conduct or improve issue conduct. The study of conduct examination has made disclosures that have demonstrated valuable in tending to socially significant conduct, for example, speeking, medicate taking, good dieting, work environment wellbeing, instruction, and the treatment of unavoidable formative handicaps (e.g., mental imbalance).

This field of science is worried about portraying, understanding, foreseeing, and evolving conduct. They look for answers by taking a gander at the organic and ecological components, in spite of the fact that they are principally inspired by the job of condition in conduct change.

There are three principle branches to the field: Conceptual Behavior Analysis, Experimental Behavior Analysis, and Applied Behavior Analysis. The Conceptual branch centers around the philosophical, hypothetical, chronicled, and methodological issues that underlie the field. Trial Behavior Analysis includes essential research expected to add to the assemblage of information about marvels that control and impact conduct. Connected Behavior Analysis is centered around the utilization of the standards of conduct to the requirements of people to advance conduct change and improve personal satisfaction.



The architecture describes the concept of analyzing the speech documents from the basic steps. The first way is we collect the documents, extract the words, apply the polarity emotion to check on the words, and then finally generate the behaviour out from the data.

IDENTIFY PARAMETERS

At First the data is taken into the R console. Then the data is displayed with the view method in the R language. The size of the data may be 1 Gb or 1Tb. Preferably the unstructured data is taken. In this module we use KNN algorithm for classifying the keywords with help of regular expressions. The regular expressions facilitate to remove the unnecessary data such as stop words or blaw words.

Now the stemming is completed once and the KNN is applied therefore to take away the spaces between the words, to create one document.

The Term-Document Matrix is used to frame the sorted words into the document and this is where we apply the stemming for the words.

Stemming

Stemming is a procedure of reducing words. To the particular text document we apply stemming process to remove the

spaces, punctualities, stop words. Then the document with the positive and negative terms is obtained. After this process an appropriate document is formed.

Steps for KNN Algorithm

Step 1: Determine the parameters K = number of nearest neighbours.

k = how many keywords - one, two, three words

Step 2: Calculate the number of keyword between the query-instance and the data.

Step 3: Sort all the keywords and determine the count of the keywords.

Step 4: Gather all the categories of the keywords.

Step 5: Use simple majority of the category of keywords as the prediction value of the query instance.

CLASSIFY KEYWORDS

Based on the results of the keywords from the first module, and then apply the bayes algorithm as per the requirement. The keywords obtained after applying KNN is named as training data set. Collect all the key words to a variable. Apply the bayes algorithm and categorise the keywords as per positive and negative terms. Once keywords are categorised, classify the emotion of words in the terms of happy, sad, fear, bad. Project the results as per the classified words.

Steps for Naive Bayes Algorithm

Step 1: Collect all the key words to a variable.

Step 2: Apply the bayes algorithm and categorise the keywords as per positive and negative terms.

Step 3: Once keywords are categorised.

Step 4: Classifying the emotion of the words as happy, sad, fear, bad.

Step 5: Project the results.

BEHAVIOUR ANALYSIS

Behaviour analysis is a natural science that seeks to understand the behaviour of individuals. The science of behaviour analysis has made discoveries which have been proved useful in addressing socially important behaviour such as speaking, drug taking, healthy eating, workplace safety, culture, and the treatment of pervasive developmental disabilities (e.g., autism).

There are three main branches to the field: Conceptual behaviour analysis, experimental behaviour analysis, and applied behaviour analysis. The conceptual branch focuses on the philosophical, theoretical, historical, and methodological issues will underlie the field. Experimental behaviour analysis involves vital research intended to add to the body of knowledge about phenomena that control and influence behaviour. Applied behaviour analysis is focused on the application of the principles of behaviour to the needs of individuals to promote behaviour change and improve quality of life.

From all the above requirements we analyse the data using the stylo methods for projecting the behaviour of the data. Now to entire data set apply stylo methods. Calculating the emotions from previous module, this method shows the behaviour of the speaker. After finding the behaviour we get the result in the form of reports. Resulting in the behaviour analysis.

Stylo

The third program to facilitate stylometry that is investigated was the R stylometry package: This toolset operates within the R programming environment and features a GUI for users who would not like to use the programming support of R. For users that wish to take advantage of R's power, Stylo includes additional functions and ways to incorporate them into the other programs. Stylo also features support for machine learning which emphasizes the scope of the toolset. Because stylo works within R, setting it up and using the basic features becomes slightly more difficult for users unversed in programming languages. Once setup is complete, however, stylo includes a GUI to aid armature analysis. The stylo manual was very comprehensive and walked through all of the different components and how they work.

V EXPERIMENT AND RESULTS

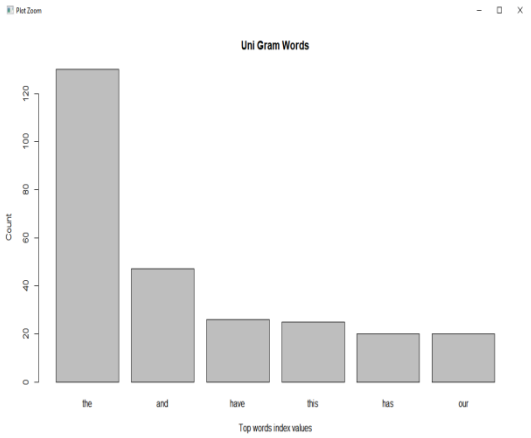
The implementation is made with the ten different speeches from a individual and multiple speaker and the found that the results are the describing the behaviour of the speaker at the best to the applied methods. The results deals with identifying the keywords, unigram, bigram, trigram words from the speech document. Then later produces the polarity from the keywords and the emotions are been classified from the speech content. Finally the behaviour of the speaker over the audience has been classified and found that results were accurate and clarification is identified.

Honourable President, Respected Vice President, Madam Speaker of Lok Sabha.
our Former Prime Minister Shri Devegowdaji, Members of the Council of Ministers
all the other members of the House, and the esteemed conglomerate gathered here representing diverse sectors.
In the process of nation building, we often arrive at a moment which leads us to a path breaking juncture and opens up a pl
At the stroke of the midnight hour today, together we shall ensure a pioneering future of the nation.
Within a few moments from now, our nation will embark upon a new economic regime. The entire 1.25 billion citizens of t
I do not believe that this process of GST is restricted to the scope of economy only.
This momentous occasion stands today as a testimony to the concept of Co-operative Federalism in Indian Democracy.
This hallmark day was possible due to the relentless efforts put in over decades by several stalwarts under whose guidance
It is overwhelming to see you all spare your valuable time to attend this auspicious occasion.
I extend my heartfelt welcome and express my sincere gratitude to all of you for your august presence today.
This path that we have tread upon, the direction that we have selected, the system that we have developed has not seen the
This is a shared heritage.
The combined efforts of all led us to this accomplishment. And here we are, unified, heralding the red letter day at 12 AM
This is the same place which has been blessed by the footprints of many great national leaders.
We are honoured to be sitting in the same sanctum.
Let us reminisce the 9th of December, 1946 when this same Central Hall witnessed the first meeting to discuss the country'
The front seats of this hall were ordained by the iconic national heroes
like Pandit Jawaharlal Nehru, Maulana Abul Kalam Azad, Sardar Vallabh Bhai Patel, Baba Saheb Bhimrao Ambedkar, Acl
The same House which once on 14 August, 1947, at the stroke of the midnight hour,
witnessed the most pious moment of the nation attaining freedom! On 26th November, 1949, this House stands as a testimc

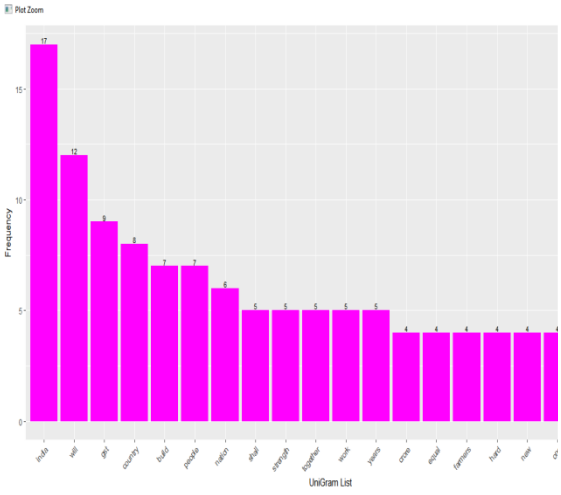
an example text document to analyze the behaviour of the speaker. Here Pakistan president annotated speech document is taken.

Values	
blDat	chr [1:75] "Honourable President, Respecte…
blg	Classes 'file', 'connection' atomic [1:1] 3
blgLinesCnt	75L
blgWordCnt	1929
data	chr [1:75] "Honourable President, Respecte…

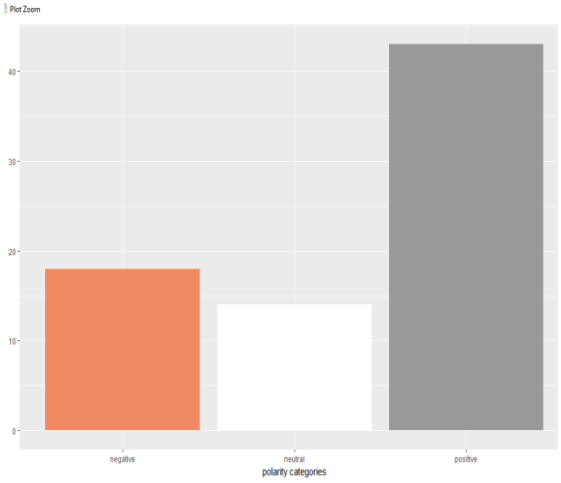
Representing the number of lines along with words in a documentidentifying two parameters from the text document. At first we find the number of words in the text document. There are about 1929 words and 75 lines in the text document.



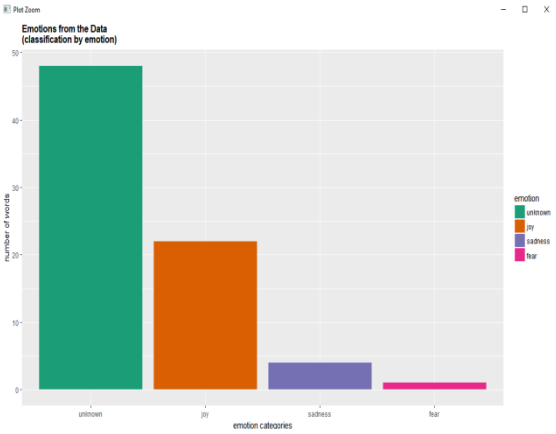
the particular text document is divided into single words. Even it identifies how many times a particular word is repeated.Representing the words of unigram list.



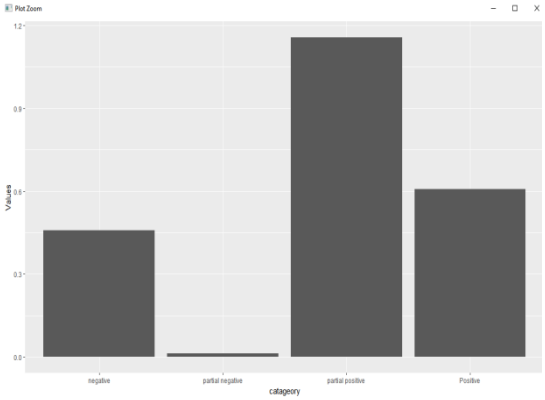
The document is divided into single words then the stemming process is applied. Then it helps to remove the unnecessary words, spaces etc. Now the document contains only positive terms and negative terms.



Representing the polarity (categorizing into positive and negative terms) after the comparison between the positive and negative words, a separate list of positive and negative words is categorized.



Classifying emotions from positive and negative words, after obtaining the list of positive and negative words, emotions are classified from the words.




```
> behaviour
          catageory     Values
1          Positive 0.60691818
2          negative 0.45848241
3 partial positive 1.15669018
4 partial negative 0.01389334
```

Representing the behaviour from the emotions, the behaviour of the person is obtained from the emotions. Thus we can find the behavioral category of the person.

VI CONCLUSION

Stylometry is applied to find the behaviour of the speaker through his speech.Results help us in analysing the behaviour of the speakers and their vocabulary. The speech is taken in the text format. Thus the behaviour of the particular speaker through his speech is analysed by identifying keywords and next the emotion of obtained words has to be

found. Later the emotion will be passed over the stylo, in classifying the behaviour of the person.We will analyse the behaviour based on the emotion.

From the recent results of polarity and the emotions from the speech data, we now classify the results to work out the behaviour of the speaker based on the emotional category. Classifying the emotions based on the type of polarity, we can detect the behaviour of person.

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A Heuristic Model for Predicting Human Fall Detection using Machine Learning Techniques

Mohammed Inayathulla, PA Hima Kiran, M Chandana Sri, M Deepika

Abstract*: *It is very obvious that human fall due to unconsciousness is a very common health problem in every human being. With the evolution of many smart health devices, we should contribute the technological advancement of machine learning into it. Different techniques are already used in order to detect human fall detection in human beings. In this paper we have studied the patterns of falling of human through the fall detection dataset while this human was performing various motions. By understanding all these we have generated the prediction protocol which estimates the fall of a person using fall detection dataset. Machine Learning classifiers were used to predict the human fall and a comparative study of various algorithms used was developed to find out the best classifier.

Keywords*: *Classification, Fall Prediction, Machine Learning, Random Forest.

I. INTRODUCTION

The term fall can be defined as an unintentional event in which the body moves from its initial position to a lower level. This would cause some serious injuries also in adverse conditions. Hence a fall prediction system would be really useful in such conditions where it can predict the human fall prior to falling so that required remedies can be carried out. A fall detection system can be defined as a usable device whose main motive is to alert when a fall action has occurred. The fall alert detectors can estimate when the user was about to fall by detecting the sudden changes of body movements. Old age people have high degree of risk of death or injury resulting from falls. As the density of population is increasing human fall prediction system can be very handy. The aim of this paper is to implement a fall detection model by using different machine learning techniques. Human fall prediction can be considered as a typical classification problem of machine learning. To carry out this work data is collected from publicly available datasets. Supervised classifiers are then implemented on the collected data. All the features available in the dataset are used to build the classifier. After the classifier was built its accuracy was built on the unseen data. Several researchers have been working in this field to expose the importance of machine learning. As the current work is based on supervised schematic studies this also can be extended in computer vision where the data is collected by using visual sensors and based upon the data collected machine learning can be applied to identify the human fall detection. The structure of the paper is as follows in the next section related work is discussed then implementation details are discussed followed by results and conclusions.

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II. LITERATURE SURVEY

In [1] the authors worked on visual surveillance for detecting the fall detection. Their approach was a two step process ellipse approximation and motion history image. In [2] the authors used an embedded camera in human body to identify the joint movements and there by classifying whether the person will classify or not. SVM classifier was used by the authors. In [3] the authors proposed a step by step process for identifying the fall detection. The critical steps were feature extraction human identification and fall detection. Histograms of Oriented Gradients and Local Binary pattern were used in combination of deep learning techniques to expose the human fall detection by authors in [4]. In [5] the authors worked on mobifall dataset with five different classifiers and proved that KNN classifier outperformed the other classifiers used. In [6] the authors used a smartphone based approach to identify the fall detection and thereby generating an alarm to the responsible of the victim. Three point based technique was employed to identify the fall detection in indoor video surveillance[7]. CHLAC features with skeletal image sequences were extracted using a mobile robot and KNN algorithm was used as a classifier for fall detection [8]. Deep Learning LSTM neural network method was used [9] with a smart phone as a sensor for fall detection. Convolutional Neural Networks was used in [10] in order to identify the fall detection with respect to the furniture and human characteristic relationships.

III. PROPOSED METHODOLOGY

The aim of this paper is to implement the classification scheme to identify the fall detection of a person. The algorithms used are Random Forest, K-Nearest Neighbor, Decision Tree and Naive Bayes. Fall detection prediction system can be categorized into four stages: Data Collection, Data Cleaning, Implementation, Prediction.

The main recognition of this paper is to identify the sophisticated among those mentioned classification algorithms. The methodology is described in figure 1.

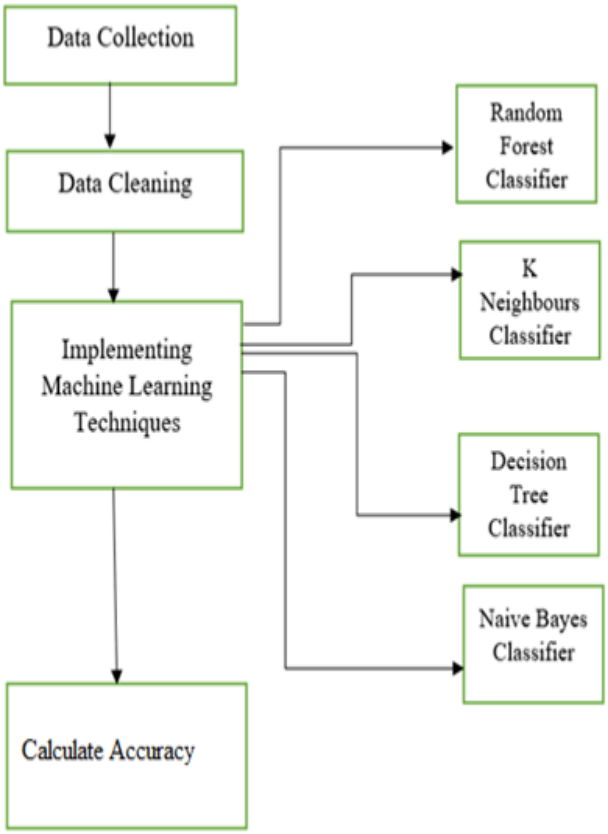

Fig 1: Fall Detection Prediction Model

Data Collection:

The "fall detection" dataset[11]is used for fall detection prediction which is used has the China Activity of elderly patients along with their medical information". The dataset consists of following features: Time, Sugar level, EEG monitoring rate, Blood pressure, Heart beat rate, Blood circulation.

Data Cleaning:

Data cleaning is the important phase as the erroneous data would significantly impact the overall performance of the system. In this phase data is thoroughly inspected to find out any missing values null values and standard statistical measures are used to deal with the null values and missing values.

Implementation and Accuracy:

Fall Prediction Model was implemented in python. After loading the dataset split the data into training and testing data. Using the training dataset train the model using the machine learning classifiers. Confusion matrix is used to test the model. All the features were used to built the classifier. The data split was performed in the ratio of 80 and 20 were 80% was used to training and 20% for testing. For decision tree entropy was used as the splitting criteria. In KNN 7 neighbours were worked for each unseen instance. When building random forest 500 trees were grown. Accuracy was computed based on the confusion matrix which is the familiar metric to evaluate the classifier and the accuracy values of each classifier are shown in the table 1.

IV. RESULTS

Table: 1 Accuracy scores of various classifiers used.

Classifiers	Accuracy
Naive Bayes Classifier	0.83
Decision Tree Classifier	0.89
K NN Classifier	0.7
Random Forest Classifier	0.92

The above table shows the accuracy values of each classifier and Random Forest has outperformed the other classifiers used with an accuracy of 92%. For every classifier the train test split ratio was 80 and 20 respectively as mentioned above.

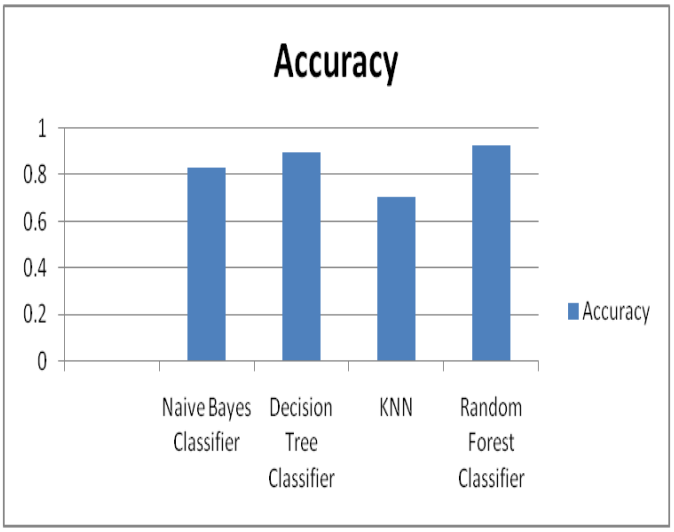

Fig 2: Comparision Chart of accuracy of classifiers

V. CONCLUSION

Out of the four learning algorithms used Decision tree and Random Forest have shown the better results. In future fall detection prediction system can be used to work in real time with regularly modernized datasets from distinct devices in various conditions. Deep Learning Techniques can be used to explore the surveillance data collected of various patients thereby predicting the human fall detection in real time.

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SPATIO-TEMPORAL DEPTH MOTION DESCRIPTOR FOR ACTION RECOGNITION UISNG 2D CONVOLUTIONAL NEURAL NETWORKS

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Abstract: *This paper proposes a new Human Action Recognition Framework by fusing the Motion History with Depth Motion information. Firstly, Difference Depth Motion Map (D^2MM) is proposed to capture the shape and motion cues of action. Particularly, D^2MM nullifies the side effects like body shaking movements and Ghost Shadows. Secondly, Modified Motion History Image (M^2HI) is proposed to identify the real ad fake movements in human body and to encode motion information effectively. Before the action representation, this work employed temporal segmentation in which the entire sequence of frames of a depth video is segmented into different sets with different frame lengths. Then the proposed two action representation methods are applied over the segments. For feature extraction and classification, we have employed a simple 2D Convolutional Neural Network (2D-CNN) in two phases and the results are fused to obtain final classification score. Simulation experiments are conducted over MSR action 3D dataset and MSR daily activity 3D dataset, shows the effectiveness of proposed method.*

Keywords: Action Recognition, Depth data, Depth Motion Map, Convolutional Neural Network, Late fusion, MSR action dataset, Accuracy.

I. INTRODUCTION

In recent years, vision based action recognition has gained a great research interest due to its widespread applicability in several applications including context based video retrieval, autonomous driving vehicle, human-computer interactions, intelligent surveillance systems [1] [2], and gaming applications [3]. In earlier several approaches are proposed to recognize human action but most of them considered the traditional RGB videos which were captured through normal cameras [4], [5]. However, the traditional RGB videos have several constraints such as different lighting conditions, varying backgrounds, color and textural variations etc., due to which the action recognition has become a challenging task in computer vision.

In recent years, with the advent of low-cost depth cameras like Microsoft Kinect [6], the action recognition research has entered into a new phase in which the input videos of an action recognition system are RGB Depth (RGB-D) videos. The depth cameras ensure depth data as well as color images sequence in real time, which makes the action recognition system more realistic and solves the traditional problems with RGB videos. The RGB-D videos are more advantageous than the traditional RGB videos in several aspects: (1) the depth cues in RGB-D videos are insensitive to illuminations variations and they can capture the videos even in dark environments also. (2) Depth videos can provide depth data while the traditional ones can't. (3) Texture and color variations are not present in the depth videos which make the action unit detection easier [7].

Considering the advantages of depth videos, an extensive research effort has been made to achieve better recognition results. Among the earlier developed action representation methods, Depth Motion Maps (DMM) [8] and Motion History Images (MHI) [9] have gained better performance in the recognition of human actions. However, they are susceptible for cluttered backgrounds, small body shaking movements, jumbled objects and low resolution depth videos. Moreover, in the depth map construction, the DMM process considers the entire frames of depth video by which the detailed temporal information in the subset of images can't be captured.

To solve these problems, in this paper, we have developed a new action recognition framework based on the combination of DMM and MHI. Two new action representation schemes namely, Difference Depth Motion Map (D^2MM) and Modified Motion History Image (M^2HI) are proposed to represent the 3D depth action video in 2D image format. Before action representation, to acquire detailed motion information, this paper employed temporal segmentation at different levels. Further for feature extraction and classification we have employed 2D Convolutional Neural Network (2D-CNN) model and the final action label is evaluated based on late fusion. At the late fusion, we have considered three different fusion techniques such as Maximum fusion, Product fusion and linear fusion. Simulation experiments are conducted over MSR action 3D dataset and MSR daily activity 3D dataset and the performance is measured through recognition accuracy.

Remaining paper is organized as follows; Section II demonstrates the details of literature survey. Section III explores the details of proposed action recognition model. Simulation experiments details are demonstrated in section IV and the concluding remarks are shown in section V.

II. LITERATURE SURVEY

Due to the great success of depth action video sin action recognition, lot of research works has been conducted in this orientation. A detailed literature survey on action recognition methods can be found at [10-12]. In this section, the recent works related to the paper, including, action segmentation, and action representation are briefly reviewed.

A. Segmentation

Generally, most of the earlier developed action recognition works have assumed that the individual instances of action in the frame or image are already isolated or segmented. In the case of continuous action recognition from depth videos, the input stream generally contains unknown number of frames, unknown number of objects, and unknown boundaries of actions and to this problem has to be solved at the same time. Means, the feature extraction or action representation or action recognition method has to solve this problem, which is highly complex and also results in less quality.

With respect to action segmentation, Dynamic Time Wrapping (DTW) is one of the widely employed techniques to determine the delimiting frames of individual actions [13], [14]. In this approach, for a given action sequence, initially difference images are extracted by subtracting the successive grayscale images. Next, the difference images are divided into small blocks of size 3×3 and every block is represented with an average value of pixels within the block. Then the final feature of each frame, called as motion feature is calculated by flattening the blocks in the difference image, excluding the final frame. This process is accompanied for both training and testing videos. Finally the action is segmented by comparing the motion features and analyzed through Viterbi algorithm [15]. However, the DTW based segmentation makes it difficult to obtain more distinct feature when a filter with small size is applied over the images. Let's consider two different difference images of two different actions. If we apply a filter with size 3×3 over them, then the obtained motion features may not differ much because at the starting, the two action frames have similar features.

Another possible method of action segmentation is based on appearance. Based on the general assumption about the similar characteristics of starting and ending frames, D. Wu et al., [16] accomplished Histogram of Gradient (HoG) with correlation coefficient and K-Nearest Neighbor (K-NN) [17] to identify the first and last frames of an action video.

Though these methods applied segmentation for action detection, they are not focused over the detection of key frames. All of these methods are applied spatial segmentation which resides within the frame but not reveals about the temporal motion information between frames. Every actor has his/her own speed and ends up the video with varying number of frames. For example, a slow action is completed in larger time and acquired in larger number of frames, which creates a he computational burden over further processes. Hence the frames are need to be segmented temporally through the temporal motion information will also get preserved.

B. Action representation

Most of the previous works focused on the extraction of Spatio-temporal features to represent an action in depth videos. The most popular approaches are HOG3D [18], 3D EMOSIFT [19], Acionlet [38], HON4D [20], Depth Motion Maps (DMM) [23] and Motion History Images (MHI) [30]. In particular, Yang et al., [8] employed DMMs to acquire cues of capture motion from dissimilar viewpoints (top, side, and front) and they employed HOGs to represent an action. Similarly, Chen et al., [21] accomplished Local Binary patterns for feature extraction after representing the depth action video with DMM from three projection views such as Front view, side view and top view. Kernel Based Extreme Learning Machine (KELM) is employed for action

classification. This method also had shown its contribution at fusion level by applying two levels of fusions such as feature level fusion and decision level fusion. At feature level the LBP features are fused and at decision level, soft max rule is applied to combine classification scores. Further, the same author, Chen et al., [22] generated the DMMs are segment level at which the depth video sequence is segmented into several overlapping segments. Then each segment is characterized by DMM followed by LBP to extract the location rotation invariant information. In the final stage, Fisher kernel is accomplished to generate a compact feature vector for every action. ELM is applied for action classification.

Next, focusing over the segmentation and motion information, M. A1-faris et al., [24] proposed a new version of DMM, called as "Fuzzy weighted multi-resolution DMMs (FWMDMMs)". This model focused over the creation of multiple DMMS at multiple levels by segmenting the temporal action frames at different levels. After DMMs representation, to find the significance, this method employed fuzzy weight function in three orientations such as Linear, reverse and central. Finally the FWMDMMs are fed to deep CNN model for classification [25]. Further, the main aim of Xu Weiyao et al., [26] is to exploit the frame selection and towards such, a new "Multilevel Frame Select Sampling (MFSS)" method is proposed to generate three levels of temporal samples from input depth sequences. Then they are represented through Motion and Static Mapping (MSM) followed by Block based and LBP and Fisher kernel representation. KELM is accomplished for action classification. Further extending the LBP to "Discriminative Completed LBP (DiscLBP)", Wu Li et a., [27] proposed DMM assisted action recognition with two classifiers such as ELM and collaborative representation classification (CRC).

Next, MHI is also a basic representation of an action image which can also determines the motion information at every pixel. Based on this fact, Watanabe et al., [28] extracted shift invariant features based on "Higher Order Local Correlation (HOLC)" from the MHI for action recognition. Next, Y.L. Tian et al., [29] considered MHIs as a basic action representation and over the obtained MHI they employed a global and location filtration method to eliminate the unaltered motions. "Gaussian Mixture Model (GMM)" based classifier is employed for action classification. Next, combining the Static History Image with MHI, E. Chen et al., [31] proposed an action recognition framework in which LBP is applied for feature extraction. Support Vector Machine is accomplished for classification. Further, D. Kim et al., [32] projected the depth map into two orthogonal planes such as front and side view. And then applied two descriptors namely, "Depth Motion History (DMH)" and "Depth Motion Appearance (DMA)" for action representation and finally applied SVM for classification.

III. PROPSOED APPROACH

3.1 Overview

In this paper, we have a novel deep learning based action recognition framework to recognize human actions form depth action videos. This framework employs Spatio-temporal features from depth videos for action recognition. Here the Spatio-temporal data is incorporated with two different action representation techniques: Temporal Difference Depth Motion Map (TD^2MM) and Temporal Modified Motion History Image (TM^2HI). Each of the method provides explicit action movements in the form of certain shape and motion cues. Further the feature extraction and classification is employed through 2D-Convolutional Neural Network (2D-CNN). Two 2D-CNN models are trained on these two action representations and the obtained classification results are fused to derive the ultimate classification label. Figure.1 shows the block diagram of proposed action recognition framework. The major contributions of this work are outlined as follows;

1. We didn't rely on the handcrafted features through which the system will consume additional time to extract the features form every action model. Instead of that we directly used CNN to extract the Spatio-temporal information from data.

2. Unlike the conventional DMM which consider all the frames, we have considered only few set of frames for DMMs construction. Moreover, the proposed TD^2MM nullifies the extra side effects like ghost shadows, and small body shake movements.

3. Unlike the conventional MHI which can't determine the whether the pixel belongs to the moving portion of human body or a fake moving pixel, the proposed TM^2HI can differentiate between these two effectively.

4. At decision level, we have employed late fusion get the final decision regarding classification label. This makes the recognition system to train different models simultaneously.

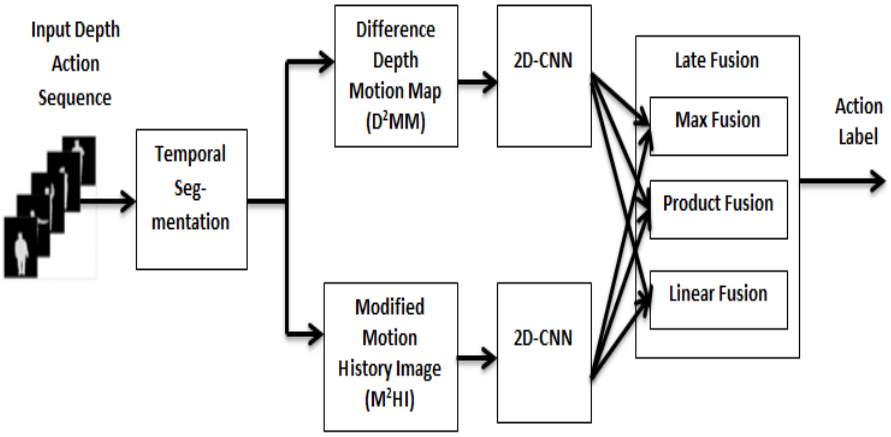


Figure.1 Block diagram of proposed action recognition model

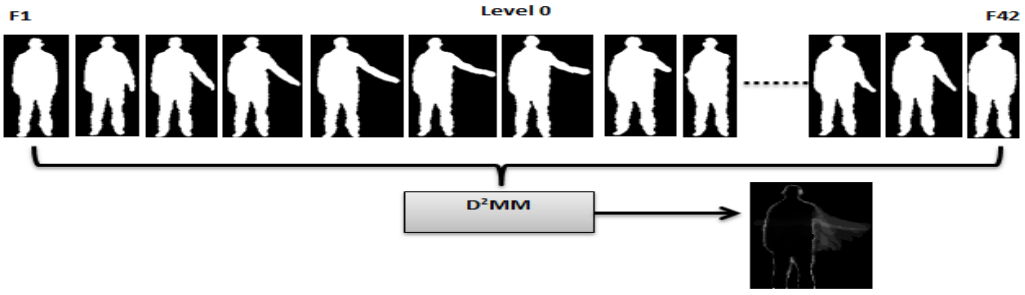
3.2 Action Representation

Action representation is an important task in the action recognition model. Representing an action with motion information is one of the significant way in which an entire video can be represented in a single 2D image. In our model, we have employed two different action representation techniques such as TD^2MM and TM^2HI. DMM and MHI are the base sources of these two techniques which have gained significant importance in the action representation with motion information. DMM and MHI are sensitive to noise caused by several side effects such as cluttered background, jumbled objects and low resolution cameras. Hence the DMM is extended to D^2MM and MHI is extended to M^2HI to remove the external noises thus the quality of DMM and MHI will get enhanced.

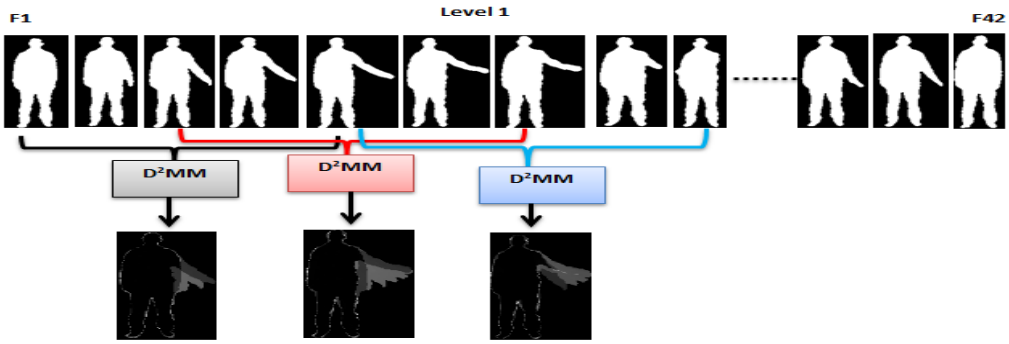
3.2.1 TD^2MM

DMM has gained much importance in the representation of human actions in depth videos. In DMM, the 3D action video is transformed into a 2D motion image and has been successfully applied for action recognition. DMMs are basically used to determine the motion and shape information of a depth action video. Generally the DMM is obtained by the accumulation of difference between the frames of an action sequence. Actually the DMM is constructed by considering all the frames into the process. However, this process may not be able to capture more and detailed temporal information. Hence to capture more and effective motion information, we have employed temporal segmentation in which the depth video sequence is divided into several temporal and overlapped set of segments with equivalent number of frames in every set. Then DMM is applied over these segments to obtain 2D motion image. Since the actions performed by different people have different variations like speed and number, consideration of entire frames or equal number of frames for computation of DMM is not a suggestible technique. Hence we have employed three different levels and at level, we have considered different number of frames for DMM computation. Further, we have considered a uniform overlapped frames to segment the video sequence into several sets of segments, i.e., the segmentation will maintain a constant number of overlapping frames between every two successive segments.

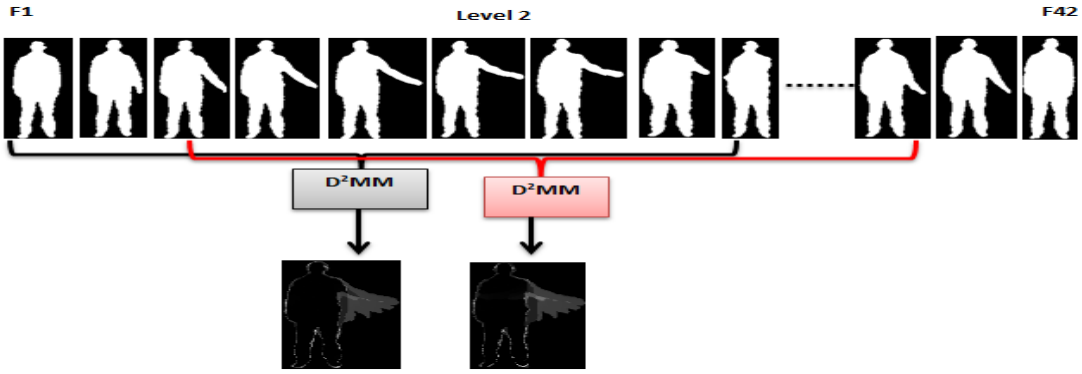
Under this temporal segmentation, we have considered tally three levels such as L_0, L_1 and L_2. At the level L_0, the process considers entire set of frames for depth map constriction. Next at level L_1, the process considers five frames with an overlapping factor R = 3. Further at level L_2, the process considers ten frames with same overlapping factor. A simple demonstration about temporal segmentation is depicted in figure.2.



(a)



(b)



(c)

Figure.2 Temporal Segmentation (a) Level 0, (b) Level 1 and (c) Level 3

As shown in figure.2, the depth video sequence is composed of 42 frames. Figure.2(a) demonstrates the original depth map construction at level L_0 in which the entire set of frame are considered. Next, Figure.2(b) shows the depth map construction at level L_1 in which the entire action sequence is segmented in several sets and every set is composed of five frames. Here we have employed the overlapping factor as 3. For example, the first set consists of frames starting from F1 to F5, the second set consists of frames starting from F3 to F7. Hence the common frames between set 1 and set 2 are F3, F4 and F5. In this way entire sequence is segmented at level L_1. Next, at level L_2, the entire action sequence is segmented in several sets and every set is composed of five frames, as shown in Figure.2(c). Here also we have employed the overlapping factor as 3. For example, the first set consists of frames starting from F1 to F10, the second set consists of frames starting from F3 to F12. Hence the common frames between set 1 and set 2 starts from F3, and ends at F10. In this way entire sequence is segmented at level L_2.

Once the frames are segmented into different segments, then they are subjected to depth map construction through D^2MM according to the method described in [33]. Even though the traditional DMM can acquire shape and motion cues of an action effectively, several side effects present in the depth action sequence like ghost shadows, and small body shaking movements' results in some unidentifiable energy regions in DMM. To suppress these external regions, D^2MM initially computes a binary motion image based the difference between consecutive frames. Next, it measures a weighted motion score of a binary image through sliding window and based on that score, a new difference map is constructed. Finally the D^2MM is obtained by the accumulation of all the difference maps. An example output of DMM and D^2MM is shown in figure.3.



(a) (b) (c)

Figure.3 (a) Original Depth action frame, (b) DMM and (c) D^{2}MM

3.1.2TM^{2}HI

Similar to the temporal segmentation employed at TD^{2}MM, here also initially the input depth action sequence is segmented into different segments at various levels. Once the temporal segments are obtained, then they are subjected to M^{2}HI, an extension of tradition MHI. MHI was initially introduced by Bobick and Davis [34]. MHI records the temporal variations history at every pixel in the action frames of a video. MHI is a very simple and effective encoding scheme that encodes the spatial distributions of movements of an action. For this computation, MHI considers the pixel intensities of a pixel located at *(x, y)* in a temporal frame at time *t, (x, y, t).* The proposed M^{2}HI is employed over grayscale images because the grayscale images preserve the compact motion information and also makes the M^{2}HI less sensitive to noise and illumination variations. Consider an RGB-D action image sequence, with N frames, initially it is converted into grayscale image sequence and let it be $F(x,y,t), t = 0,1, \dots N-1$. Next, convert the grayscale image sequence into binary motion image sequence $B_m(x,y,t), t = 0,1, \dots N-1$, by the computation of difference between consecutive frames $F(x,y,t)$ and $F(x,y,t+1)$. Mathematically the $B_m(x,y,t)$ is obtained as;

$$B_m(x,y,t) = \begin{cases} 1, & if\ |F(x,y,t) - F(x,y,t+1)| > \tau \\ 0, & Otherwise \end{cases} \quad (1)$$

Where $F(x,y,t)$ is the pixel located at position (x,y) in a frame F at time *t*, $F(x,y,t+1)$ is the pixel located at position (x,y) in a frame F at time *t+1*. The Binary motion image can be simply defined as a temporal difference image which has larger deviations in pixel intensities. Next, τ is a pre-determined threshold that signifies the motion variations. For larger value of τ, the binary motion image obtains only the pixel which have larger deviations in their pixel intensities in the consecutive frames and vice versa. Hence the value of τ is to be determined experimentally. In our work, we have set the value of τ as 40, that means the pixels in the binary motion image will become 1 if the difference between the pixels at the same location in two consecutive frames will be greater than 40. Based on the obtained binary motion image, the MHI is computed as;

$$MHI = \sum_{t=0}^{N-2} \omega_t . B_m(x,y,t) \quad (2)$$

Where ω_t is the weight of a $B_m(x,y,t)$ at time t and is computed as

$$\omega_t = (t+1).{}^{255}/_{N} \quad (3)$$

Here ω_t follows a linearly increasing characteristic with time *t*. It signifies that the recent binary motion image has higher significance than the oldest binary motion image. This is valid only for some times because as the time progresses, the action will reach to peak and then slowly ends up. After the peak frame, the motion won't have any significance. Moreover, the frames after the peak frame won't contribute much motion information. Hence consideration of an entire set of frames for MHI construction won't have much significance in the provision of more motion information. This problem is solved by considering only a set of frames which is handled through eh temporal segmentation as described in the above subsection.

Note: the temporal segmentation is done up to 3 levels only because more number of levels constitutes an increased computational burden and less number of levels can't explore motion information effectively. Further, the speed of an action is also unknown, hence we have employed only up to three levels. For an action with high speed, the entire motion information is covered with less number of frames and vice versa. The segmented sets of frames can achieve better results in both cases due to the multi-level temporal segmentation.

In the traditional MHI, the motion region is identified through pixel-wise difference which results in some unidentified regions due to object boundaries and small body shaking movements. Such kind of undefined regions are treated as noises in the binary image sequence $B_m(x,y,t), t = 0,1, \dots, N-2$, resulting in a poor

quality MHI. To solve this problem, we have proposed a simple and effective method to remove these noises in the $B_m(x,y,t), t = 0,1,\dots,N-2$, called as Modified Motion History image (M^2HI). M^2HI employs a 2D sliding window at every pixel location (x,y,t) to decide whether the pixel belongs to the moving portion of human body or a unconnected fake moving pixel. Generally in the action image, the movement of human body occupies a larger number of pixels which results in a more number of connected pixels. In the case of binary image, the real movement of human body occupies a larger region with no-zero pixels. In other words, if the movement at pixel location (x,y,t) is a real movement (having pixel intensity 1), then the neighbor pixels within the 2D sliding window also have pixel intensities 1 only. Otherwise if the pixel at location (x,y,t) is not a real movement and if it is fake movement, then then relative pixels in its neighborhood won't have any significance, i.e., they will be 0's. to compute the motion significance of a pixel at location (x,y,t), we have computed a new score called significant motion score ($S_M(x,y,t)$) for every moving pixel in the binary image $B_m(x,y,t)$, as follows;

$$S_M(x,y,t) = \frac{1}{(w+1)^2}\sum_{i=x-(w/2)}^{x+(w/2)}\sum_{j=y-(w/2)}^{y+(w/2)} B_M(i,j,t) \qquad (4)$$

Where w is the size of sliding window, i.e., height and width. In our work, we have set the height and width value as 6, i.e., $w = 6$. After the computation of significant motion score at every pixel, then the $S_M(x,y,t)$ is checked for the significance, i.e., whether it is significant or not. This is done by comparing the $S_M(x,y,t)$ with a pre-defined threshold φ. Generally, for a fake moving pixe1, the neighbor pixels differ and the $S_M(x,y,t)$will be close to 0. Unlike, for a real movement, the neighbor pixels also have same value and the $S_M(x,y,t)$ value will be close to 1. But we can't consider only the pixels with $S_M(x,y,t) = 1$ as significant because some real movements are also exists which have $S_M(x,y,t) \approx 1\ (> 0.6)$. Hence, we have employed a threshold based decision to find the some more pixels with real movements which have $S_M(x,y,t) > \varphi$. In this phase, the $S_M(x,y,t)$ is compared with the predefined threshold, φ. If it is found to be greater than the threshold, then that pixel value is assigned as 1 otherwise zero. Based on this strategy, a new binary motion image $B_M'(x,y,t)$ is computed as follows;

$$B_M'(x,y,t) = \begin{cases} 1, & if\ B_m(x,y,t) = 1\ and\ S_M(x,y,t) > \varphi \\ 0, & otherwise \end{cases} \qquad (5)$$

In our experiments, we have set the threshold $\varphi = 0.6$. Further the new MHI, i.e., M^2HI is constructed based on the obtained new binary motion image $B_M'(x,y,t), t = 0,1,\dots,N-2$ using Eq.(2). The output of this process is a grayscale image with only real movements of the human body where the real moving pixels are more brighter and remaining are less brighter. Figure.4 shows an example of outputs obtained through MHI and M^2HI.

3.3 CNN Model

Once the human action representation is completed through TD^2MM and TM^2HI, the next step is to extract Spatio-temporal features. Here to extract such type of features, we have employed a CNN model according to the CNN model described in our earlier work [33]. The architecture of CNN model is shown in figure.5 which consist of five convolutional layers ad three pooling layers. The structural details such as number of filters and filter size of every layer are described in table.1.



(a) (b) (c)

Figure.4 (a) Original Depth action frame, (b) MHI and (c) M^2HI

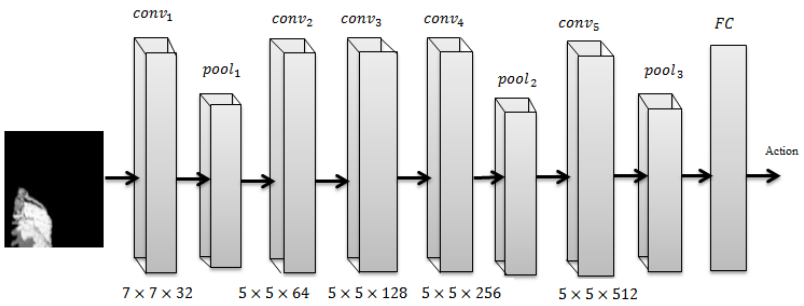


Figure.5 CNN model for action recognition

Table.1 CNN structures

Layer	Filter Size	Stride	Pad
$\boldsymbol{Conv_1}$	7×7	2×2	0
$\boldsymbol{Pool_1}$	-	2×2	-
$\boldsymbol{Conv_2}$	5×5	1×1	0
$\boldsymbol{Conv_3}$	5×5	1×1	0
$\boldsymbol{Conv_4}$	5×5	1×1	0
$\boldsymbol{Pool_2}$	-	2×2	-
$\boldsymbol{Conv_5}$	3×3	2×2	0
$\boldsymbol{Pool_3}$	-	2×2	-

3.4 Fusion for Classification

Information fusion is an important aspect in multi-modal action recognition. Basically, the fusion strategies are of three types and they are defined based on the stage at which the fusion is employed. The three types are: Early fusion (fusion of multiple data modals), Intermediate fusion (fusion of multiple features) and late fusion (fusion of multiple decisions). The early fusion needs multi modal data which have some distinct features, which is not our case since we have employed only one model. Next, the intermediate fusion is employed a feature level and it fuses different feature extracted through different feature extraction methods. This is also not suitable for our work because we didn't apply any feature extraction techniques. We have employed different action representations only. The feature extraction is done with CNN only. If we employ intermediate fusion, we have to fuse the motion maps and motion history image obtained through TD^{2}MM and TM^{2}HI, but the size of the feature maps obtained are of very large (almost equal to the size of original frame). This process required a huge memory and also this constitutes a more computation burden at classification level. Hence we have adopted late fusion and here we compute the probabilities for final fusion result calculation. The main advantage of late fusion is the possibility of simultaneous training of data of different feature maps.

In general, late fusion can be employed in two ways: unsupervised fashion and supervised fashion [34]. The supervised decision necessitates an extra training on the obtained outputs at different models. Moreover, according to [35], an additional training of classifier necessitates an extra memory usage and some distinct parameters are needed to set, which is not suitable for our work. SVM and Neural Networks (NN) are the best example for supervised learning. Unlike the supervised learning, the unsupervised learning didn't require any additional training. Majority voting is a best example for unsupervised decision strategy. In unsupervised decision making, the additional memory and additional parameter setting won't come into picture. Hence we have employed an unsupervised decision making strategy to find the final classification score.

Let's consider an action A, each of CNN model produces for each class $C_l, 1 \leq l \leq C$, a class membership probability $P(C_l|A)$. Further let's assume the probability of class membership obtained through TD^{2}MM + CNN is $P_{CD}(C_l|A^{CD})$ and the probability of class membership obtained through TM^{2}HI + CNN is $P_{CM}(C_l|A^{CM})$. Then the final probability of class membership is derived by providing a simple linear relation between $P_{CD}(C_l|A^{CD})$ and $P_{CM}(C_l|A^{CM})$, as

$$P(C_l|A) = \alpha . P_{CD}(C_l|A^{CD}) + (1 - \alpha) . P_{CM}(C_l|A^{CM}) \qquad (6)$$

Here the additional parameter α controls the significance of each model and it is determined experimentally. Along with this fusion, we also have employed two additional and most popular fusions such as product fusion and maximum fusion. Based on the obtained fused results, the final class label $\hat{C}_l$ is determined as the one which have maximum probability of class membership, obtained as;

$$\hat{C}_l = \text{argmax}_{1 \leq l \leq C}\left(P(C_l|A)\right) \quad (7)$$

IV. SIMULATION EXPERIMENTS

To evaluate the proposed action recognition model, we have used totally two standard datasets and the performance is measured at several instances. Initially this section describes the details of datasets. Next, the details of performance metrics such as Recall, Positive Predictive Value (PPV), F-Score, False Negative Rate (FNR) and False Discovery Rate (FDR) are illustrated. Finally this section explores the comparison between prosed and earlier approaches.

4.1 Datasets

A. MSRAction3D dataset [36]

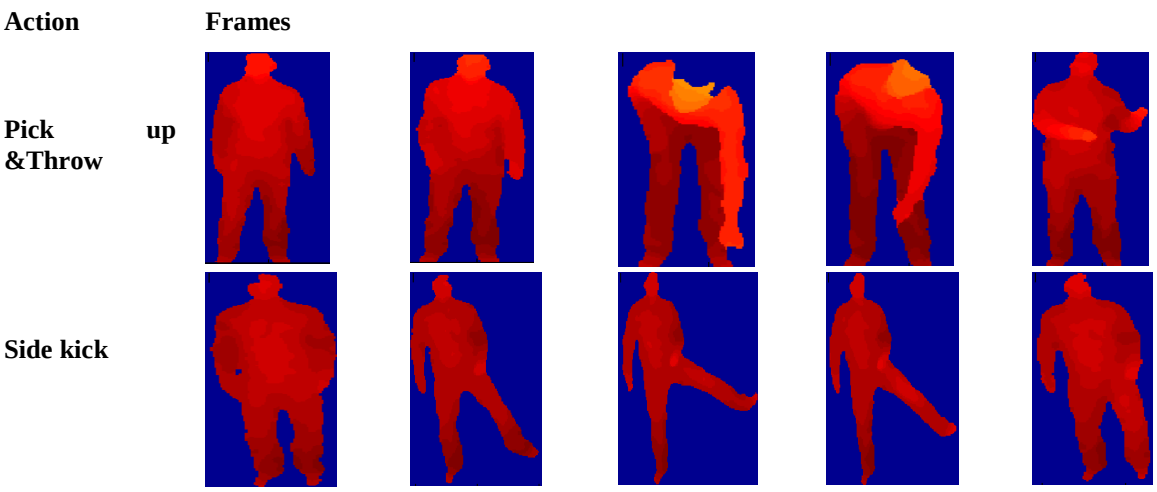
This dataset is of the most popular depth videos dataset and most of the earlier works used this dataset for validation. Totally this dataset consists of 20 different actions: “horizontal arm wave”, “high arm wave”, “high throw”, “forward punch”, “hand catch”, “hammer”, “draw tick”, “draw cross”, “draw circle”, “side boxing”, “two hand wave”, “hand clap”, “jogging”, “side kick”, “forward kick”, “bend”, “pick up & throw”, “golf swing”, and “tennis swing”. A depth camera is used to capture all these actions facing the action with front view. Totally 10 actors are used for this dataset creation and they performed each action 2 to 3 times. Since every actor has his/her own speed, the action videos of this dataset are very challenging. For example the two actions such as Draw tick and Draw cross are much similar and they are differed by just hand movement. Some samples of this dataset are shown in figure.6.

B. MSRDailyActivity3D dataset [37]

This dataset is a daily activity dataset consists of totally 16 daily activities: “Call cellphone”, “read book”, “eat”, “drink”, “cheer up”, “use vacuum cleaner”, “use laptop”, “write on paper”, “sit down”, “stand up”, “play guitar”, “walk”, “lay down on sofa”, “play game”, “toss paper”, and “sit still”. Every action is performed under two positions; one is in standby position and another is sitting in sofa position. The total number of depth videos present in this dataset is 320. This dataset contains noises and cluttered backgrounds.

4.2 Results

The simulation was done according to the even and odd basis, i.e., for ten subjects of MSR action 3D dataset, the action performed by even number actors are trained and the actions performed by odd number actors are tested. This type of validation is called as cross action validation means the trained and tested actions are not same. Here the actions with actor numbers 1, 3, 5 7 and 9 are trained and the actions with actor numbers 2, 4, 6, 8 and 10 are tested. After testing, the performance is measured through several performance metrics and they are shown in the following table.2 andtable.3.



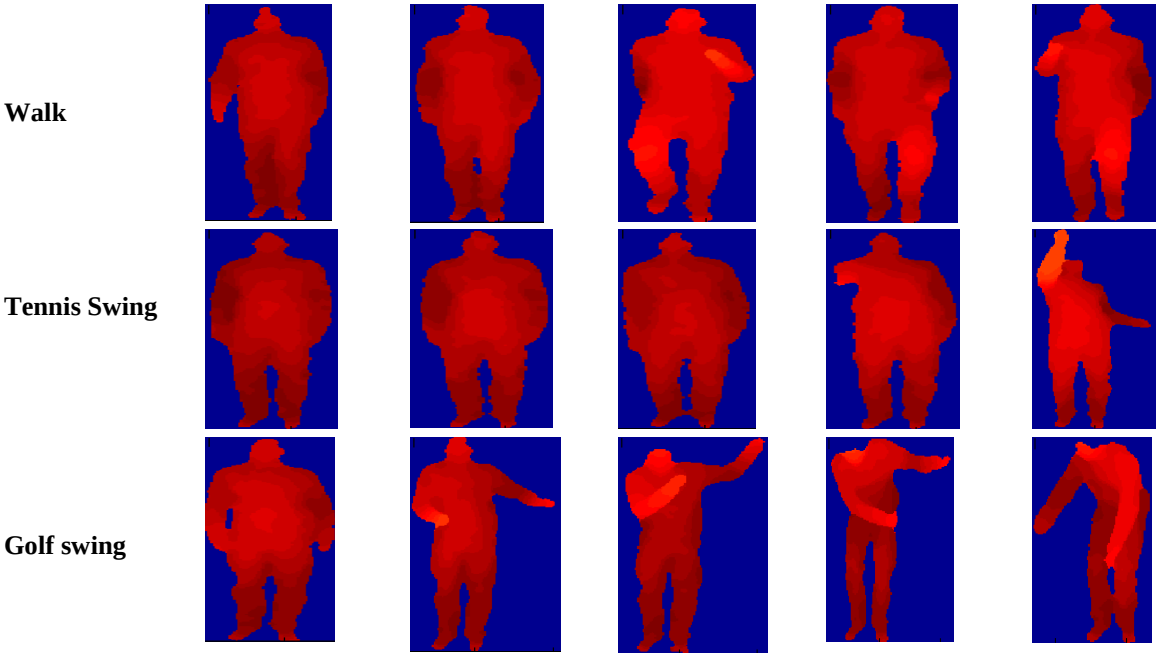
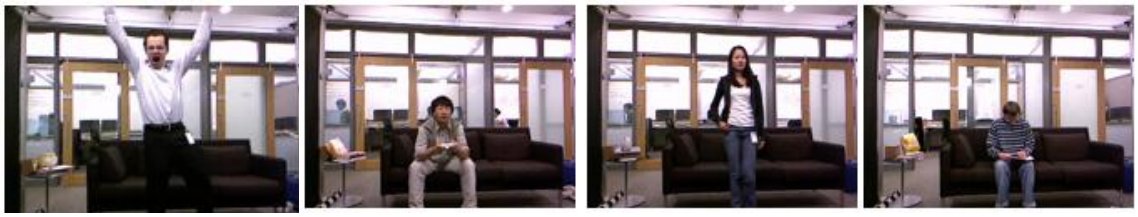


Figure.6 some samples of MSRAction3D dataset



(a) (b) (c) (d)

Figure.7 some samples of MSR Daily Activity 3D dataset (a) Cheer up, (b) Play game (c) Stand up, and (d) Read book

Table.2 Performance Metrics of MSR action 3D dataset for different actions

Action/Metric	**TPR (%)**	**PPV (%)**	**F-Score (%)**	**FNR (%)**	**FDR (%)**
High Arm Wave	86.0459	100.00	92.4996	13.9541	0000
Horizontal Arm Wave	94.9294	86.5292	90.5348	5.07060	13.4708
Hammer	100.00	100.00	100.00	0000	0000
Hand Catch	79.28922	90.9392	84.7155	20.7107	9.0608
Forward Punch	89.27212	100.00	94.3320	10.7278	0000
High Throw	96.22742	92.4931	94.3233	3.77258	7.5069
Draw Cross	83.29362	93.9394	88.2967	16.7063	6.0605
Draw Tick	95.48432	89.0622	92.1615	4.51568	10.9378
Draw Circle	95.68222	100.00	97.7934	4.31778	0000
Hand Clap	96.59922	87.2936	91.7109	3.40078	12.7064
Two-Hand Wave	100.00	94.8575	97.2254	0000	5.1425
Side-boxing	100.00	100.00	100.00	0000	0000
Bend	87.2547	90.2364	88.7205	12.7452	9.7636
Forward Kick	100.00	97.1294	98.5437	0000	2.8706
Side Kick	100.00	93.2215	96.8854	0000	6.7785

Jogging	100.00	100.00	100.00	0000	0000
Tennis Swing	95.5336	89.0598	92.1831	4.46639	10.9402
Tennis Serve	95.2725	91.4785	93.3369	4.72750	8.5215
Golf Swing	93.1294	97.5992	95.3119	6.87060	2.4008
Pick Up & Throw	91.5992	98.4500	95.6154	8.40080	1.5523

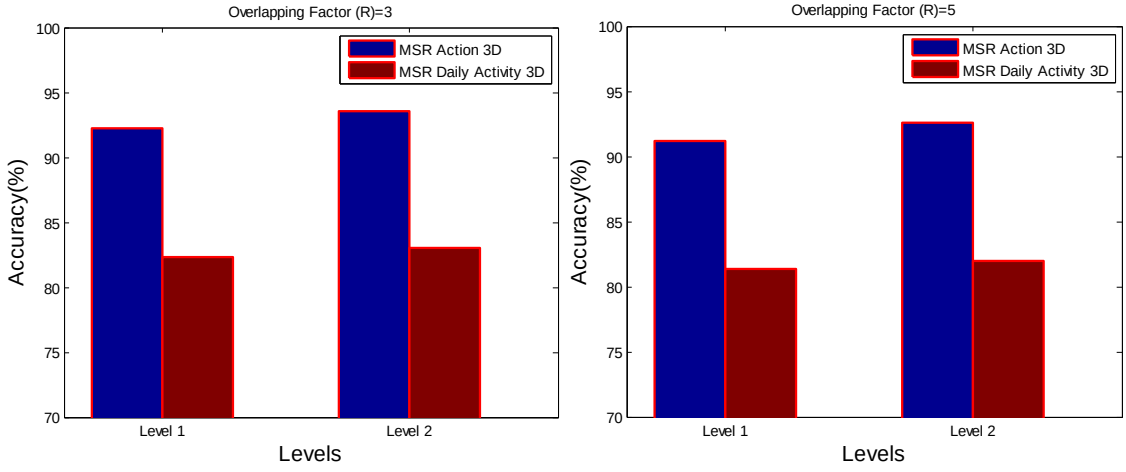
Table.2 shows the details of performance metrics obtained after the simulation of proposed recognition framework over MSR action 3D dataset. The performance evaluation is accomplished totally throng fie metrics such as Recall, PPV, F-score, FNR and FDR. From the results shown in the above table, we have noticed that the maximum recall (100%) is obtained for totally six actions and they are Jogging, Side kick, Forward kick, Two-hand wave, side boxing and Hammer. And the minimum recall is noticed for Hand catch (79.28922%). The next minimum s achieved for Draw cross action (83.29362%). Next, the maximum PPV (100%) is achieved for totally six actions and they are Jogging, side boxing, draw circle, forward punch, hammer and high arm wave. And the minimum PPV is noticed for Horizontal Arm Wave (86.5292%). The next minimum s achieved for Draw Tick action (89.0622%). The main reason behind the les recall rate or less PPV of draw cross and draw circle actions is the structural similarity between them. The three actions namely Draw Tick, Draw cross and Draw circle have almost same movements expect the hand movements and this this main of less PPV. For a given draw cross action frame, the system recognized it as either draw circle or draw tick and hence it has less recall rate. Similarly for a given other inputs like Draw Circle and Draw Cross actions, the system mostly recognized them as draw ticks and hence it has less PPV.

Next, the maximum F-Score (100%) is observed at totally three actions they are hammer, jogging and side boxing. And minimum F-Score is noticed for Hand catch action (84.7155%). The next metrics such as FN and FDR follows an inverse relation with Recall and PPV respectively. Hence for an action which has gained maximum recall will have less FNR and the action which has gained maximum PPV will have less FDR. Based on this we have noticed the minimum FNR (0%) for six actions and they are Jogging, Side kick, Forward kick, Two-hand wave, side boxing and Hammer. And maximum FNR is observed for Hand catch (20.7107%). Similarly, the minimum FDR (0%) is observed for totally six actions and they are Jogging, side boxing, draw circle, forward punch, hammer and high arm wave. And the maximum FDR is noticed for Horizontal Arm Wave (13.4708%).

Table.3 Performance Metrics of MSR daily activity 3D dataset for different actions

Action/Metric	**TPR (%)**	**PPV (%)**	**F-Score (%)**	**FNR (%)**	**FDR (%)**
Drink	86.2234	71.4458	78.1421	13.7765	28.5542
Eat	85.4127	90.1147	87.7007	14.5873	9.88530
Read book	95.2252	82.6693	88.5861	4.58480	17.3307
Call cellphone	66.3145	65.2471	65.7764	33.6855	34.7529
Write on a paper	92.1345	86.3312	89.2226	7.68550	13.6688
Use laptop	93.1124	75.4214	83.3383	6.88760	24.5786
Use vacuum cleaner	89.2341	92.3312	90.8495	10.5853	7.66880
Cheer up	76.4147	95.4574	84.8811	23.5853	4.54259
Sit still	96.0032	84.4414	89.8518	3.99679	15.5586
Toss paper	66.1457	89.4578	76.0554	33.8543	10.5422
Play game	50.2345	85.3369	63.2413	49.7655	14.6631
Lay down on sofa	89.4574	75.4878	81.8810	10.5426	24.5122
Walk	85.7741	88.6996	87.2123	14.2259	11.3004
Play guitar	90.3336	75.8858	82.4817	9.66640	24.1142
Stand up	88.8854	85.6653	87.2456	11.1146	14.3347
Sit down	89.4175	92.4578	90.9122	10.5825	7.54219

Table.3 shows the obtained Performance Metrics after the simulation of proposed recognition framework over MSR daily activity 3D dataset. Towards this simulation, we have considered both set of action depth videos (action videos captured under two positions such as Standby and siting in sofa position) for training and testing. Similar to the above simulation, here also the validation is done through cross subjects, i.e., the subjects of 1, 3, 5, 7, 9 are trained and the subjects of 2, 4, 6, 8, and 10 are tested. In this simulation we have noticed that some actions like read book, use laptop, play guitar and sit still has very much less movements and hence they can be considered as 3D video with static motions. These actions are also processed for simulation and we observed maximum recognition performance. From the table.3, we have noticed that that maximum recall (96.0032%), precision (95.4574%), and F-Score (90.9122%), are obtained for actions sit still, cheer up, and sit down respectively. Next the minimum recall (50.2345%), precision (65.2471%), and F-Score (63.2413%), are obtained for actions Play game, Call cellphone, and play game respectively. Next, the maximum FNR (49.7655%) and FDR (34.7529%) are observed for actions play game and call cell phone respectively. Finally the minimum FNR (3.9967%) and FDR (4.54259%) are observed for actions sit still and cheer up respectively.



(a) **(b)**

Figure.8 Accuracy at different overlapping factors (a) R = 3, and (b) R = 5

To alleviate the effectiveness of temporal segmentation, we have simulated the proposed action recognition model with varying overlapping factors (R) at both Level 1 and Level. At level, the frames length is considered as 5 and at level 2, the frame length is considered as 10. Initially at both level, we have segmented the frames with overlapping factor R=3 and next with overlapping factor R = 5. After the simulation though these parameters, the obtained accuracy are shown in figure.8, where 8(a) is the accuracy at R = 3 and the 8(b) is the accuracy at R = 5. From these results we have noticed that as the frame length increases, the accuracy also increase but up to certain extent only. For example, the accuracy at level 1 (frame length = 5) for MSR action 3D dataset is observed as (92.2212% whereas it is of 93.5568% at level 2 (frame length = 10).

Similarly the accuracy at level 1 for MSR daily activity 3D dataset is observed as 82.3452% whereas it is of 83.0012% at level 2. Further we have noticed that as the overlapping factor, R value increases, the accuracy reduces. This is illustrates with the following values; the accuracy obtained for MSR action 3D dataset at R=3 and level 1 is observed as 92.2212% whereas it is of 91.2212% at R = 5 at the same level. Similarly the accuracy of MSR action 3D dataset at R=3 and level 2 is observed as 93.5568% whereas it is of 92.1023% at R = 5 at the same level. The similar nature of accuracy results are observed for MSR daily activity 3D dataset also. For instance, the accuracy of MSR daily activity 3D dataset at R=3 and level 1 is observed as 82.3452% whereas it is of 81.3321% at R = 5 at the same level. Similarly the accuracy of MSR daily activity 3D dataset at R=3 and level 2 is observed as 83.0012% whereas it is of 82.3214% at R = 5 at the same level.

4.3 Comparison

Table.4 shows the comparison between the proposed and conventional approaches through recognition accuracy on the both MSR action 3D and MSR daily activity 3D datasets. LOP [38] and actionlet [38] are the two typical features which are mainly focused on the encoding of depth data. These methods have limited accuracies, which reflects the challenges (e.g. cluttered backgrounds and noises) of the dataset especially MSR Daily Activity 3D dataset. Using DMM with HOG, X. Yang et al., [8] achieved an accuracy of 88.73% while this approach is not able to capture the body shaking movements due to the simple DMM. Next, combining the

DMM with DMA, Kim D et al., [32] achieved an accuracy of 90.4500% which is more sensitive to the noise and textural variations in the depth action videos. To overcome this problem, Chen et al., [21], [23] employed LBP over the obtained DMM and every action is represented with a fisher kernel vector. Though these methods have gained a better recognition performance, they are not focused over the presence of fake moving pixels in the DMM. These fake moving pixels are derived due to several reasons like small body shaking movements, cluttered backgrounds and low resolution cameras. The conventional DMM cannot capture such kind of noises and hence the proposed approach has better performance compared to them. On an average the recognition accuracy of DMM + LBP methods is noticed as 91.20% while the proposed D^2MM+M^2HI+CNN is noticed as 93.6410%, shows an improvement of 2.44% in recognition accuracy.

Table.4 Comparative analysis through accuracy

Method	**Dataset**	**Accuracy (%)**
DTW [16]	MSR Action 3D	63.8900
DMM + HOG [8]	MSR Action 3D	88.7300
HON4D [20]	MSR Action 3D	88.9300
DMA + DMH + HOG [32]	MSR Action 3D	90.4500
Actionlet Ensemble [38]	MSR Daily Activity 3D	74.2200
STIPs (Harris3D+HOG3D) [18]	MSR Daily Activity 3D	60.6000
DMM + LBP [23]	MSR Action 3D	90.5000
DMM + LBP + FV [21]	MSR Daily Activity 3D	84.000
DMM + LBP+ LF [21]	MSR Action 3D	91.9000
LOP Features [38]	MSR Daily Activity 3D	42.5000
D^2MM-CNN [33]	MSR Action 3D	91.5900
D^2MM-CNN	MSR Daily Activity 3D	**85.2330**
M^2HI-CNN	MSR Action 3D	**90.3620**
M^2HI-CNN	MSR Daily Activity 3D	**83.3320**
D^2MM+ M^2HI+CNN	MSR Daily Activity 3D	**87.7850**
D^2MM+ M^2HI+CNN	MSR Action 3D	**93.6410**

Our recent method, i.e., D^2MM-CNN [33] has developed an extension to the conventional and DMM obtained an accuracy of 91.5900% after the simulation over MSR Action 3D dataset. Here the same method is applied over the MSR Daily Activity 3D dataset and the recognition accuracy is observe as 85.2330% while for conventional approaches, like STIPs (Harris3D+HOG3D) [18] and Actionlet Ensemble [38], it is of 60.6000% and 74.2200% which is very less. Next, Chen at al., [21] also applied the DMM + LBP+ FV method over MSR Daily Activity 3D dataset and obtained an accuracy of 84.000% which is 1.233% less than the proposed D^2MM-CNN.

Next, another proposed method, M^2HI-CNN applied over two dataset and gained an accuracy of 90.3620% and 83.3320%. Compared to the conventional approaches, this method also gained a better performance because it has efficiently encoded the motion information by finding the face movements in the human body. Finally the average accuracy of integrated method (i.e., D^2MM+ M^2HI+CNN) has obtained an accuracy of 93.6410% and 87.7850% after its accomplishment over the MSR Action 3D and MSR Daily Activity 3D datasets respectively, which is high, compared to all the earlier methods. The main reason is that the proposed action representation model is more resilient to the side effects present in the actions videos such as body movements and cluttered backgrounds etc.

V. CONCLUSION

In this paper, we have proposed a new action descriptor which can identify the real and fake motions in the actions videos and encodes the temporal information between sequences of frames. The proposed descriptor is an integrated form which was constructed by combining depth motion map and motion history information of a depth video. The newly proposed Difference Depth Motion Map can remove the cluttered backgrounds

effectively and can also derive the motion information in the low resolution videos. Further the newly proposed Modified Motion History Image can differentiate the real movements from fake movements and can represent the motion image much effectively. Before the action representation, to include much motion information, a new segmentation called a temporal segmentation s employed at different levels. Simulation experiments are conducted over MSR action 3D dataset and MSR daily activity 3D dataset and the obtained results out-performs the state-of-art methods.

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Hybrid Convolutional Neural Networks Model for Stress Detection

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Abstract

Psychological wellness conditions influence a noteworthy level of the world's population every year. The stress investigation of emotional wellness phenomena in openly accessible social networking sites like Twitter, Sina Weibo and Facebook. A set of stress-related textual, visual, and social attributes from various aspects are first defined and then propose a novel hybrid model. The work has demonstrated the utility of online social information for contemplating despondency, be that as it may, there have been limited assessments of other mental wellbeing conditions. It is not easy to access the user posts on their Facebook page. In order to obtain the user data from Facebook, system have to get the access token from Facebook developer page. The API act as an intermediate system that will help the system to analysis the user information from the Facebook page. The system will also help to Recommending users with different links for psychological counselling centers, soft music or articles to help release their stress according to users' stress level

Key words: *Stress detection, social media, microblog, access tokens, and face book.*

1. Introduction

More and more teenagers today are overloaded with adolescent stress from different aspects: academic future, self-cognition, interpersonal, and affection. Long-lasting stress may lead to anxiety, withdrawal, aggression, or poor coping skills such as drug and alcohol use, threatening teenagers' health and development. Hence, it is important for both teenagers and their guardians/teachers to be aware of the stress in advance and manage the stress before it becomes severe and starts causing health problems. The current social media micro-blog offers an open channel for us to timely and unobtrusively sense teenager's stress based on his/her tweeting contents and behaviours. This study describes a framework to further predict teenager's future adolescent stress level from micro-blog and discusses how we address the challenges (data incompleteness and multifaceted prediction) using machine learning and multi-variant time series prediction techniques. Forthcoming events that may possibly influence teenager's stress levels are also incorporated into our prediction method. Our experimental results demonstrate the effectiveness of considering correlated features and event influence in prediction. To the best of our knowledge, this is the first work on predicting teenager's future stress level via micro-blog. College can be stressful for many freshmen as they cope with a variety of academic, personal, and social pressures. Although not all stress is negative, a certain level of stress can be beneficial to help improve performance. However, too much stress can adversely affect health in the annual survey of the American Freshman; the number of students reported feeling overwhelmed and stressed has increased steadily in the last decade. Over 50% of college students suffer significant levels of stress during a typical college semester.

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Consequently, there is a need to find innovative and cost-effective strategies to help identify those students experiencing high levels of stress and negative emotions early on so that they can receive the appropriate treatment in order to prevent future mental illnesses. Social media use, such as Twitter and Facebook, has been rapidly growing, and research has already shown that data from these technologies can be used for novel approaches to public health surveillance . Twitter usage among young adults has increased 16% from 2012 to 2014. Currently, 32% of adults of the ages 18-29 years use Twitter, and the usage is expected to increase steadily in the future. People often have the need to share their emotions and experiences . Researchers have theorized that emotional sharing may fulfil a socio-affective need by eliciting attention, affection, and social support. Consequently, this may help individuals cope with their emotions and provide an immediate relief . Users often share their thoughts, feelings, and opinions on these social media platforms, and as a result, social media data may be used to provide real-time monitoring of stress and emotional state among college students.

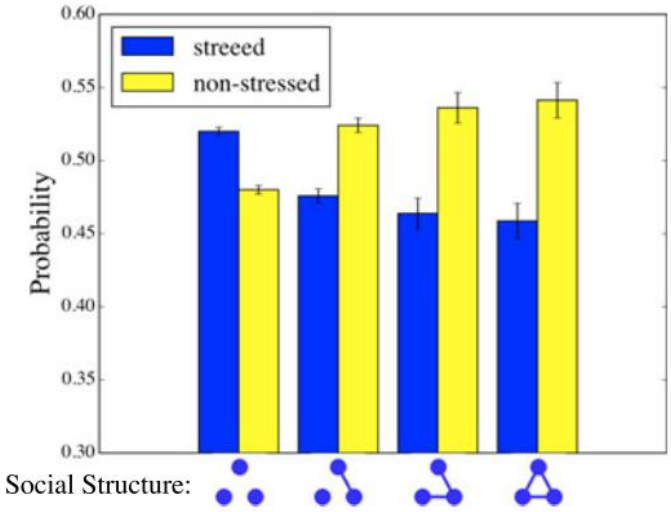

Figure 1. The sampling test results of the diversity of the user's social structures form Sina Weibo

Previous studies have shown that Twitter data can be used to monitor a wide range of health outcomes, such as detecting human immunodeficiency virus infection outbreaks and predicting an individual's risk of depression . For example, De Choudhury et al conducted one of the first studies that used an individual's tweets to predict the risk of depression . The authors found that certain features extracted from a person's tweets collected over a 1-year period were highly associated with the risk of depression in adults, such as raised negative sentiment in the tweets, frequent mentions of antidepressant medication, and greater expression of religious involvement. Currently, no studies have examined whether Twitter data can be used to monitor stress level and emotional state among college students. Studying this topic is important because the large amount of social media data from college students' frequent use of social media can be used to help university officials and researchers monitor and reduce stress among college students.

2. Proposed System

Inspired by psychological theories, we first define a set of attributes for stress detection from tweet-level and user-level aspects respectively: 1) tweet-level attributes from content of user's single tweet, and 2) user level attributes from user's weekly tweets. The tweet-level attributes are mainly composed of linguistic, visual, and social attention (i.e., being liked, retweeted, or commented) attributes extracted from a single-tweet's text, image, and attention list. The user-level attributes however are composed of: (a) posting

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behavior attributes as summarized from a user's weekly tweet postings; and (b) social interaction attributes extracted from a user's social interactions with friends. In particular, the social interaction attributes can further be broken into: (i) social interaction content attributes extracted from the content of users' social interactions with friends; and (ii) social interaction structure attributes extracted from the structures of users' social interactions with friends.

2.1. Advantages

Experimental results show that by exploiting the users' social interaction attributes, the proposed model can improve the detection performance (F1-score) by 6-9% over that of the state-of-art methods. This indicates that the proposed attributes can serve as good cues in tackling the data sparsity and ambiguity problem. Moreover, the proposed model can also efficiently combine tweet content and social interaction to enhance the stress detection performance.

Beyond user's tweeting contents, we analyzed the correlation of users' stress states and their social interactions on the networks, and address the problem from the standpoints of:

(1) social interaction content, by investigating the content differences between stressed and non-stressed users' social interactions; and

(2) social interaction structure, by investigating the structure differences in terms of structural diversity, social influence, and strong/weak tie.

We build several stressed-twitter-posting datasets by different ground-truth labelling methods from several popular social media platforms and thoroughly evaluate our proposed method on multiple aspects.

We carry out in-depth studies on a real-world large-scale dataset and gain insights on correlations between social interactions and stress, as well as social structures of stressed users.

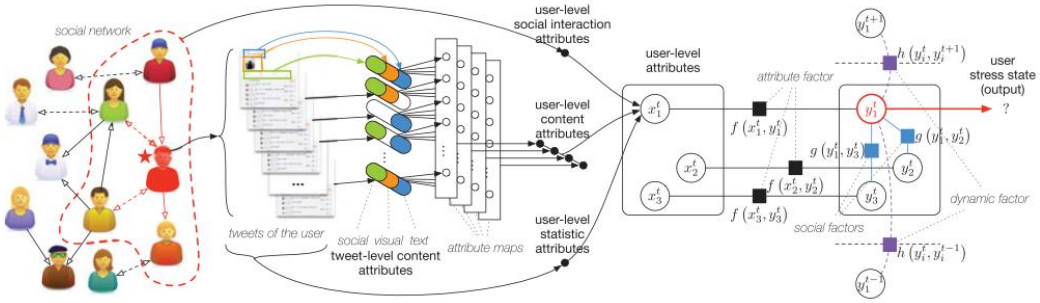

Figure. 2 Architecture of proposed stress detection model

3. Implementation

3.1. System Framework

In this framework we propose a novel hybrid model - a factor graph model combined with Convolution Neural Network to leverage tweet content and social interaction information for stress detection. Experimental results show that the proposed model can improve the detection performance by 6-9% in F1-score. By further analysing the social interaction data, we also discover several intriguing phenomena, i.e. the number of social structures of sparse connections (i.e. with no delta connections) of stressed users is around 14% higher than that of non-stressed users, indicating that the social structure of stressed users' friends tend to be less connected and less complicated than that of non-stressed users.

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3.2. Social Interactions

We analyzed the correlation of users' stress states and their social interactions on the networks, and address the problem from the standpoints of:

(1) social interaction content, by investigating the content differences between stressed and non-stressed users' social interactions; and

(2) social interaction structure, by investigating the structure differences in terms of structural diversity, social influence, and strong/weak tie. Our investigation unveils some intriguing social phenomena. For example, we find that the number of social structures of sparse connection (i.e. with no delta connections4) of stressed users is around 14% higher than that of non-stressed users, indicating that the social structure of stressed users' friends tend to be less connected and complicated, compared to that of non-stressed users.

3.3. Attributes categorization

We first define two sets of attributes to measure the differences of the stressed and non-stressed users on social media platforms: 1) tweet-level attributes from a user's single tweet; 2) user level attributes summarized from a user's weekly tweets.

3.4. Tweet-level Attributes

Tweet-level attributes describe the linguistic and visual content, as well as social attention factors (being liked, commented, and retweeted) of a single tweet. We can classify words into different categories, e.g. positive/negative emotion words, degree adverbs. Furthermore, we extract linguistic attributes of emoticons, so we can map the keyword in square brackets to find the emoticons. Twitter adopts Unicode as the representation for all emojis, which can be extracted directly.

3.5. User-Level Attributes

Compared to tweet-level attributes extracted from a single tweet, user-level attributes are extracted from a list of user's tweets in a specific sampling period. We use one week as the sampling period in this paper. On one hand, psychological stress often results from cumulative events or mental states. On the other hand, users may express their chronic stress in a series of tweets rather than one. Besides, the social interaction patterns of users in a period also contain useful information for stress detection. Moreover, as aforementioned, the information in tweets is limited and sparse. We need to integrate more complementary information around tweets, e.g., users' social interactions with friends.

4. Conclusion

Psychological stress is threatening people's health. It is non-trivial to detect stress timely for proactive care. Therefore, we have presented a framework for detecting user's psychological stress states from user's monthly social media data, leveraging Facebook post content as well as user's social interactions. Employing real-world social media data as the basis, we studied the correlation between user's psychological stress states and their social interaction behaviours. We recommend the user for health consultant or doctor. We show the hospitals for further treatment on a graph which locate shortest path from current location of user to that hospital. We recommended the user for health precaution and send mail for user interaction purpose.

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Early identification of Tomato Plant Leaf Diseases using Clustering and Neural Networks

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Abstract

Agriculture aims at cultivating crops to gratify the human needs. A study claims that nearly 50% of crops are being affected with diseases in early stages. Even though there exists many traditional approaches to eradicate the early stage diseases, the implication of digital technology lays a foundation in a efficient manner. Early diagnosis not only reduces time and money, also avoids spread of diseases to other crops, in turn improving the overall production. By considering this fact in the mind (as the focal area), the paper proposes an approach to categorize diseases in the tomato plant leaf at an early stage(s). The proposed method adopts clustering technique to cluster the disease affected regions and extract the features from those regions subject to classification process. The techniques adopted for clustering, feature extraction and classification are K-Means, Discrete Wavelet Transform (DWT) followed by Gray Level Co-occurrence Matrix (GLCM) and Neural Networks (NN) respectively. The proposed approach is assessed on the standard dataset images from Kaggle repository. Among various classes of leaf categories, randomly 50 images are chosen from each category to evaluate the proposed method. Experimental findings unfold that the proposed disease identification plays a vital role in early stages that the existing state-of-the-algorithms.

Keywords: *K-Means, DWT, GLCM, Neural Networks, Tomato leaf disease, feature extraction*

1. Introduction

The planet earth is crammed with plant life irrespective of the location in the world. Plant life, one of the parts in eco-system, makes the world sustain. Unlike various land forms-hills, mountains, plains, plateaus and basins, the plants that grow in these land forms also show discrepancy. An apple tree that grows in temperate zone cannot be grown in tropical zone. The flora depends upon the land form of specific region. To develop a conservative and sustainable eco-system for future generation, humanity should preserve the flora of each and every landform.

The humanity is dependent on agriculture for its daily livelihood. The boom of computer vision in fields of communication, science and technology, transportation ended up with numerous contemporary techniques such as Biometrics, Artificial intelligence, drones and many more. Computer vision needs to be extended in the field of agriculture too.

Agriculture aims at cultivating quality crops to gratify the human needs. In turn, the crops are qualitative if and only if the plants are not diseased. 50% of overall plant life in agriculture is diseased. Certain traditional technique in eradication of the diseases is suitable for meager plant diseases. Identification of diseases in early stage avoids further spread of disease in plants. At this

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juncture, Image Processing Technique contributes production of quality plants to achieve increased yield.

The diseases affected in plants might be due to biotic or abiotic factors. For instance, symptom like disease reflection in leaf of the plants (which is not the only symptom) are well analyzed by a farmer based on prior experience. Other symptoms that aid in identification include soil analysis and pH measurement, microscopic examination, and microscopic methods [4]. Early diagnosis of diseases, help the farmers to

- Identify disease causing agent.
- Minimize waste of time and money, and
- Prevent irreparable damage even before visualizing.

To achieve aforesaid advantages, scientific diagnosis techniques such as Multilayer Perceptron (MLP) Neural Network , Thresholding, Dual-segmented regression, Color-based, Quantification, Fuzzy-logic, Feature-based, Knowledge-based, Discriminant analysis, Region growing techniques, Third party image processing packages, Support Vector Machine and many more are used [5].

2. Existing Methods

The following section summarizes the salient features of existing (tomato) plant leaf classification disease

Hiteshawari Sabrol and Satish Kumar [6] studied Gray-Level Spatial Dependence-based approach for Feature Extraction to recognize the plant disease with Adaptive Neuro Fuzzy classifier to classify the diseased plants. When the method was tested on TDPS1.0 and BPDS 1.0 dataset recognition accuracy of 90.7% and 98% was achieved for tomato and brinjal/eggplant, respectively. Ning Fu, Chong Wang, and Xiaowen Ji [7] examined corn leaf spot disease through Fuzzy technology. The corn lesions were clearly identified from the sample images which were classified as Class A –maize leaf spot identification, Class B – corn leaf spot disease recognition, Class C – disease identification by patch superimposition and the recognition accuracy was 89.76, 87.43, and 85.6 respectively. The authors measured real time data samples including plant foliage via image processing thus enhancing the efficiency of the study.

Amrita Tulshan and Natasha Raul [8] identified plant leaf disease using Machine Learning – KNN classifier the type of plant disease were also identified. The plant leaf images underwent pre-processing, segmentation and feature extraction stages and the outputs of every stage processed in KNN classifier by the textural feature based algorithm classified the diseased leaf as well as its type. The results of the algorithm used for the study when compared with SVM classifier yielded 98.56% accuracy for 75 leaf images. Sammy Militante, Bobby Gerardo and Nanette DIonisio [9] utilized Deep learning to detect and recognize the diseases in plant leaves. 35,000 images of the Plant Village Repository were used for the testing. The images acquired were resized into 96X96 resolutions for processing. The multi layered convolution neural network classified the infected diseases with the accuracy rate of 96.5%. The model also yielded more than 99% accuracy result for plants like tomato, grape and apple plants.

Sherly Annabel, Annapoorani and Deepalakshmi [10] reviewed machine learning techniques for detecting the plant leaf disease followed by classification. The authors' detected disease in various plant leaves such as rice, grape, cotton, soybean, sugarcane via machine learning algorithms like SVM, Multi SVM, K-Means clustering, Fuzzy C-Means, CNN, ANN, Back propagation neural network, Decision tree, Multi layer perceptrons and many more. The comparative chart designed by the authors revealed the type of disease detected in the respective methods. Further, the comparison of classification algorithms not only disclosed the accuracy of algorithms but also the pros and cons of using each algorithm. Akshay Kumar and Vani [11] detected the diseases affected from tomato leaf images by means of Convolutional Neural Network (CNN). 14,803 images from Plant village dataset were studied. Among various architectures in CNN, LeNet, VGGNet, ResNet50 and Xception architectures were investigated. During investigation, VGGNet achieved an accuracy rate of 99.25%.

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Rath and Meher [12] detected brown spot and blast diseases in rice plants by the method of computation. The dataset images include normal, brown spot and blast diseased rice plants obtained from the crop fields and other public domains among which 100 images were used as the training dataset. PCA preprocesses the images, Gabor Filtering technique extracted shape and texture features and finally to detect the diseases Radial Basis Function Neural Network classifier was used. The performance of the aforesaid steps when evaluated using metrics such as accuracy, recall and precision was 95%, 95% and 97%, respectively. Santhana Hari, Sivakumar, Renuga, Karthikeyan and Suriya [13] identified and detected plant diseases from the images through the technique of Convolutional Neural Network. The put forth Plant Disease Detection Neural Network (PDDNN) has 16 layers like input layer, convolutional, maxpooling, ReLu activation layer and fully connected layer. The dataset includes defected images of various plants and 400 images were treated as training dataset. Accuracy rate of 86% was achieved when the performance was evaluated.

Rishabh Yadav, Yogesh and Sushama [14] exploited Particle Swarm Optimization technique to identify, detect and classify diseases that occurs in plant leaves. The acquired 8750 plant leaf images from Plant Village dataset were pre-processed and resized to 250X250 pixel size. With the aid of Alexnet, the features were extracted from the resized images and passed into PSO to deduce and optimize the extracted features. Finally, the leaf diseases were classified by the classifiers like XGBoost, Random Forest, KNN and SVM classifiers among which SVM classifier classified the images with the cross validation accuracy of 99.07%. Mosin, Bhavesh and Krina [15] utilized drones based Precision Farming method in the field to identify disease affected area and minimized the usage of pesticide based on leaf category such as good, bad or average. To categorize the leaf images from drones, the inception model in CNN trained the dataset. The model achieved accuracy of 99% on 2600 images procured from internet and local farms.

3. Materials and Methods

This section unfolds the procedure for early disease identification of tomato plant leaves adopted in the proposed approach and incorporates the clustering based and feature selection methods for extracting the disease affected regions of the tomato plant leaf. The plant village dataset is collected from [1], which consists of ten class of tomato leaf classes namely, (1) class 1: leaf affected with target spot (2) class 2: leaf affected with mosaic virus (3) class 3: leaf affected with yellow leaf curl virus (4) class 4: leaf affected with bacterial spot (5) class 5: leaf affected with early blight (6) class 6: healthy leaf (7) class 7: leaf affected with late blight (8) class 8: leaf affected with mold (9) class 9: leaf affected with Septoria leaf spot and (10) class 10: leaf affected with two spotted spider mite disease. Table 1 shows the dataset specification details with respect to tomato leaf diseases. Various classes of tomato plant leaves from Class 1 to Class 10 is illustrated from (a) to (j), respectively. Figure 1 shows few tomato leaves affected various diseases collected from [1].

Table 1. Dataset Description

Sl . No	Class Names	Total Count	No. of Images chosen randomly
1	Target Spot	1404	50
2	Tomato mosaic virus	373	50
3	YellowLeaf__Curl_Virus	3209	50
4	Bacterial_spot	2127	50
5	Early_blight	1000	50
6	Healthy	1591	50
7	Late_blight	1909	50
8	Leaf_Mold	952	50
9	Septoria_leaf_spot	1771	50

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10	Spider_mites_Two_spotted_spider_mite	1676	50
	Total	**16012**	**500**

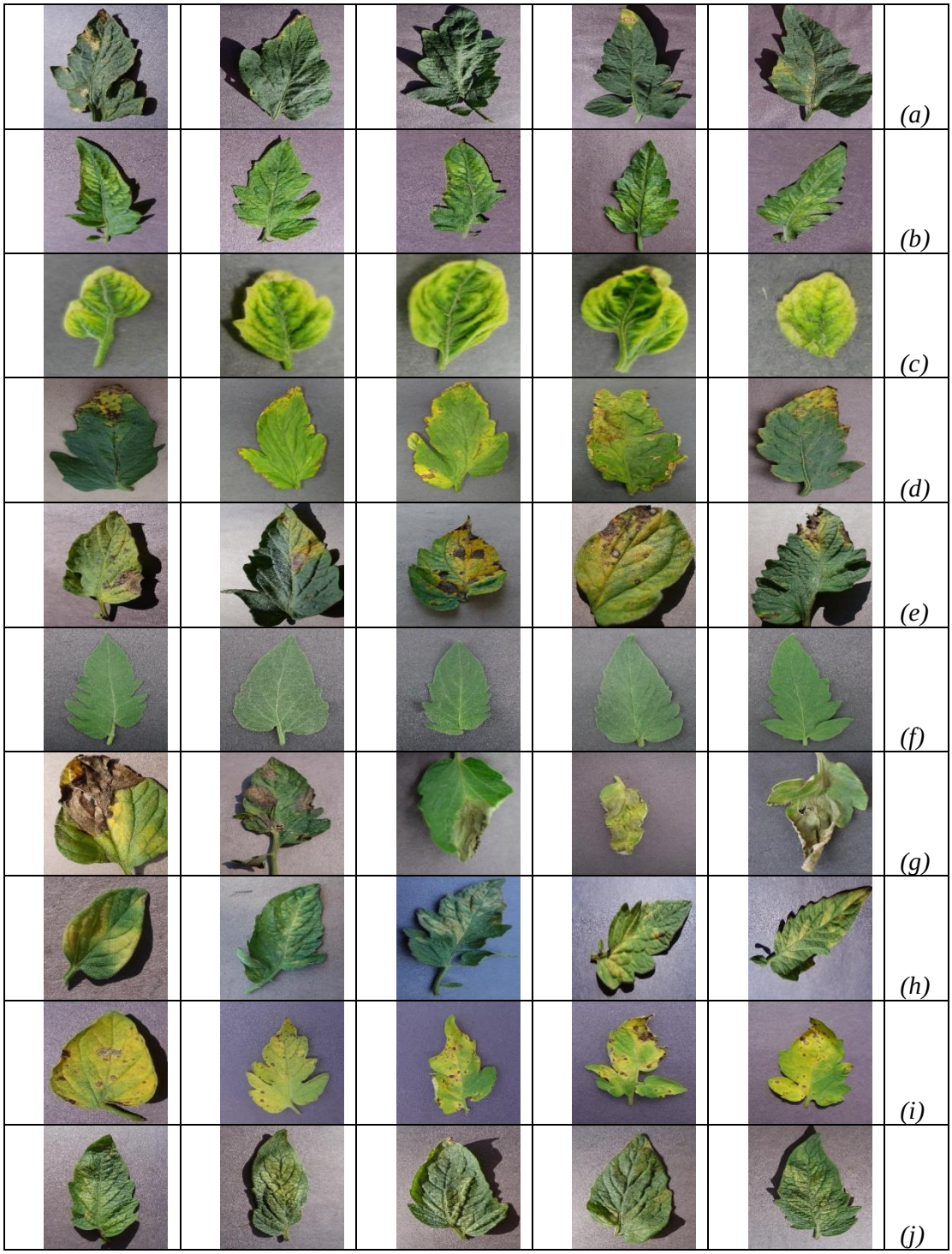

Figure 1. Samples tomato plant leaves affected with various diseases collected from [1]

3.1 Approach

The proposed method has three steps namely, (1) Clustering (2) Feature Extraction (FE) and (3) Classification. The techniques adopted in the proposed method are K-Means for Clustering, Discrete Wavelet Transform (DWT) and GLCM for FE and finally the Neural Networks (NN) for classification. Figure 2 shows the pseudo code of the proposed tomato leaf disease detection method.

Input: Leaf Image

Output: Disease Category

Read the Input Image.

2. Cluster the affected region using K-Means Clustering Technique.
3. From the resultant clustered image, choose the leaf affected cluster area and repeat the following:
   a. Extract the DCT features.
   b. Extract GLCM features from the resultant image.
   c. Apply the Neural Networks (with the specified features) on the extracted GLCM features.
   d. Maximum value in the corresponding row (index) determines the corresponding type of disease.

Figure 2. Pseudo Code for the

Proposed Tomato Leaf Disease Detection Method

The simplest clustering technique, K-Means Clustering, is adopted in the proposed method to cluster the disease affected regions in the tomato plant leaves. It includes the following steps summarized from [16]:

a) Initially, random points are selected (in this case, the product of rows and columns in the input image is considered) as cluster center.

b) Number of random centroid is chosen as ten.

c) Based on the distance between the chosen centroid and the other points, those points are clustered to the concern centroid(s) with respect to the minimum distance.

d) The cluster center(s) are revised in accordance with the mean of designated observations.

e) The above two steps (step (c) and step (d)) are repeated till the convergence occurs.

Finally, the outcome of K-Means Clustering approach is the clustered regions of disease affected and unaffected regions in the input tomato plant leaf. Figure 3 shows the resultant of clustering operations for a sample image from [1], where the Figure 3 (a), (b), (c), (d) and (e) represents the input image, clustering operations, Clustered Region 1 (CR1 – the clustering of leaf portion affected with disease), CR2 - unaffected leaf portion and CR3 - the clustered leaf, respectively.



Input Image (a) | **Clustering Operation (b)** | **CR1 (c)** | **CR2 (d)** | **CR3 (e)**

Figure 3. Resultant of Clustering operations for a sample image

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In the FE method, the proposed method adopts DWT and GLCM approaches for extracting the predominant features of the input tomato leaf. In general, one dimensional (1D) DWT perform operations on vector, which is of length 2x, (where x ranges from 2, 3, and so on) and produces a transformed vector of same size. Initially, the input vector is filtered with Low Pass Filter (LPF) and High Pass Filter (HPF) of specific size and stored in the first half and second half of the transformed vector, respectively. Thus, ends up with one-level wavelet transform of input vector. Subsequently, these steps are repeated for three iterations, resulting in a three level 1-D DWT. With respect to two dimensional (2D) DWT, one level 1-D DWT is applied along the rows followed by columns subsequently. As a result, low-low, low-high, high-high and high-low bands of transformed images are generated. Subsequently, these steps are repeated for three iterations, resulting in a three level 2-D DWT [2]. Followed by DWT, GLCM and Haralick features are extracted. The features examined in the proposed method are Contrast, Correlation, Energy, Homogeneity, Mean, Variance, Entropy, Standard Deviation, Smoothness, Kurtosis, Skewness, Inverse Difference Moment (IDM) and Root Mean Square (RMS) Values and determined using the Equations from (1) to (13), respectively.

$$\sum_{i,j=0}^{N-1} P_{i,j}(i-j)^2 \tag{1}$$

$$\sum_{i,j=0}^{N-1} P_{i,j}\left[\frac{(i-\mu_i)(j-\mu_j)}{\sqrt{(\sigma_i^2)(\sigma_j^2)}}\right] \tag{2}$$

$$\sum_{i,j=0}^{N-1} P_{i,j}^2 \tag{3}$$

$$\sum_{i,j=0}^{N-1} \frac{P_{i,j}}{1+(i-j)^2} \tag{4}$$

$$\mu_i = \sum_{i,j=0}^{N-1} i(P_{i,j}),\ \mu_j = \sum_{i,j=0}^{N-1} j(P_{i,j}) \tag{5}$$

$$\sigma_i^2 = \sum_{i,j=0}^{N-1} P_{i,j}(i-\mu_i)^2,\ \sigma_j^2 = \sum_{i,j=0}^{N-1} P_{i,j}(j-\mu_j)^2 \tag{6}$$

$$\sum_{i,j=0}^{N-1} P_{i,j}(-\ln P_{i,j}) \tag{7}$$

$$\sigma_i = \sqrt{\sigma_i^2},\ \sigma_j = \sqrt{\sigma_j^2} \tag{8}$$

$$R = 1 - \frac{1}{1+\sigma^2} \tag{9}$$

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$$K = \{\frac{1}{MN}\sum_{i=1}^{M}\sum_{j=1}^{N}[\frac{p(i,j)-\mu}{\sigma}]^4\} - 3 \quad (10)$$

$$S = \frac{1}{MN}\sum_{i=1}^{M}\sum_{j=1}^{N}[\frac{p(i,j)-\mu}{\sigma}]^3 \quad (11)$$

$$H = \sum_{i,j}\frac{P(i,j)}{1+|(i-j)|} \quad (12)$$

$$y = \sqrt{\frac{\sum_{i=1}^{M}|u_{ij}|^2}{M}} \quad (13)$$

where,

N and P_{ij} denotes the rows/columns and probability of points,

- σ, σ_i and σ_j denotes the standard deviation (SD) and SD of rows and columns,
- μ, μ_i and μ_j denotes the mean (M), and M of rows and columns,
- R, K and S denotes the contrast measure, kurtosis and skewness,
- H and y denotes the IDM and RMS

Table 2 illustrates the dimension variations of input image during the feature extraction phase.

Table 2. Image Dimensions after Features Extraction

Sl. No	Input image dimensions (in pixels)	Image dimensions after applying (in pixels)	
		DWT	GLCM
1	256 x 256	38 x 152	1 x 13

Followed by the feature extraction, classification of plant leaf diseases is accomplished through the Neural Network (NN) with following specifications:

- Number of sample selected for training = 80%
- Number of sample selected for testing = 10%
- Number of sample selected for validation = 10%
- Number of hidden layers (chosen) = 15
- Training function adopted in the pattern recognition network is Bayesian Regularization Back Propagation ('trainbr'). The significance of this network lies in updating the weight and subsequent bias values with respect to Levenberg-Marquardt Optimization technique. Moreover, it reduces the consolidation of weights and squared error [3] and then regulates the appropriate combination to improvise the network performance. This type of network is referred as Bayesian Regularization (BR).

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4. Experimental Results

The proposed method of tomato plant leaf disease detection approach is evaluated on the sample leaf images collected from plant village dataset [1]. The dataset consists of ten classes of tomato leaf categories (nine affected classes and one healthy class) resulting in 16,012 number of images. Randomly, 50 images are selected from each category resulting to 500 images for evaluating the proposed method. As an initial step, K-Means Clustering is applied on the input image and clustered images are resulted for leaf regions and disease affected regions. Upon choosing the disease affected region cluster, the feature extraction process is carried out using 2D-DWT and GLCM approaches. Thus, the input image of uniform size (256 x 256) pixels are subjected to feature reductions of 38 x152 pixels and 1 x 13 pixels due to DWT and GLCM approaches, respectively. Later, resultant features are classified using NN of specified specifications. Table 3 unfolds the proposed method's performance with respect to classification accuracy and metrics used to evaluate are Sensitivity and Specificity.

Equations 14, 15 and 16 are used to determine the Sensitivity, Specificity and Classification Accuracy respectively.

$$\text{Sensitivity} = \frac{TP}{TP+FN} * 100 \tag{14}$$

$$\text{Specificity} = \frac{TN}{TN+FP} * 100 \tag{15}$$

$$\text{Classification Accuracy (CA)} = \frac{TP+TN}{TP+TN+FP+FN} * 100 \tag{16}$$

Here, the variables TP, TN, FP and FN denote the True Positive, True Negative, False Positive and False Negative respectively. Further, the best training performance is 5.029e-10 at 45 epochs. When compared to the existing tomato plant leaf disease classification approaches namely, [6], [7], [8] and [13], the proposed classification has significantly higher performance in terms of classification accuracy.

Table 3. Performance Measures

Number of images	TP	FN	TN	FP	Sensitivity	Specificity	Classification Accuracy
500	445	5	48	2	98.88	96.0	98.6

5. Conclusion

The proposed method of tomato plant leaf disease identification approach has three phases namely (1) Clustering of affected and healthy regions using K-Means approach (2) Feature Extraction through DWT and GLCM and (3) Classification using NN. The proposed work was evaluated on Plant Village Dataset with randomly selected 500 images comprising of ten classes. When compared with the performance of the existing approaches, the proposed method has significant classification accuracy. The proposed model can be enhanced with the real dataset and evaluated with different NN architectures (such as AlexNet and GoogLeNet). Further, the scope may be extended to imperatively suggest the remedial measures for the concern leaf diseases.

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A Job Recommendation and Prediction with Uncertainty Estimation Using RNN

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Abstract

Currently, college-going students would take more time over their parental generations. Further, in the united States, the six-year graduation rate need been 59% for decades. Moving forward that educational quality by preparing better-prepared learners who could effectively propose over an auspicious way may be basic also too to anticipate that part. Faultlessly foreseeing students' occupation part clinched alongside future need pulled in substantially consideration as it could assistance distinguish good way might make given will them on time by advisors. Former Look into once students' part prediction incorporate shallow straight models; however, students' scholastics and investment will be a Exceptionally mind boggling transform that includes those amassing of information crosswise over an arrangement for parts that could not be sufficiently displayed by these straight models. What's more to that, former methodologies concentrate on prediction precision without recognizing prediction uncertainty, which may be key to advising and choice making. In this work, we avail recurrent neural network (RNN). These c's models need aid In light of those suspicion that former information of the scholar can provide people for future occupation part thus that evaluations from claiming former courses could make used to anticipate evaluations in An future course. The MLP ignores the transient flow from claiming students' information advancement. Hence, we recommend RNN to students' execution prediction. Should assess those execution of the suggested models, we performed broad investigations ahead information gathered. Those test Outcomes indicate that the recommended models accomplish finer execution over former state-of-the-craft methodologies and give more exact outcomes as a result.

Keywords: Sequential Models, Educational Data Mining, Job Prediction.

1. INTRODUCTION

In the educational data mining field Academic students' performance is one of the most important topics. It can be a very useful factor for both students and teachers. Data mining conception basically extract the meaningful data from the raw information and the Educational Data Mining (EDM) is a developing technique which extracts meaningful knowledge in the context of educational field. Researchers contributed a lot on EDM theory to learn and investigate educational psychology and also data sciences that closely related to the learning analytics. Many different machine learning approaches are there to forecast a student's presentation using the student's family details as well as educational background. Particularly, these machine learning method enable to detect the student, who is at the risk i.e. who is likely to fail or drop out from the class. This helps a teacher to provide a remedy to the weak student. It can also help to identify the high performer student in the class. Decision Tree [1] and Naive Bayes [2] algorithm is highly used in Educational Data Mining. Havan Agrawal [3] stated limitation of these algorithms, the accuracy of the Bayesian classification model reduces when input is provided in a continuous range. Artificial Neural Network is a powerful tool to make a prediction. Deep learning is the state of art [4] for artificial intelligent research. Currently deep learning concept is highly used in voice/sound recognition [5], Natural Language Processing [6], computer vision [7]. Here proposed Recurrent Neural Network (RNN) classifier model to predict the students' Job. RNN is a different of a neural network. It obtains the output value based on the past and the current information using the recurrent loop of the network. The proposed RNN model aims to predict a

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student Suitable Job through logistic classification analysis. One hidden layer with Relu activation function is implemented. The proposed model is able to predict a student Job with the accuracy of around 85%.

II. LITERATURE SURVEY

Kyndt [8] Utilized neural network to predict academic execution of the first year b.tech student, In light of students' motivation, methodologies with learning, attempting memory limit and consideration.

Ioannis E. Livieris, et al. [9] Here the studytells about the performance of students in Mathematics using an Artificial Neural Network (ANN) classifier. They Discovered that the changed ghastly perquisite prepared simulated neural system performs finer arrangement contrasted with different classifiers in this context.

S. Kotsiantis, [10] investigated indistance learning using machine learning techniques for dropout prediction of students. Their study made an important contribution as it was a pioneer and helped to carve the pathway for educational data mining.

Moucary, [11] utilized anhybrid strategy on K-Means clustering Also simulated neural system to foreseeing those execution about people of higher training about new outside dialect. They utilized neural system to foresee the student's execution et cetera fitting them for An specific cluster utilizing the K-Means calculation. This clustering aided the instructors to distinguish a student's abilities throughout their right on time phases for scholastics.

Mukta Also Usha[12] predicted those academic execution from claiming business school graduates utilizing neural networks And accepted Factual systems they recognized the underlying constructs of a accepted business school educational program Also exhibited its significance for those different components of confirmation transform.

Amrieh, [13] suggested a prediction model for students' execution In view of information mining routines. Those model might have been assessed previously, three diverse classifiers; Naïve Bayesian, simulated neural system Also choice tree. The classifier's execution might have been enhanced by utilizing irregular forest, packing and boosting as a cluster system. Those model attained dependent upon 22. 1% that's only the tip of the iceberg in correctness compared The point when behavioural Characteristics were uprooted and precision will be expanded up to 25. 8% after utilizing those cluster systems.

III. IMPLEMENTATION

A Recurrent Neural Network (RNN) Is An class of artificial neural system the place associations the middle of units form a graph chart along an arrangement. It is mainly used to handle the time series data. RNN may be on settle on utilization of consecutive majority of the data. RNNs are called repetitive a result they perform those same undertaking for each component of a grouping. RNN can be described in other way to say that has "memory" to capture the data that is calculated till now. Figure 1 (a) shows a graphical illustration of a structure of an RNN. Figure 1 (b) shows the recitation by the time of working out of an RNN

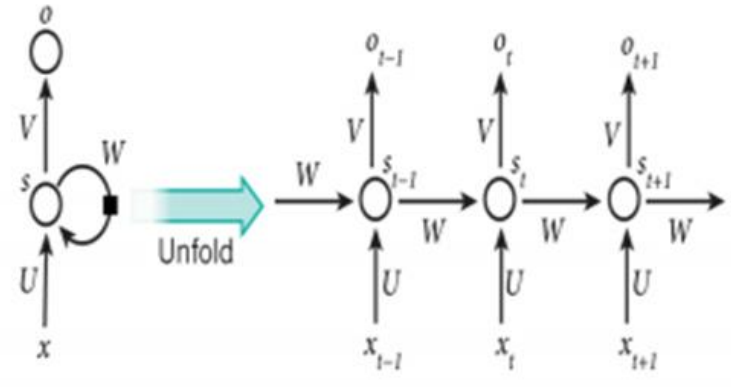

Figure.1. Structure of the recurrent neural network

Those forward pas of the RNN may be Just about same Likewise that from claiming an MLP with single hidden layer but that actuation arrives in those hidden layer from both the present outside information and the hidden layer activations particular case venture once more in time. To the information to hidden units we have:

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$$a_h^t = \sum_{i=1}^{I} w_{ih} x_i^t + \sum_{h=1}^{H} w_{hh} b_h^{t-1}$$

$$b_h^t = \theta_h(a_h^t)$$

The output unit has:

$$a_k^t = \sum_{h=1}^{H} w_{hk} b_h^t$$

The back propagation of the RNN is just the standard back propagation. Those complete arrangement for delta terms could make computed toward beginning In t = t and recursively applying those The following functions, decrementing t In each step. Note that δj T+1= 0, ∀j, since no slip is gained from past the limit of the arrangement.

$$\delta_h^t = \theta^j(a_h^t)(\sum_{k=1}^{K} \delta_k^t w_{hk} + \sum_{h'=1}^{H} \delta_{h'}^{t+1} w_{hh'}$$

$$\delta_h^t = \frac{\partial O}{\partial a_j^t}$$

IV. DATA PROCESSING

It is an educational data set together since a learning management system. The data set is little bit updated by adding two more features with the existing data set. The data set contains record for total 480 students. The modified data set contains total of 34 features as below

1. Academic percentage in Operating Systems
2. percentage in Algorithms
3. Percentage in Programming Concepts
4. Percentage in Software Engineering
5. Percentage in Computer Networks
6. Percentage in Electronics Subjects
7. Percentage in Computer Architecture
8. Percentage in Mathematics
9. Percentage in Communication skills
10. Hours working per day
11. Logical quotient rating hackathons
12. coding skills rating
13. public speaking points
14. can work long time before system?
15. self-learning capability?
16. Extra-courses did
17. certifications
18. workshops
19. talent tests taken?
20. Olympiads
21. reading and writing skills

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22. memory capability score Interested subjects
23. interested career area Job/Higher Studies?
24. Type of company want to settle in?
25. Taken inputs from seniors or elders
26. interested in games
27. Interested Type of Books
28. Salary Range Expected ?
29. Gentle or Tuff behaviour?
30. Management or Technical Salary/work
31. hard/smart worker
32. worked in teams ever?
33. Introvert
34. Suggested Job Role

mark in range 60%-80% is class 'Medium' and mark below 60% is 'Low'. Data processing is essential to recover the eminence of the dataset. Text data type attributes Gender, Parent Responsible, Parent Answering, Parent Satisfaction ,Student Absence Days are transformed to binary data '0' and '1'. Other Text data type attributes Nationality, PlaceofBirth, Stage, Grades, SectionID, Topic, Class in 1st Term and Class in 2nd Term are transformed to numerical data type.

V. METHODOLOGY

In this paper, a modified vanilla RNN is used to make the prediction of a student's performance. After building the proposed system, a comparative study is made with the Deep neural network (DNN) which is proposed by the Prabu P, et al.[14]. The whole implementation is done in PYTHON. Once the data pre-processing is completed, the whole data set is classified into two parts. One is training set and another one is the testing set. The data set is divided into the ratio of 3:1(Train/Test). The class variable is one-hot encoded for both train and test dataset. The class variable is represented in the numerical format as below

Classes	One-Hot Encoding Format
Low	[1,0,0]
Medium	[0,1,0]
High	[0,0,1]

The proposed neural network contains three layers. The first layer is the input layer and the seventeen features are given as input in the system. The final result of the student is produced as output from the output layer. The hidden layer is located in between the input and the output layer. The hidden layer consists of 40 neurons. One recursive path is there in between the hidden layer neurons to make the neural network recurrent. Random initialization of weights w and bias b to every interconnected layers. This initialization is specifically proposed for hidden nodes with Rectified Linear Unit (ReLU) non linearity. The ReLu activation function is defined as the positive part of its argument. It is represented by

$$f(x) = x+ = max(0,x) \quad \text{Where } x \text{ is the input to a neuron.}$$

VI. RESULT

The proposed method is applied to a dataset of 480 students. 360 data is used for training and the rest 120 data is used for testing. The proposed RNN is able to achieve the accuracy of 85.4% in predicting of a student's final grade. The performance of the training data is determined using the mean square error. After completing the 200 epochs, the mean square error of the training data set is determined as 0.11.

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Classification Results:-

Classifier	Accuracy (%)
Artificial Neural Network	77.8
Deep Neural Network	83.7
Recurrent Neural Network	85.4

VII. CONCLUSION

Here a method is presented to forecast a student presentation utilizing Recurrent Neural Network with Rectified Linear Unit (ReLU) initiation purpose. RNN is suitable for analysis of the time series data. In this paper, student's ultimate term class is projected utilizing first two term class along side by other fifteen features. Here it is assumed that the student's final class is a sequential output of other two term class. The projected ideal achieved an exactness of 85.4% that outperformed the other machine learning algorithm. Higher accuracy can be obtained with larger dataset and features. This model can be used to predict student's performance and help to identify the students who have higher chance of failing. As a part the future work, the model can be tested with larger data set by adding more features. A clustering technique can be used to categorize the students at the very early phase, which will help to deal with the cold start problem. The proposed method can also be used in the intelligent tutorial system (ITS) to predict a student performance and based on that ITS can provide proper feedback to the students.

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A Study on Data Prevention Approaches for Cloud Computing

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Abstract.
This paper proposes protecting data by using data security and it is considered to introduce alteration, inspection, intrusion, and footage. Cloud computing may be a kind of online based computing that grants approaches of PC and various devices depending on resources and necessary information. It is an ideal that empowers entirely on the prevention and control of configurable computing resources. Now a days security is a major problem in developing cloud computing so efficient debugging of cloud computing is a successful model by security in cloud presentations. The present work is a part of cryptography in cloud computing for getting better information safety. Here we approach another security for cryptography to get secured information at cloud data centers.

Keywords: *Sensitive data management, Information security, Cryptography.*

1. Introduction

In the recent network Data Prevention is a main concern for the business organization. Prevention of sensitive data from unauthorized entities and monitoring the data flow to avoid more security risks are the main goals of the security domain. Unapproved prevention has severe concerns by organization in both long term and short term. To prevent from the unwanted access and transaction from trendy, an structured effort is wanted to control the data flow inside and outside the organization. Data Prevention and prevention process are the important research issue, which is not always possible because several reasons. Recent news and reports indicates 50 % of data's are leaked in the business sector either partially or fully [1]. This is very difficult to identify the exact details of leaked data and the leaker. However, the data Prevention has many channels to leak. So monitoring every channel is an impossible task, and thus creates many serious issues. There is numerous detection and prevention schemes like Intrusion Detection System (IDS), firewall, and virtual private networks are the common security systems used to detect or prevent some unwanted access. These

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schemes can perform well if the rules are properly defined.

However, the rules can be violated from dissimilar manageable channels such as email, prompt messaging, and via other social media supplements. To overcome this problem, Data Prevention (DP) systems are deployed. There are less adequate researches introduced to thwart the DP issue, so there is a need and challenge to design and develop a new DP mechanism with detection ability. Motivated by the DP field of study, a survey on the Data Prevention and Prevention approaches are presented in this paper. The paper provides the basic process of DP along with the recent techniques under the data Prevention process. The paper finally contributes the problem and challenges of the recent techniques with future work.

2. Data Prevention and Standards

Numerous studies conducted to define the area of Data Prevention and prevention in the literature. But the definition of data or information leakage and prevention is the process of content watching and protective by the misuse [2]. Although researches on Information Avoidance are growing is small problem on the detection of information Prevention by the perception of employer behavior [3]. Writers in [4] reviewed DP methods and its problems by appropriate description. The DP procedure comprises three phases such as collecting data, analyzing and remedial action phases as shown in Fig 1.0. The data collection is starting by the user internet or intranet logs and the database sources. The collected data's are imported in the DP analysis phase, which performs rule matching, policy verification, content and context verification processes. The setting confirmation extracts the sender, wellspring id, timings of the information access, organization and extent starting with those header majority of the data and so forth throughout this way, observing and stock arrangement of all instrumentation may be the content may be the pre-processed information from standard statement and tagging transform. That identification also classifying the information under those predefined population generally uses those security strategies What's more preparing tests. At long last the DP schemes determines the issue by choice suitable medicinal activities like alerting, blocking, permitting Furthermore finishing some other activities in the security arrangement standard situated.

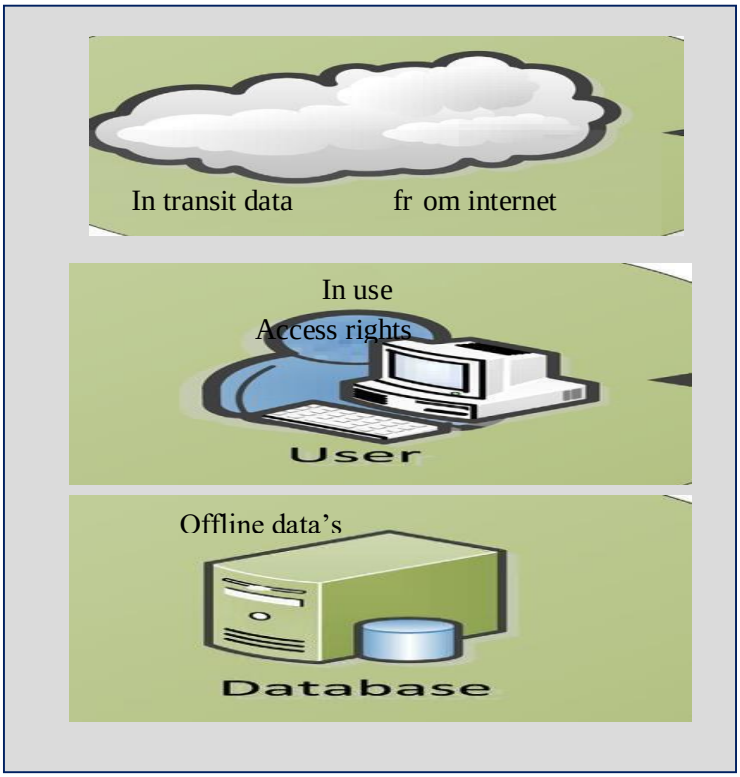

Fig 1 Deployment of DP

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Fig. 1 shows the simplified deployment of a DP, where the exposure and avoidance qualities and investigation, recognition and corrective activities. That dataset methodology incorporates the web data's alternately on travel data's, client entry privileges also logged off recorded information starting with the database. These three sorts about data's are by and large gathered to the DP transform. That fig 2.0 indicates the information sorts utilized to the DP. Information clinched alongside travel is those information being transmitted manifestation particular case hub should in turn inside the same system alternately different networks. Information being used is those data, which will be receptive of the clients clinched alongside record organization or email formats inside the requisitions. Those information being used organization is not encrypted Also this might be effectively deciphered. Those third database data's need aid typically organized Furthermore secured with solid entry controls.

The content based DP monitors delicate data by regular expressions for identifying the arrangement. For sample account number, phone number and other delicate details are monitored. According to this type, authors in [5] proposed a DP with regular expression. But the technique is not successful and creates high false positive rates.

The DP are performed by agent who has the ability to alter the availability of confidential data. Author in [6] identified dissimilar leaky channels while data is transferred. This includes the portable Media such as USB, memory cards and several more. Author's audits the actions associated to the sensitive data access and restricts according to the audit report.

The categories of DP techniques are summarized in fig , which has different types of methods to prevent data Prevention and maintain the Proprietorship and identification utilizing behavioral Investigation and so forth throughout this way, observing and stock arrangement of all instrumentation may be etc. , those practically prominent methodologies under DP is the utilization from claiming cryptographic Also watermarking techniques, this abstains from the information starting with the unapproved clients. In the identification process, those information also behavioral examinations for quick mining need several developments.

3. Challenges Facing DP

Similar to the other data protection and security techniques, the DP face several issues while detecting and preventing the data Prevention. There are seven main challenges were identified from the earlier work [7] such as listed below.

- The first challenge is the data transaction may happen in many channels and many ways. If the data transmitted via the desired application then it can be detected or protected. But, if the data channel is other than the specific application like email, USB and other format then it will be a challenging task.
- The second challenge is the data modification, where the data can be modified and that can be partially leaked to the users. Sometimes many approaches find the whole pattern of the sensitive content. So it is failed to detect the partial and full data Prevention with or without modification.
- The third challenge is determining and providing appropriate access rights to the specific users according to their security level is more complicate. The improper guidelines and policies may affect the DP accuracy. The access controls should be properly configured.
- The fourth challenge is the process of encryption and steganography process, this technique can protect the data from the unauthorized user, but it difficult to analyze the data content when the strong encryption techniques are used.
- The use of watermarking concepts preserves the ownership and thus avoids the data Prevention. But the watermarking contents are unreliable for all type of data. And moreover, the watermarked contents are easily recoverable. This creates many challenging issues.
- The scalability and integration for vast domain is certainly impossible. This creates a scalability issue. When the network size is huge, then the policy matching, monitoring and access specifications are difficult one.
- Finally the detection of data Prevention from the log needs a complete supervised learning process. This creates many uncertainties and cause several issues over sensitive data. These challenges are commonly noted from the literature. Based on these challengers many researches made and that is described in the following section.

4. Literature survey

Wang, l. , Tao, j. , & Kunze, m. In their investigate paper "Scientific cloud computing: early meaning

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and experience" says that, registering clouds equips clients for benefits will get hardware, software, and information asset. Some clouds administration models are:.

i) HaaS: Hardware as service fittings likewise an administration might have been recommended conceivably toward 2006. Likewise an outgrowth of fast developments for fittings virtualization, it mechanization and more utilization metering Furthermore pricing, clients Might purchase it fittings - or actually a whole information centre/computer center- as a pay-as-you-go membership administration. Those HaaS Might make flexible, versatile Also reasonability will meet your needs.

ii) SaaS: Software as a service product or provision will be facilitated Concerning illustration An administration Also furnished with clients over those Internet, which excludes the prerequisite with introduce What's more run those provision on the customer's nearby machine. SaaS accordingly changes that customer's cerebral pain about product maintenance, furthermore declines the overhead for product buys by once interest estimating.

iii) DaaS: information as a administration information clinched alongside Different formats, from Different sources, Might a chance to be accessed by means of benefits with clients on the organize. Customers could, to instance, control remote data essentially like worth of effort around neighborhood circle alternately get information semantically on the web. 2. Er. Sharanjit Singh and Er. Rasneet Kaur Chauhan, "Introduction will Crypto cloud clinched alongside cloud registering "proposes cryptographic calculations as: 1) information encryption norms (DES) 2) propelled encryption guidelines (AES) 3) triple – des 4) RSA 5) blowfish These calculations camwood a chance to be connected effectively to cloud earth.

Nelson Gonzalez, Charles Miers, Fernando Redígolo, Tereza Carvalho, Marcos Simplicio, Mats Näslundy and Makan Pourzandi clinched alongside their exploration paper, "An measurable Investigation for current security worries What's more results for cloud computing" says that pointing should c the majority of the data identified with cloud security have recognize the principle issues in those region Furthermore assembled them under a model made of eight categories: Compliance, Trust, Architecture, personality card Furthermore Access, availability, episode response, information security Furthermore governance.



Fig. 2. Cloud computing environment

A. Historical backdrop also description cloud computing bursts similarly as a hot point starting with the late from claiming 2007 because of its abilities from claiming rendering versatile propelling it organizations, QoS guaranteed registering situations and configurable product administrations [3]. The cloud computing gives registering again those web furthermore this statement is essentially propelled eventually Tom's perusing the climate cloud. On cloud, information will be put away toward remote area What's more may be accessible with respect to interest. It permits customers to utilize requisition product without introducing those document in whatever machine locally, for web connectivity. Toward information outsourcing client might get those required data starting with anyplace a greater amount effectively Also need no cerebral pain for storage room also could skip those additional costs with respect to software, hardware, Also data assets What's more information upkeep [2].

B. Current cloud tasks at present various undertakings starting with business Furthermore academia is projected, to example, supply undertaking [4] - IBM What's more european union joint exploration

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activity to cloud computing, amazon versatile figure cloud [5], IBM's blue Cloud[6], experimental cloud undertakings for example, aura [7] Furthermore Stratus[8], OpenNEbula [9].

C. Categorization of clouds. Clouds might be arranged comprehensively as: i) state funded Cloud: hosted, worked Also figured out how Eventually Tom's perusing outsider merchant from person alternately more information focuses. Ii) Private Cloud: figured out how or claimed Toward an organization, giving work to administrations inside an association. Iii) mixture Cloud: comprised both those private and open cloud models the place association might run non - center requisition done a government funded cloud, same time administering center requisitions Also delicate information in-house over An private cloud.
D. What's more On-Demand organization cloud registering depends When association at oneself What's more on-demand organization models. It ought should for enable the individuals client with fellow team member with the cloud ought to perform assignments over building, deploying, managing, Moreover arranging. The client ought with respect to need the capacity will get to figuring abilities Concerning illustration Besides during they might required and a greater amount to no alliance starting with the cloud organization supplier. This could assistance clients will an opportunity to make secured close by control, getting deftness their work, Furthermore will settle on better choices with respect to the present also future necessities.
E. Broad network entry abilities need aid open again those system Furthermore got with through standard components that development utilization Eventually Tom's perusing heterogeneous slim alternately thick customer phases (e. G. , cell phones, tablets, convenient Pcs furthermore workstations).
F. Measured services cloud frameworks thus control and more, overhaul asset use toward using an metering capacity at exactly level from claiming reflection best possible of the sort from claiming management (e. G. Stockpiling capacity, processing, diffusion limit Furthermore vigorous customer accounts). Asset use could make monitored, regulated and more reported, giving straightforwardness of the supplier Wand more purchaser.
G. Rapid adaptability capabilities might make flexibly provisioned also discharged, every so often naturally, proportional fast outward also inner proportionate for interest of the customer, those capacities open to provisioning consistently need every last one of earmarks about continuously limitless and might be appropriated for any amount at whatever point.

5. Implementation

Elliptical curved cryptography in cloud computing will be efficiently utilized similarly as an contact from claiming get ready with instant public key cryptography resolutions, for example implementing keys furthermore digital signatures. There would different inspirations overdue vitality from claiming utilizing elliptic curves Likewise they offer that's only the tip of the iceberg minimal key sizes and more workable implementations [11]. ECC is a sort about open cryptosystem like RSA. A chance to be that as it may, its snappier propelling breaking point Furthermore by giving engaging What's more alternative approach to masters about cryptographic computation impacts it on difference from RSA. An comparable security level offered toward RSA, could a chance to be also provided for toward ECC, that similarly for more diminutive key sizes. To example, "the 1024 bit security quality of a RSA Might a chance to be decreased on 163 bit security quality from claiming ecc with those same level. Separated starting with this, ecc will be particularly great suiting for remote communications, like portable phones, PDAs, keen cards Also sensor networks".

Ecc utilization purpose of duplication operation, which need been discovered with make computationally that's only the tip of the iceberg proficient over RSA exponentiation [12]. Ecc need drawn a great part consideration Likewise those security results to remote networks for example, such that Clouds, because of the little way measure and more rearranged calculation [13].
Elliptic bend compelling reason An fascinating property that makes it fit for utilization done cryptography previously, cloud registering i. E. Its energy with make whatever two keeps tabs ahead An specific curve, incorporate them together Additionally get An third reason for existing on the same twist. The fundamental operation bolted in for ecc might make reason for existing multiplication, i. E. Extension of a scalar k for toward whatever associate p on the twist to get an additional side of the

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side of the point Q on the same twist [14]. The general scientific articulation for a elliptic bend is:.

$$y2+axy+by=x3+cx2+dx+e \quad (1)$$

Here a, b, c, d and e are actual figures
Where x and y are a set of actual numbers. In its simplest form, an elliptic curve equations can gives as

$$y2\text{-}x8+dx+e \quad (2)$$

A statistical investigation, exhibits that An similar level starting with security rendered Toward a RSA-based diagram to an enormous modulus could aggravate proficient for An extensively more diminutive elliptic bend group, i. E. An 163 touch enter of ecc might make thought will make concerning delineation secure Similarly as 1024 odds enter for RSA. Likewise ecc utilization more diminutive way sizes, which impacts On quicker calculations, more level control consumptions, sparing memory What's more transfer speed. Ecc In this way clubbed for cloud registering will doubtlessly provide a significant part more secure nature's domain alongside velocity and sparing about Numerous intangible/indirect assets. Ecc connected to cloud will bring about All the more consideration paid towards how with evade information duplications, how on use information and benefits proficiently what's more entryway should attain expense profit investigation results. Additionally ECC employments more diminutive way sizes, which impacts on quicker calculations, low power consumptions, saving memory also band width. ECC in this way clubbed with cloud computing can provide secure environment including speed and saving of many intangible resources.

6. Conclussion

Data prevention is a main problem in the area of information safety. There are numbers of researches from different domains is constantly operational to emerging data avoidance and prevention approaches to alleviate this issue. Protecting confidential and sensitive information is more important. Cloud prevention will be used to service-based information security. Will plough with respect to cloud computing, those group must take genuine also committed measures to ensure security. A development proceeds will receive widespread guidelines (for example, open source) to guarantee interoperability around service providers. ECC can a chance to be used likewise and only portable computing, remote sensor systems, also server based encryption, picture encryption and its provision previously, each field of correspondence. Cloud computing for ECC may be a completely new region and need enormous degree from extent research. The worry here is data security with elliptic curve cryptography to provide for mystery furthermore affirmation about information the middle of clouds. Over future, security issues about cloud computing could make cantered a greater amount also a endeavour could a chance to be produced with find exceptional results using elliptical curve cryptography.

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Collaborative Filtering and Regression Techniques based location Travel Recommender System based on social media reviews data due to the COVID-19 Pandemic

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Abstract
Nowadays, Dynamic industries like tourism is a enhance to boost many countries economy in recent years. The hotel sector leads to a significant role among all aspects of the tourism industry. Online travel platforms, in association with hotel management, are a part of hotel E-tourism that helps users to make travel plans online, suggest precise recommendations in consideration with the earlier feedbacks upon hotel stay. From the past few months, the user roaming ratio falls rapidly due to the COVID-19 Pandemic across the globe. In a business concern, this Pandemic affects all tourism sectors, specifically in the hotels' occupancy. To retain business positions and attract the users in these problematic scenarios, hotel and travel platform management concerns about past preferences of users, which have a significant impact on gratification for a comfortable stay. The current market trends show that user reviews are playing a vital role to select a hotel based on a safe location. Our work tries to find and recommend the dimensions that contribute more towards higher satisfaction levels of users in Asian continental top tourism city hotels listed by the Master and VISA Inc survey with item collaborative filtering and regression techniques based on Tripadvisor reviews from social media in recent times. The outcome of the work is helpful for Asian continental hotel management to concentrate more on the dimensions for obtaining better reviews. From an online travel platform perspective, this work suggests the contexts for the travel recommender system to gain things effectively from users.

Keywords: Tourism, Travel platforms, Hotel management, Hotel class, Travel purpose, Context, Collaborative, Recommender System.

1.Introduction.

Because of its influence and significance in e-commerce and the achievement of superior consumer acceptance, in the current days of growth, web technologies, the recommended systems (RS) have twisted the notice of business people and the common man to itself. Nowadays everyone wants to refresh themselves in the vacation by visiting the locations across the globe, mainly in the categories of middle and upper sections of users. At least once a year, these sections plan their vacations due to an increase in socioeconomic factors. Online Travel platform is one such opportunity for fulfilling their desires. Figure 1 shows the traditional recommender system architecture how it is working to fill fill customer needs.

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Burke[7] talked about various matters. Types of algorithms suggested. It clarified there that Two methods of suggestion. Collaborative cooperation is first, Filtering (CF), and content-based filtering (CBF), respectively. The mixer of each of these algorithms is called hybrid filtering. The internet is a platform in which one can express the views and opinions among a community of users who are located globally[5]. The content generated by users through the internet encompasses diversity in different web domains and also in media[7]. Ratings and Reviews are a part of online content created by a user. The analyses and ratings provided by customers are one of the most prevalent and accessible information in the electronic World of Mouth[1,2]. In the vacation industry sector, eWOM helps users in decision making about the selection of a hotel to stay with the availability of online content. In the hospitality and tourism sectors, social media play a significant role[6][9].

The significant and widespread online activity in the tourism industry is the information searched by the travellers [10]. Many tourism studies indicate that the user relies on the information available in the online tourist platforms for planning their trips. In online travellers' decision making, user-generated information leads to a vital role. User choices about travel plans are affected by the increase in the growth of online generated content. Before planning their trips, 50 per cent of travel planners depend on the content generated by previous users[8,20]. Opinion platforms are increasing in recent years, offering their users to create reviews and ratings online. TripAdvisor is one of the travel opinion platforms that allows users to express views and ratings regarding the hotel stayed experience.

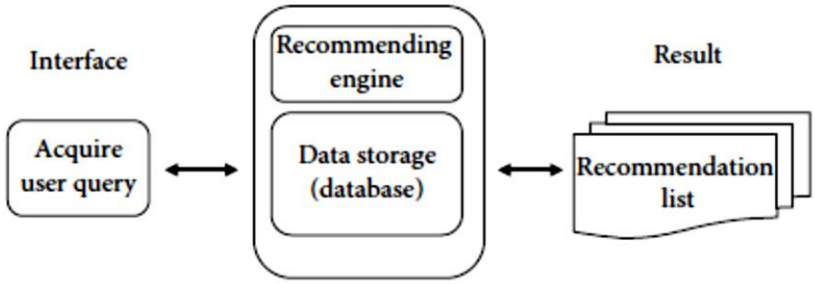

Figure 1: A generic architecture of recommender system

2.Literature Survey

Prior studies on the recommender method Discussed in the segment above. Previous research identifies similar factors Recommenders' principles, such as the filtering of information and Recommendation algorithms used previously for the development of Recommendation of systems[20] which aid to know and to understand Comprehend the need of web-based recommenders in the modern age Techno. Technology.

2.1. Recommender Systems.

Helping to end recommendation systems Users to help them locate goods and essential customer services that they are Searching. Tan and He[13] tabled a necessary proposal Echo process, called resonance similitude (RES), a novel approach. Superior is the book resemblance. Predictive accuracy vs similar conventional Tourism means an overnight stay away from the regular place of residence. Tourism and hospitality sectors generate significant revenue in many country's economies. In recent years numerous e-commerce applications developed related to tourism and hospitality for attracting the users[12]. Current statistics indicate that majority of hotel room bookings related to travel are done online with a percentage of 71 by individual users[15]. [18] Fasahte et al. Discussed if unrated products could be suggested and Using various filtering techniques, expected, and Using the Trip Advisor dataset, did tests. They also demonstrated a hybrid approach using ranking To predict user behaviour, data and textual content. Crespo Crespo Explain that Sem-Fit uses the experience of customers[16] point of view to apply the fuzzy logic technique to the relation between customers and hotels.

Hotels must concentrate on many vital aspects to obtain profitable revenues. One of the critical elements of the hotels is their presence online. Online reviews perform a significant role in knowing about the reputation of hotels, which act as an interface between users and providers of service offering useful information to make decisions about hotel stays[1][11]. To choose their accommodation in hotels, majority users depend on reputed online traveler platforms like Tripadvisor, Trivago, and Yelp, who provides the previous guest opinions based on social networks[15].[A recent study by Barclays indicates the potential growth of acquiring an additional 3.2 billion

dollars earnings by the hotel sector's income next decade if they pay more attention to online reviews those reviews to analyse and find out the best recommendations based on machine learning techniques[14,15].

Asia and the Pacific have been standing at the forefront of tourism development, having one-third of the world's economy. The hotel sector in this continent offers attractive tour packages in different hotel classes for users throughout the year. Hotel class and Trip-Type of a user take part in a crucial role in the selection of hotels to stay who have varied socioeconomic backgrounds[4,14]. Generalised Context-aware Recommender Systems is also one of the simple methods for acquiring views of previous users[3,15]. To build a customised hotel recommendation by Lin et al.[10], The techniques for text mining are used in combination with monitoring and browsing.

Rianthong et al.[13] It is concluded that the review ranking, prices and usefulness of the hotels must be taken on the upper side of the series in order to minimise the search expense of the customers. Using multiple regression analysis, a helpful model of stochastic programming was used. The most common and significant features for the classification of feelings are defined by Baghel and Lal[11] and grouped into seven classes, identified as basic features, seed word features, TF-IDF, punctuation-based features, phrase-based features, N-grams, and POS lexicons. Sharma et al., and Sharma, respectively.

Unfortunately, from the last three months in the entire world, the tourist roaming ratio falls due to the COVID-19 Pandemic[23]. Since most users rely on traveler domains in the selection of hotels they want to stay. To sustain the business and attract the users continuously, one of the crucial factors taken into consideration by the traveler domains is users' past opinions for that hotel class and Trip-type along with the location. Users view changes from one location to another; many factors influence the satisfaction level, like hotel class and travel purpose[25]. This study tries to find the impact of trip-type on hotel class.[26] This research article tries to find the contextual segments which have a high impact on user overall rating from different hotel classes, trip-types in Asian continent hotels of top tourism cities, and recommends these contexts to both hotel management, traveler domains for future improvement[27].

3.Methodology:

The approach suggested uses the heterogeneous nature (textual and numerical) of data crawled in from social media. Data is collected from selected hotel websites (data sources) containing the keywords that are present in the active user search query. For the download of the requested data, a web crawler was used, and data for further processing was stored in the NoSQL Cassandra database. Numbers (such as votes, ranks, and a number of video views) and text (such as ratings and comments) typically contain E data. To obtain accurate recommendations, our system used ranks, votes, and feedback data to extract hotel features from it. In two simultaneous instances, the scheme works. Numericranks and hotel votes are normalised from each chosen source of data. Analysis info, on the other hand, is processed using the natural language processing kit for review mining and highlights are extracted in the form of a matrix of hotel functions. Furthermore, for these extracted functions, numerical polarity scores are computed using SentiWordNet, and the average polarity score is calculated. Weighted average polarity scores are now determined by aggregating the normalised rank score, voting score, and polarity score. Lastly, suggestions are co-recommendations. Regression approaches for machine learning techniques. To calculate the final score to find out the type of guest (solo, family, company, friends, couple, etc.) for the hotel, we have

described a collaborative filtering other machine learning technique. The hotel recommendation method proposed is shown in Figure 2. In each of the five separate classes, the hotels' final recommendations are shown based on a specific guest category.

3.1. Feature Extraction Process.

The reviews are extracting from Tripadvisor, one of the leading e-tourism travel platforms. The data set consists of 37 cities across the Asian continent from different hotel classes having 15,977 reviews. From each city, we select 30 top hotels, at least with 200 to 1000 records. Maximum of reviews are coming from the last two recent years. This review contains the contextual dimensions Room, Location, Value, Cleanliness, Service, Sleep-Quality, and overall rating of the hotel. The item-item collaborative filtering recommendation algorithm used here replaces missing values of some contexts in this data set and backword elimination method in multiple regression algorithm which uses to obtain the significant impact of contextual dimensions on user overall satisfaction.

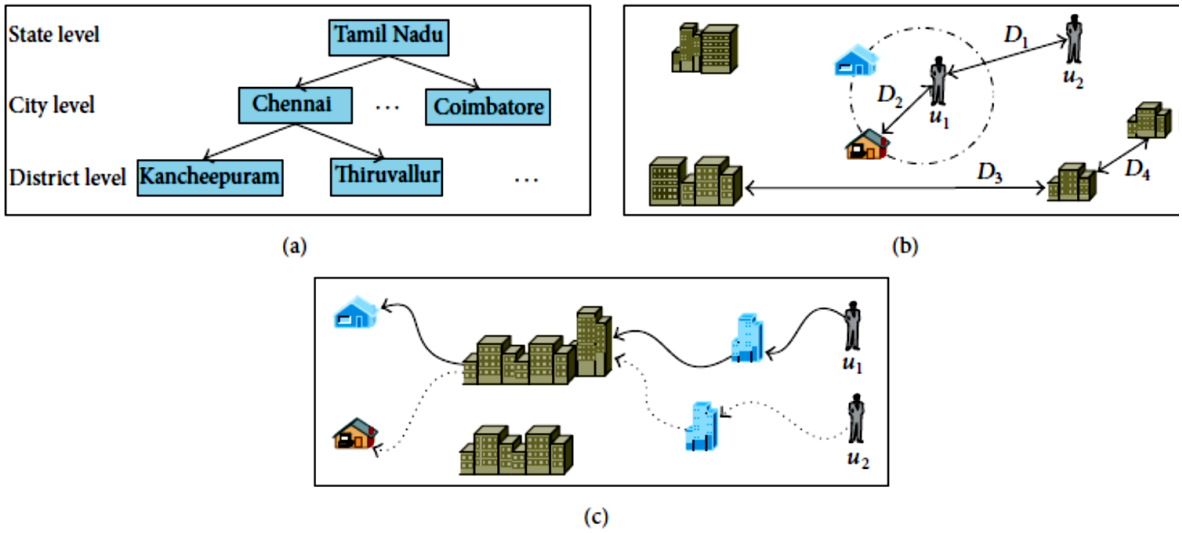

Figure 2:The proposed system for hotel Recommendation
(a)Location hierarchy (b)location Distance(c)location sequence

4. Results

After applying the O.L.S regression model to predict the significant contextual attributes on the overall user satisfaction level on different classes of hotels ranging from 1-5, The following screenshots show the results.

Table 4.1: List of cities in the Asian continent in consideration to extract reviews

S.NO	CITY	COUNTRY
1	Agra	India
2	Amman	Jordon
3	Bali	Indonesia
4	Bangkok	Thailand
5	Bangalore(Bengaluru)	India
6	Beirut	Lebanon
7	Chennai	India
8	Cochin	India
9	Delhi	India
10	Denspar	Indonesia
11	Dubai	U.A.E
12	Galle	Srilanka
13	Giza	Egypt
14	Hongkong	Hongkong
15	Hyderabad	India
16	Istanbul	Turkey
17	Jaipur	India
18	Japan	Japan
19	Johor Bahru	Malaysia
20	Kuala Lumpur	Malaysia
21	Katmandu	Nepal
22	Kuta	Indonesia
23	Macau	China
24	Mecca	Saudi Arabia
25	Medina	Saudi Arabia
26	Mumbai	India
27	Osaka	Japan

28	Pattaya	Thailand
29	Phuket	Thailand
30	Riyadh	Saudi Arabia
31	Seoul	South Korea
32	Sharjah	U.A.E
33	Singapore	Singapore
34	Taipei	Republic of China(Taiwan)
35	Tehran	Iran
36	Vijayawada	India
37	Vishakapatnam	India

Hotel class-1(*)

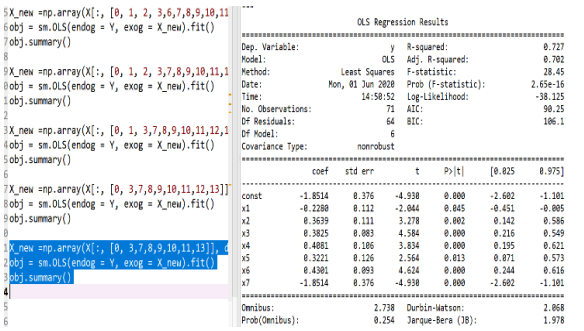

Figure 3: Hotel class-2(**)

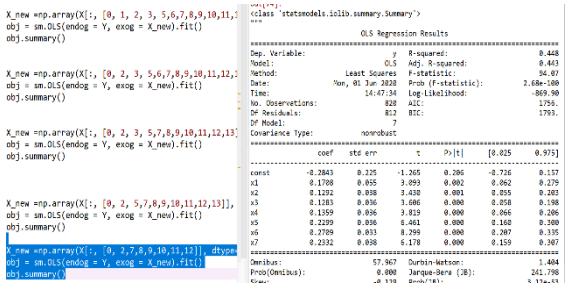

Figure 4:Hotel class-3(***)

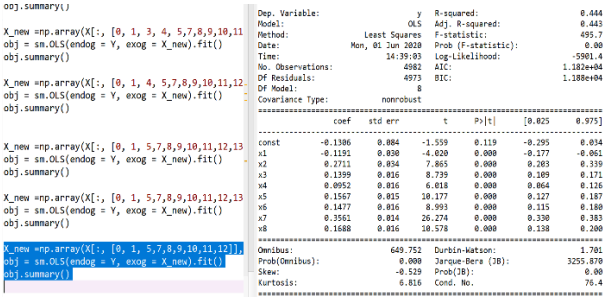

Figure 5:Hotel class-4(****)

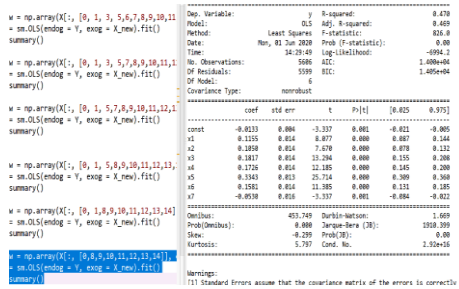

Figure 6:Hotel class-5(*****)

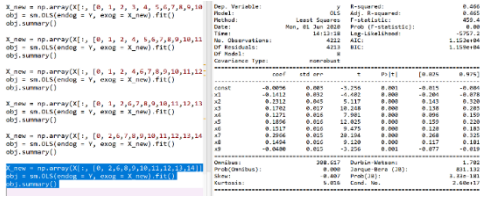

Figure 7: Durbin-Watson is also in suggestable range for all hotel classes from 1.5 to 2.5.

The above results indicate that all contextual segments make a significant contribution to the user gratification level in a hotel stay on several star hotels having in a range from 0.000 to 0.05, and Durbin-Watson is also in suggestable range for all hotel classes from 1.5 to 2.5. From the above observations of several hotel categories we rank, the contextual dimensions contribute more towards user happiness, also recommending these contexts to the recommender system to obtain valid recommendations is shown in the below table.

Table 4.2: Impact of contextual dimensions on overall rating in several star hotels

IMPACT RANK	*	**	***	****	*****
1	Service	Service	Service	Service	Service
2	Value	Sleep-Quality	Sleep-Quality	Value	Value
3	Location	Room	Value	Room	Cleanliness
4	Cleanliness	Value	Room	Sleep-Quality	Room

5	Room	Location	Cleanliness	Cleanliness	Sleep-Quality
6		Cleanliness	Location	Location	Location

Based on the rankings in above, all classes of hotels users are giving more importance to the context "Service" while in two, three-star hotels quality of the bed, i.e., Sleep-Quality, in one, four and five-star hotels amount spent for a room(Value) Have more impact in the user view. The context Cleanliness has an impact in one-star hotels, whereas least for the ambiance of a room(Room) since the user spent less amount comparing with other star hotels, so they give the least importance. The context Location does not make an impact on 3,4 and five-star hotels.
Since users stay in hotels for various travel concerns, this study tries to explore the same context significance in several trip-types. Below are the results of the same trip-type in different star hotels.

Hotel class-2

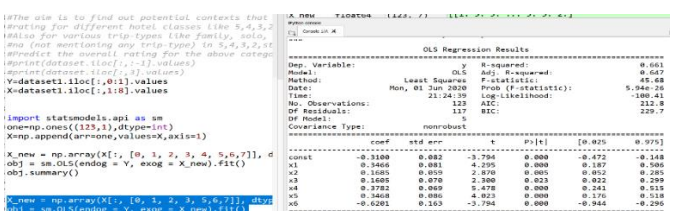

Figure 8: Trip-Type: Family

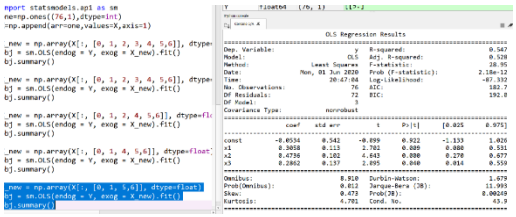

Figure 9: Trip-Type: Couple

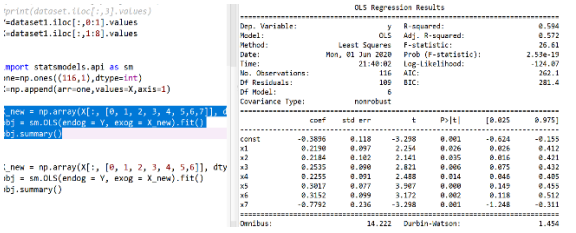

Figure 10: Trip-Type: Friends

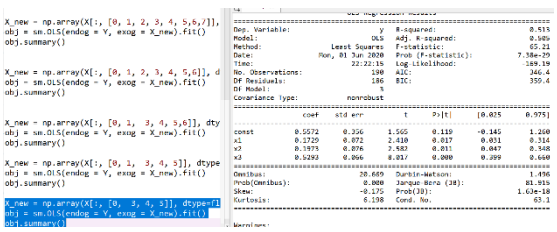

Figure 11: Trip-Type: Solo

Hotel Class-3

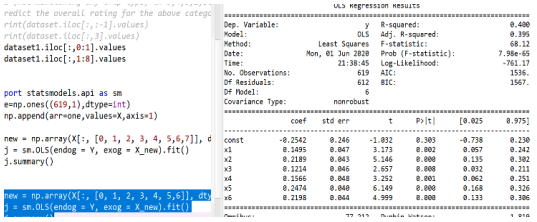

Figure 12: Trip-Type Friends

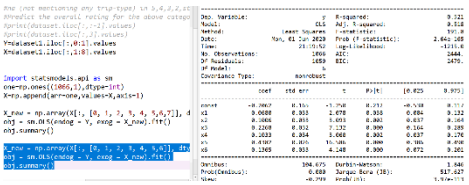

Figure 13: Trip-Type: N.A.

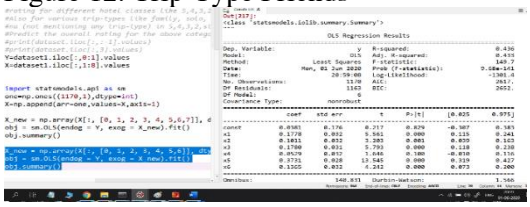

Figure 14: Trip-Type: Family

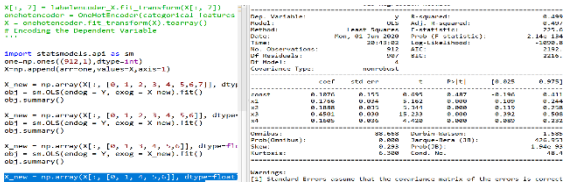

Figure 15:Trip-Type: Business

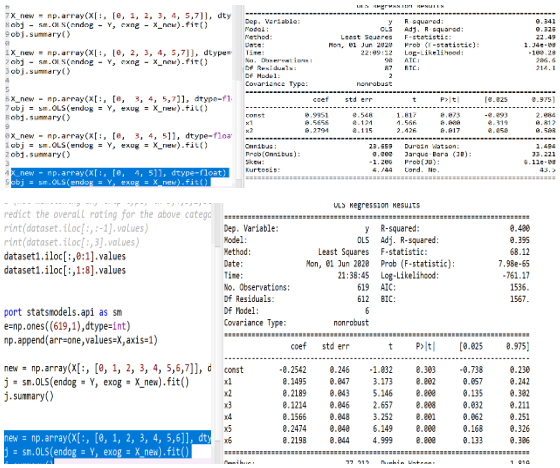

Figure 16:Trip-Type: Friends

Figure 17:Trip-Type: Solo

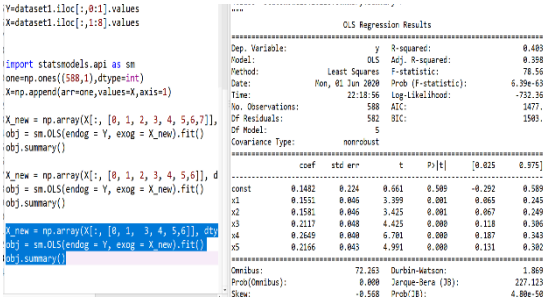

Figure 18:Trip-Type: N.A.

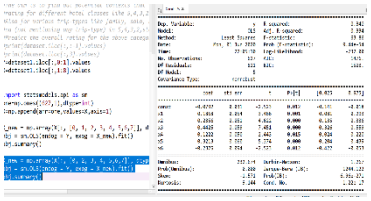

Figure19: Trip-Type: Family

Hotel class-4

TRIP	**	***	****	*****
FAMILY	1.Service 2. Sleep-Quality 3. Cleanliness 4. Location 5. Value	1. Service 2. Value 3. Sleep-Quality 4. Location 5. Room 6. Cleanliness	1. Service 2. Value 3. Room 4. Location 5. Cleanliness 6. Sleep-Quality	1. Service 2. Value 3. Cleanliness 4. Room 5. Location

Table 4.3: Significant contextual segments in Trip-Typ: Family

Table 4.4: Significant contextual segments in Trip-Type: Couple

Trip	**	***	****	*****
Couple	1.Sleep-Quality 2. Room 3. Service	1. Service 2. Value 3. Cleanliness 4.Sleep-Quality 5. Location	1. Service 2. Room 3. Value 4. Sleep-Quality 5. Location 6. Cleanliness	1. Service 2. Value 3. Room 4. Cleanliness 5. Location

Table 4.5: Significant contextual segments in Trip-Type: Business

Trip	**	***	****	*****
Business	1. Service 2. Cleanliness 3. Sleep-Quality	1.Service 2.Sleep-Quality 3.Room 4.Location 5.Cleanliness	1. Service 2. Value 3. Sleep-Quality 4. Cleanliness 5. Room 6. Location	1. Service 2. Value 3. Cleanliness 4. Sleep-Quality 5. Room 6. Location

Table 4.6: Significant contextual segments in Trip-Type: Solo

Trip	**	***	****	*****
Friends	Service 1.Ser 1.Sleep-Quality Room 2.Sle 2.Service Value 3.Roo 3.Value 4.Val 4.Room 5.Cle 5.Location 6.Cleanliness	1.Service 2.Location 3.Sleep-Quality 4.Room 5.Cleanliness 6.Value	leep-Quality 1.Sleep-Quality ervice 2.Room oom 3.Value alue 4.Location leanliness 5.Service ocation	1.Service 2.Sleep-Quality 3.Location 4.Cleanliness 5.Room 6.Value

Table 4.7: Significant contextual segments in Trip-Type: Friends

Table 4.8: Significant contextual segments in Trip-Type: N.A(Not Answer)

Trip	**	***	****	*****
N.A	1.Room 2.Service	1.Room 2.Sleep-Quality 3.Value 4.Location 5.Service	1.Service 2.Sleep-Quality 3.Room 4.Cleanliness	1.Cleanliness 2.Sleep-Quality 3.Value 4.Room 5.Location

Table 4.9: Impact Trip-Types on Hotel classes

**	***	****	*****

1.Couple	1.Business 2.N.A	----	1.Business 2. N.A

Tables from 4.3 to 4.8 reflect the significant contextual segments in several travel purposes. From the above observations, Trip-Type makes a considerable impact on contextual segments in hotel classes. Contexts priority changes from one Trip-Type to another also its impact on user overall gratification. According to the results in table 4.9 in two-star hotels, Couple, four, five-star hotels Business and N.A trip-types shows a significant impact on user overall satisfaction.

5.Conclusion

In e-Tourism, the role of online travel platforms is a significant one that offers services and makes recommendations to their users for a comfortable stay in hotels upon prior views. The type of recommendations made by travel platforms is also vital in the hotel management eye in a business concern. To reach user dynamic satisfaction levels, every travel recommender system periodically broadly assesses the users' views identify the things influencing more towards the expectation level, and makes necessary changes in the recommendation model. In this paper, we analysed user opinions of top tourism destinations in the Asian continent identified the contexts and travel purposes that show more interest in the user view to opt high gratification levels in several classes of hotels. Our observations indicate that user preferences vary with hotel classes and travel purposes.

Future Extension

Users are traveling around the world for several reasons; their preferences vary from one continent to another regarding the hotel stays. In the future, we will analyse other continent user opinions.

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Detecting Faults within a Cloud Using Machine Learning Techniques

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Abstract:
In distributed computing, clients can get to cloud administrations using the web. In present days, in superior registering and cloud frameworks, disappointment is an inexorably significant issue. Alleviating the impact of misfortune and making stable conjectures with excellent lead time stays an overwhelming exploration issue as huge scope frameworks keep on creating in scale and multifaceted nature. Because of the advancing unpredictability of elite figuring frameworks, specific current adaptation to internal failure procedures, for Example, successive registration and replication are not adequate. It includes the significance of having a productive and useful way to deal with disappointment the executives set up to relieve the impacts of disappointment inside the framework. With the approach of AI methods, the capacity to gain from past data to anticipate future personal conduct standards makes it conceivable to foresee potential framework disappointment all the more precisely. Along these lines, in this paper, by applying a few calculations to improve the exactness of disappointment forecast, we investigate the prescient capacities of AI. We have set up an expectation of disappointment. The fundamental analysis that we have Random backwoods (RF), SVM, Classification and Regression Trees (CART) considered). Exploratory discoveries show that comparative with different calculations, the typical expectation precision of our paradigm utilising SVM while foreseeing breakdown is 92% exact and productive. This discovering implies that all likely future device and application disappointments can be viably imagined by our cycle inside.

Keywords: Cloud Computing, Reliability, Fault Tree, random forest, SVM, CART.

1. Introduction

Distributed computing relies upon assets sharing to achieve intelligence and versatile economies, similar to a public utility. Non-business applications utilised in the logical space are displayed as work process applications request significant computational assets, and these requests can be productively satisfied using a cloud stage. One of the absolute highlights of the dispersed figuring phase; for

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Example, the cloud is disappointment taking care of the cloud must store the customer's information when it is running on a customer side application.

Inside the field of processing, disappointment forecast utilising AI is a massive region of intrigue has expanded significant thought since it is a central point in the first-class appropriated figuring condition and expect a crucial part in the organisation of gainful variation to inside disappointment. Investigation in gigantic degree enlisting relies upon an escalated and significant appreciation of what system frustrations in trademark structures appear to be to be equivalent. For Example, earlier information on disappointment qualities can be utilised to improve the framework and hub accessibility using asset assignment [3, 5].

It takes a basic comprehension of the highlights of real gadget disappointments to construct a helpful disappointment expectation model. Additionally, some measurable disappointment properties can help Designers of adaptation to internal failure framework create to assess and build up a proficient and powerful technique for transformation to internal failure [3-5]—the size of equipment stockpiling frameworks in current superior, enormous scope foundation processing. Even though there are numerous standard methodologies of adaptation to internal failure for adapting to and limiting the impact of disappointments, the potential disappointment pattern and conduct of existing frameworks [1, 4] should be seen fundamentally. It is crucial to observe that all of the three layers of circulated figuring, Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and s, are made sure about by our cycle.

In [3], creators utilise fractional Critical Path (PCP) given the high reliance of the errands. After finding the PCPs, planning is done with the end goal that each PCP is appointed to an alternate asset type dependent on the heartiness of the asset. Authors [4] have proposed a C-HEFT calculation, an augmentation of HEFT, where the disappointment of assignments during execution is tended. The flat bunching technique utilised by the creators blends the capacities in a similar even degree of the application. After the misfortune, just the bombed assignments of that specific level bunch are executed as opposed to running the whole application the figure1 and figure 2 are demonstrated the standard college cloud organisation and disappointment cloud network the log record can create a wide range of deficiencies and disappointments.

*1.2 problem statement***:**

Medical or scientifical applications utilised in different examination space are made out of ward assignments and may likewise include multi-step information move among the capacities. Work processes are the straightforward technique for speaking to reliance limitation in appropriated frameworks, and the information structure utilised for an inward portrayal of these applications is regularly done using DAG (Coordinated Acyclic Graphs). The type of work process is Pipeline, Split, Merge and Diamond structures, grouped dependent on conditions. There are two modules in proposed models. The underlying model expectation of the errand disappointment with learning calculations is

completed. The following strategy is utilised to amend the happened blow proactively.

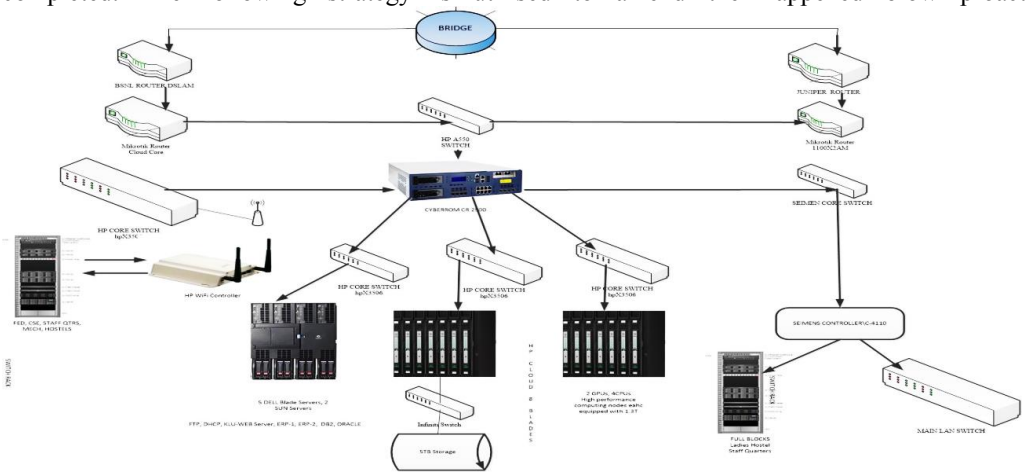


Figure1: Typical university University cloud Network**.**

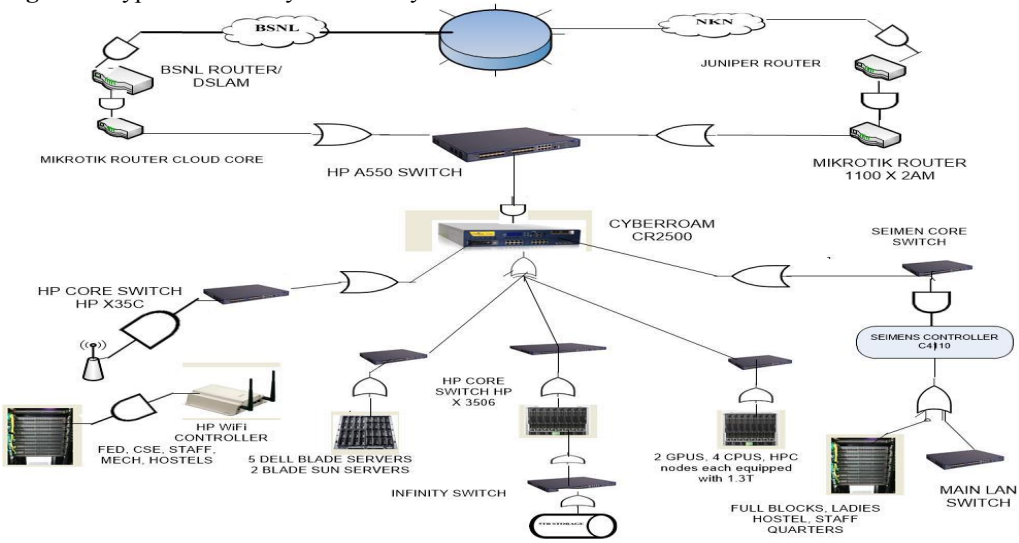


Figure 2: Fault tree diagram for the University Network

2. Literature survey

adaptation to non-critical failure as a fundamental issue in Cloud Computing and created a calculation that will reallocate the errand of a flawed worker to the worker with least burden around then and creator analysed the MPI furthermore, MPIL calculations. [1]. Lately, disappointment expectation utilising AI procedures has increased colossal consideration in a vast scope dispersed elite cloud condition, and a ton of exploration has been completed in this field. Regardless, next to no investigation has endeavoured to investigate thoroughly and observationally estimate superior cloud framework information utilising continuous information disappointment being developed. The authors in [10] had a useful endeavour has been made to analyse the disappointment information of a vast scope cloud creation condition comprising of more than 12,500 workers, including an examination of disappointment and fix times and highlights for both cloud outstanding tasks at hand and workers. In any case, they have never taken a gander at the disappointment affiliation Strength of remaining burden and gadget scale, separately, The creator in[11] set up an AI technique that recorded it as substantially more precise than the customary MTBF strategy for foreseeing only part times before disappointment. Their calculation was intended to follow the soundness of 14 equipment tests and alarm them of a fast-approaching blow well ahead of time of genuine misfortune, giving adequate opportunity to address the issue before absolute trouble happened the main drawback, in any case, was that their model had not been prepared on a continuous disappointment module. Like this, there is

no arrangement that this model would dependably anticipate disappointment and that the information they utilised was not made accessible to people in general. Even though the creators in [12] introduced another contraption dissatisfaction estimate approach By methods for help vector machines (SVM) considering the information found in the log reports, where their extended technique exploits the back to back the thought of log messages and makes sense of which progression of notes are trailblazers to frustration

The Authors in [13] explored disillusionment data that has been assembled as of late at Los Alamos National Laboratory and fuses 23,000 Failures have been represented on more than 20 unmistakable structures, for the most part, immense SMP what's more, NUMA centre point gatherings. The information insights, including the underlying driver of disappointments, the interim among disappointments and the interim for a fix, were examined., yet they never applied any forecast methods. Creators in [14] The experimental and factual properties of gadget mistakes and disappointments were assessed from an organisation of almost 400 heterogeneous workers longer than a year running an assortment of significant burdens. Their discoveries demonstrate that time-differing movement with long fixed periods comprises of machine mistake and disappointment designs. These static stretches show different concrete connection structures, and ordinary practices, which sway execution yet also, can be used to address such execution issues. Creators in [15] portray Cloud datacentres' equipment dependability from an assortment of information sources eventually fail to assess the remaining task at hand disappointments and didn't utilise a freely available dataset in their trials.

The Authors in [22, 23], focused on programming dependability demonstrating and programming defect forecast utilising neural organisation classifier pulls near. While the author in [24] proposed a financially savvy and blamed versatile reusability forecast model by using hereditary calculation, the creators in [25] proposed a top to bottom neural organisation based half breed approach for programming imperfection expectation utilising programming measurements. Our system is to use openly accessible equipment dataset utilising time arrangement and AI (ML) calculations to anticipate required disappointment of all the framework part and applications. Despite the vast majority of the cutting edge research, we select to use a university cloud dataset so different features in the area can compare the result with our proposed system results.

Cloud computing is a significantly fast advancement to deal with the massive proportion of moving toward data adequately. These may encourage lead to the vast number of inadequacies relating the system. Therefore, it is fundamental to address this issue; it is essential to give capable transformation to non-basic disappointment techniques. The technique used by our structure is just a gainful strategy for industry development and try to show resources handle specific weaknesses like worker mishap and System blockage. Furthermore, simple obstacle control techniques are never really stopped up control. Our proposed scheme is ready.

3.Methodology

The complete procedure that would be expressed in this review is portrayed in this section. As the point of this is to build up a model that can predict segments and deployment of conceivable disappointment process in an elite cloud environment. We start by using the time-arrangement to illustrate the solution since five years of dissatisfaction has occurred. To evaluate the device and network failures of the aggravated dissatisfaction dataset extracted from the PC, we collect the data set from the KL university cloud data centre to regret the data from the university cloud dataset[39]. This is a collection of different failures of the framework components reported over a given time. We had the option from the information collected to imagine the timestamps of the specific system section that fizzled (yield), without the disappointment (input) wellsprings. In this way, as every blow was registered at average spans at an alternate point after some time, we were absent with no choice but to apply time arrangement.

Once again, by modifying the data and applying AI, we went above and beyond. They followed the accompanying developments. We defined and acknowledged our concern as a multi-arrangement

problem (multi-ostensible) that needs some expectation that helps us to discern particular components that will come up shortly afterwards. We organised and modified our information and applied some estimates of guided learning and played out a connexion between them. By selecting the best analysis based on execution and accuracy, we tested our analyses and improved our outcome. The care bundle in R was sent because it provides a steady interface to many AI calculations and provides information representation, information resampling, model tuning and model correlation with helpful comfort techniques. Be that as it may, by transmitting specific ML measurement, which involves upholding vector machines (SVM) and arbitrary woods (RF), Classification and Regression Trees (CART), we chose to boost the methodology.

3.1 Data collection Phase

An original dataset on framework segments disappointment for a time of five years beginning from 2015–2019 was gathered [40]. The information was collected to give disappointment particulars to I/O connected frameworks; however, considerable detail as could be expected so examination may deliver some valuable discoveries. Information was gathered for capacity, organising, computational machines, and record frameworks underway use at K college cloud. The data was removed from an information base utilised for global positioning framework inconveniences, called Remedy, and is right now put away in a MySQL information base and accessible for the fare to Top design.

3.2 Data Pre-Processing Phase

A dataset [40] set up a yield variable addressing the bombarded system parts. To use managed machines learning figurings, we want to mix the knowledge parts to the dataset. As earlier referred to, we tend to get the information factors from the examination in [13] wherever the information used was isolated from a comparable house [39]. In Table 1, we tend to gift 5 (5) wellsprings of structure components disillusionment, for instance, Hardware; programming; human screw up; association and subverted [13]. For the duration of this assessment, we'd use the going with shortenings HW, SW, HE, NW and UD, severally to mean the wellsprings of structure portion dissatisfaction. Within the entire dataset, the undercut bounties of hardship appeared solely a solitary time within the amount beneath assessment. We, this way, discard its possessions within the examination in light-weight of its less chance of an occasion.

We passed on combinatorics assessment [41, 42] and designated the quality blends of wellsprings of framework items feebleness to the yield factors. Table two shows, however, the yield factors are named to varied mixes of knowledge factors. This half is union as follows:

Accepted, we have n different achievable dissatisfaction of discontent with a machine variable and we seem to be excited about taking clearly k varied mixes in a very steady progression. During this section, we tend to apply the combinatorics to avoid a repetition of Disappointment prediction using AI, we tend to thoroughly investigate and analyse some notable AI methods that are often used to predict disappointment in a very superior cloud-based process. We prefer to fit the technique into our model, considering and selecting the most successful out of each of them at that stage.

Table 1 The sources of failure of cloud-based systems measured in this study.

S.NO	SOURCE OF FAILURE
1	Hardware failure
2	Software failure
3	Human Error
4	Network failure
5	Unterminated

The AI procedures handle the issues of how to create and schedule PC programmes that enhance their exhibition and accuracy based on past occasions or expectations for some unique errand. The methods we considered are straight discriminant inquiry, order and classification regression trees and SVM, as previously expressed.

3.3.Classification and regression trees

The estimate of the classification and regression tree depends on the plan and Backslide Trees. A classification and regression tree is an equal decision tree which is developed by reliably dividing a centre into two child centre points, starting with the root centre containing the entire learning test. The Decision Tree is a recursive distribution approach, and all data centre points are divided into two adolescent centre points by classification and regression tree, thus the Binary Decision Tree is the classification and regression tree decision tree. The calculation recognises a condition at each level of a decision tree, which variable and status should be used to separate the input centre (data test) into two points of the youth centre. Decision Tree Building Computation explicitly integrates many.

Steps according to the corresponding steps:

Step-1 Take named input data with a goal variable and an overview of components that are self-governing.

Step-2 Best split: For all the independent variables, find the best split.

Step-3 Best factor: for the split, choose the best component.

Step-4 Split the data into centres on the left and right.

Step-5 On all of the centre points, proceed step 2-4 until it meets the final rules.

Step-6 Decision cutting tree: steps created to prune the decision tree.

3.4.Random forest (RF)

Another type of organised learning estimation in information mining is Random Forest. During this review, we appear to propose to fabricate a model for predicting the mistreatment of structure fragments disillusionment to communicate with differentiating and SVMs. Subjective forest areas have representational or drop-off teams of trees. This technique makes the use of bootstrap testing during tree selection on the readiness dataset and arbitrary step call.

Expect the subjective forest tests m > > M to half at any tree centre point development for a given variety of options M. The estimates are obtained by averaging for this scenario. The effects are the speed increase in mean square bumbles from zero to 100 per cent in erratic wood mistreatment drop off trees, with a lot in imperative features showing a lot of critical components.*3.5.Support vector machines (SVM)*

Support vector machines (SVMs) are controlled learning methodology used for backsliding assessment, portrayal issue and peculiarity acknowledgement. The critical idea behind SVMs is to pick the hyperplane that in a perfect world isolates two classes with the most noteworthy edge. For instance, given a readiness data D, described a ton of n centres and addressed in the structure:

$$\mathbf{D} = \{(x_i, y_i) | x_i \epsilon \mathbf{R}^p, y_i \epsilon \{-1, -1\}\}_{i=1,2,\ldots,n}$$

where yi suggests the two classes either +1 or - 1, to show the level for the point xi has a place.

In d-measurements and elements the primary area in 2 halfspaces, the hyperplane job g(x) provides an immediate discriminant: maybe a d-dimensional weight vector, and b is scalar inclination. The Associate in Nursing uninflected hyperplane is always located on the off probability that the dataset is

directly detachable with the tip objective that

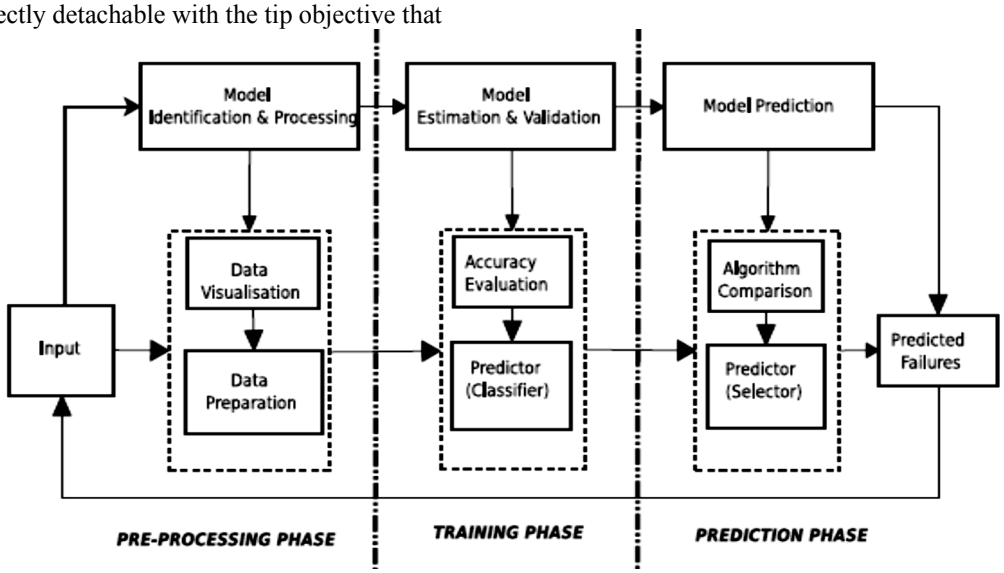


Figure 3: Architecture of Proposed system model

for all focuses with name-1, g(x) < 0>0.0. By designing the primary d-dimensional region in d*—dimensional space, SVMs are designed to take care of problems with non-straight selection limits. That the d*>d focal points are possibly directly free. Mistreatment of the alteration work/, another dataset is obtained as a changing area necessary for this operation to change area in the internal item, which is the portion work (K)between xi and xj.

3.4 Architecture of the system

In Figure. 1, we have a tendency to present the planned schematic diagram of disenchantment need model of this examination. It's contained three (3) organises, The pre-dealing with steps, the readiness stage and therefore the estimate stage, independently.

a) Pre-getting prepared stage (unmistakable model proof and taking care of)

The final distinctive check is the vital sum of the action model construction time course when stationarity is exercised. With the autocorrelation work guide (ACF) and short autocorrelation work (PACF), as shown in Figs, we can understand the most efficient achievable model subject to the model and solicitation showed by the correlogram. 4 and 5 in a straightforward way.

b)The arrangement stage (model analysis and endorsement)

After identifying the correct model, the next step is to examine the limits of victimisation of specific conventional techniques, such as least-squares technique, most noteworthy opportunity evaluation and set up for a second, and so on. The model is then tested for consistency and endorsement, although the suggestion has been made that all models are not correct, some are better than others. For Example, considering the properties of the residuals and testing whether or not the AN ARMA residuals may be a standard or subjective dispersion.

c)*The model need stage*

The perceived model will be used at this point to determine what's to come. To adopt a base commotion the surveyed residuals of the model will be meticulously investigated.

4. Results Discussion

In this segment, we partitioned off the oral communication of results into two: The principal presents and talks concerning the time arrangement approach and also the noninheritable outcomes throughout the conversation Figure. Three projected framework model offers the 5-millilitre calculation, and its examination hooked into our model. It's primer investigation to select up understanding into the instance of the frustration of the half and to check for the normality of the frustration information.

4.1 System failure model

In Example. 5, to understand the case of its occasion, we appear to plot the repetition of time-subordinate device efficiency. The arrangement of the discontented system indicates that it is not fastened and once it slows, the mean and differential of the setup remain dynamic. We want to die some technique of knowledge adjustments to determine this situation, for Example, log amendment and distinction procedure similarly to address their properties. In Figure, we gift the plots of machine dissatisfaction repeat amendment. Half a dozen mistreatment and log discrepancies, separately. As a result of some dubious outcomes due to zero reported structure dissatisfaction, the log-change will not be affordable for this case. Wherever the methods and comparisons of the course of action are seen as low, the issue of systemic disenchantment is seen. During this analysis, we appear to prefer the method of differentiation over the log. Since the model shown by the differentiation shows

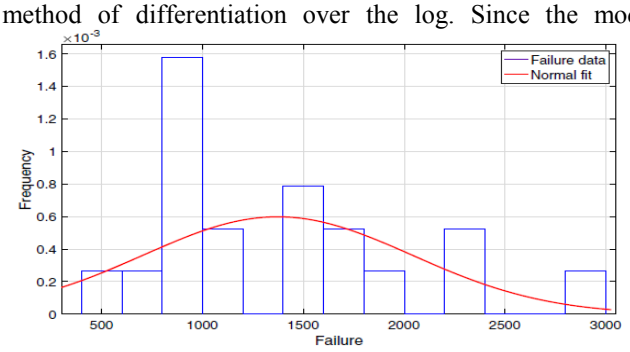


Figure 4: failure data routine distribution test

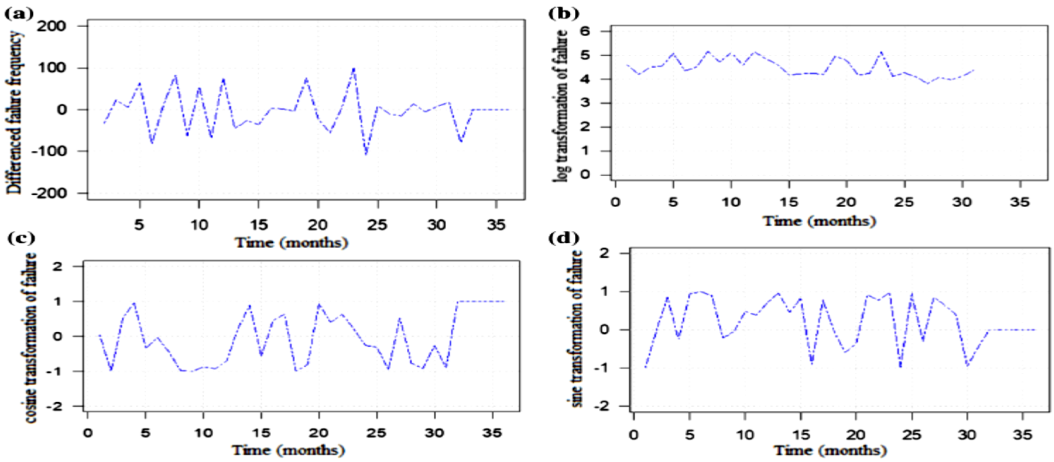
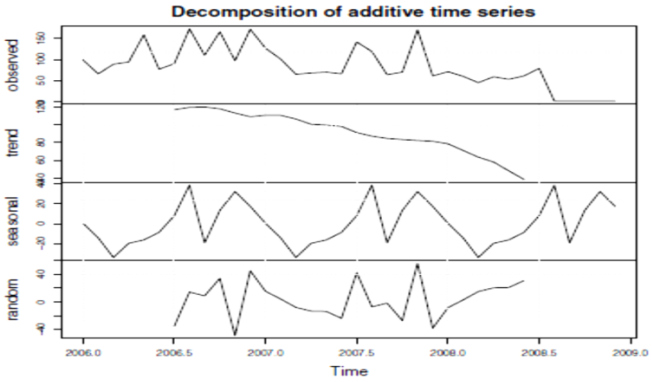


Figure 5: Differenced and log failure frequency transition plots that mean and variance of system failure series are relatively constant.

4.2. Prototypical Model Identification

Figure 6: Decomposition of additive time series plot of the failure



We plot a correlogram of the structure discontent game arrangement showing auto-association work and fractional autocorrelation work (see Figures 4 and 5). We tend to have the option to consider the usual moving model of solicitation one, victimisation of the ACF correlogram, whereas the auto-in reverse model is another, AR, of solicitation one (1). The ARIMA (1,1,1) model offers the combination of the 2 models wherever one at the middle is that the model's events are separated. As a consequence of stationary practises, the machine edification repeat of the arrangement was distinguished only once. All the autocorrelation evaluations that fall within the 2 blue dotted lines indicate non-immense at ninety-five. 95 per cent. All the while, those features that fall beyond the ninety-five.5 per cent guarantee stretch mean that they are enormous.

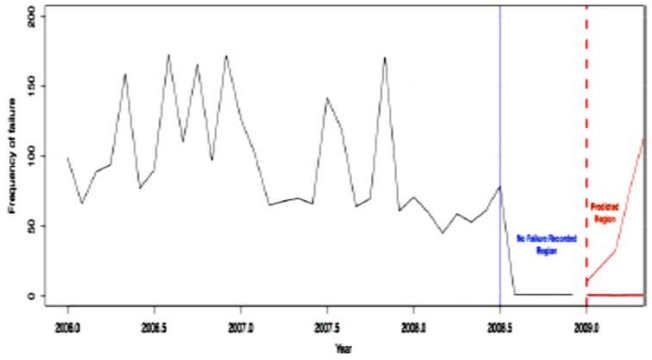


Figure 7: prediction region of the failure data

5.Conclusoin

This paper offers a rational technique to manage discontent estimate, exploitation time game arrange and AI. Our planned models are exemplified with the dataset accumulated from the K L University cloud centre to present discontent specifics to I/O connected systems and sections. The info was gathered for limit, arranging, machine machines, and record structures ongoing use at K L University cloud networks from the 2015–2019 timeframe [40].

Via aid vector machine, subjective forest, appeal, and lapse trees, the experimental results for discontent conjecture models have what is more evaluated. Because the truth was to build a model that can reliably predict achievable structure and disillusionment with the application, we prefer to use a quantity of game arrangement that demonstrates an approach recently. We appear to recognise an associated ARIMA (1,1,1) model for the information set of irritated anger extracted from the computer disillusionment data vault (CFDR)[39]. At that point, at taking a goose at and tweaking our model before selecting the most successful investigation, we appear to apply cubic centimetre computation on our dataset. Because of the best model, the degree of affectability, followed by LDA and RF, the analysis of our findings demonstrates SVM. This was achieved with SVM by differentiating half the dissatisfactions of the whole system and hence the anticipated disappointments.

Finally, once diverged from RF, CART and LDA, the failure estimate model exploitation of the assist vector with machining has absolute sufficiency with a standard accuracy of (90 per cent). Later on, we prefer to recommend choosing the best-performed model-related additional model-tuning framework with a 100 per cent accuracy for predicting frustrations in an incomparable cloud structure of the Brobdingnagian degree. In the same way, we can demonstrate even more the primary use of the outcomes obtained in a very cloud.

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Chapter 4
Cross-Industry Use of Blockchain Technology and Opportunities for the Future: Blockchain Technology and Aritificial Intelligence

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ABSTRACT

Blockchain and artificial intelligence are two disruptive technologies in the today's world; Blockchain can connect data storage and data users from multiple domains, and different kinds of analytics applications run on top of the data in artificial intelligence techniques. So that Blockchain technology provide the excellent backbone for the development of artificial intelligence algorithms, it is useful to secure the data input from multiple data storage locations and to have whatever applications running on top of the data in a Blockchain visible to everyone. The concept of Blockchain technology and artificial intelligence techniques together develop interesting uses cases and nice applications. When paired with Blockchains, AI is better understood by humans, operates more efficiently, and the blockchains in general more efficiently. AI and Blockchain together support B2B environment and getting better outcomes.

INTRODUCTION

Blockchain is a digitized and decentralized system for facilitating secured transactions. These transactions are stored in ledgers similar to the traditional ledger. This ledger can store and manage transactions. Once transactions are completed, these completed transactions are stored in blocks and recorded chronologically in a transparent setup. (Rohitha, 2018). The Blockchain technology has been made popular by cryptocurrencies. Cyrptocurrencies such as Bitcoin use Blockchain to maintain a public

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ledger for every single transaction (Chikara, 2019). Hence, Blockchain technology is the foundation of Cryptocurrency technique. Therefore, Blockchain is a concept and bitcoin is the implementation of that concept. Nevertheless, Blockchain is equipped with digital signatures, which enables secure transactions. Security in Blockchains is enabled by the utilization of public &private keys inorder to solve puzzles on cryptographic hash functions (Yaga, Mell, Roby & Scarfone, 2018).

Blockchain technology is the next generation of the internet (Rohitha, 2018). It is not a centralized data systems. Rather this is a system of decentralized distributed database systems. Hence, the ledger can be distributed all around the world (ibid). Bitcoin demonstrates how the decentralization is implemented using Blockchain. Bitcoin is a peer-to-peer digital currency developed using Blockchain, The peer-to-peer network consists of nodes. Each node verifies and validates the legitimacy of payments before a transaction is completed. Hence, there is no need for intermediaries (such as banks) in the Bitcoin payment process (Agrawal, 2019).

Although Blockchain has been used for Cryptocurrencies, it has value for enhancing the performance of other technologies. An example of such a technology is Artificial Intelligence. Artificial Intelligence (AI) enables the implementation of computer systems that can solve independently and intelligently. It influences operational processes in workplaces. These processes are enabled via the building of machines capable of performing intelligent tasks. (Yessi Bello Perez, 2019). The machines operate by receiving and executing commands generated from data gathered, analyzed, interpreted and reinterpreted by algorithms powering the machines. This enables the machine to act independently and efficiently with limited human supervision (Budko, 2018). AI uses different techniques to enable machine intelligence. These techniques include the use of neural networks, support vector machines, natural language processing, fuzzy logic, robotics and machine learning etc., (Marwala & Xing, 2018). These techniques are data driven, and the security and encryption of such data is important. The compromise of such data will have consequence on the intelligent operation of the machine. This is where Blockchain comes into play.

Blockchains will enable the storage of encrypted AI data in a distributed, decentralized, & immutable ledger format. The data collected and stored in Blockchain can be used to facilitate the decision-making ability of the machine within the AI engine or system. The synergy between Blockchain and AI will ensure the availability of data storage and power resources to the overall network. This synergy will reflect a combination of two network approaches, which are the centralized (for AI), and Decentralized (Blockchain) network approaches (Gonfalonieri, 2018). Industries that have utilized both technologies in their production processes have realized that they synergy presents a unique and powerful pair which further contributes to the growth within that industry (Daley, 2019). Therefore, this chapter provides very basic explanations of both technologies and how they can work together.

BACKGROUND

In this section, an overview of Blockchain technology and artificial intelligence, with its concepts, applications and its use cases will be discussed. Blockchain technology, as mentioned earlier, is a digitized, decentralized, distributed ledger that can be used for different kinds of transactions. These transactions occur in a decentralized on peer-to-peer (P2P) network. The structure of Blockchain technology is represented by data structure concepts of pointers (information of the variable pointing to one another) and linked lists (with help of pointer each block points to specific data and link, that contains the sequence of blocks) (Lastovetska, 2019).

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A Heuristic Model for Predicting Human Fall Detection using Machine Learning Techniques

Mohammed Inayathulla, PA Hima Kiran, M Chandana Sri, M Deepika

Abstract*: *It is very obvious that human fall due to unconsciousness is a very common health problem in every human being. With the evolution of many smart health devices, we should contribute the technological advancement of machine learning into it. Different techniques are already used in order to detect human fall detection in human beings. In this paper we have studied the patterns of falling of human through the fall detection dataset while this human was performing various motions. By understanding all these we have generated the prediction protocol which estimates the fall of a person using fall detection dataset. Machine Learning classifiers were used to predict the human fall and a comparative study of various algorithms used was developed to find out the best classifier.

Keywords*: *Classification, Fall Prediction, Machine Learning, Random Forest.

I. INTRODUCTION

The term fall can be defined as an unintentional event in which the body moves from its initial position to a lower level. This would cause some serious injuries also in adverse conditions. Hence a fall prediction system would be really useful in such conditions where it can predict the human fall prior to falling so that required remedies can be carried out. A fall detection system can be defined as a usable device whose main motive is to alert when a fall action has occurred. The fall alert detectors can estimate when the user was about to fall by detecting the sudden changes of body movements. Old age people have high degree of risk of death or injury resulting from falls. As the density of population is increasing human fall prediction system can be very handy. The aim of this paper is to implement a fall detection model by using different machine learning techniques. Human fall prediction can be considered as a typical classification problem of machine learning. To carry out this work data is collected from publicly available datasets. Supervised classifiers are then implemented on the collected data. All the features available in the dataset are used to build the classifier. After the classifier was built its accuracy was built on the unseen data. Several researchers have been working in this field to expose the importance of machine learning. As the current work is based on supervised schematic studies this also can be extended in computer vision where the data is collected by using visual sensors and based upon the data collected machine learning can be applied to identify the human fall detection. The structure of the paper is as follows in the next section related work is discussed then implementation details are discussed followed by results and conclusions.

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II. LITERATURE SURVEY

In [1] the authors worked on visual surveillance for detecting the fall detection. Their approach was a two step process ellipse approximation and motion history image. In [2] the authors used an embedded camera in human body to identify the joint movements and there by classifying whether the person will classify or not. SVM classifier was used by the authors. In [3] the authors proposed a step by step process for identifying the fall detection. The critical steps were feature extraction human identification and fall detection. Histograms of Oriented Gradients and Local Binary pattern were used in combination of deep learning techniques to expose the human fall detection by authors in [4]. In [5] the authors worked on mobifall dataset with five different classifiers and proved that KNN classifier outperformed the other classifiers used. In [6] the authors used a smartphone based approach to identify the fall detection and thereby generating an alarm to the responsible of the victim. Three point based technique was employed to identify the fall detection in indoor video surveillance[7]. CHLAC features with skeletal image sequences were extracted using a mobile robot and KNN algorithm was used as a classifier for fall detection [8]. Deep Learning LSTM neural network method was used [9] with a smart phone as a sensor for fall detection. Convolutional Neural Networks was used in [10] in order to identify the fall detection with respect to the furniture and human characteristic relationships.

III. PROPOSED METHODOLOGY

The aim of this paper is to implement the classification scheme to identify the fall detection of a person. The algorithms used are Random Forest, K-Nearest Neighbor, Decision Tree and Naive Bayes. Fall detection prediction system can be categorized into four stages: Data Collection, Data Cleaning, Implementation, Prediction.

The main recognition of this paper is to identify the sophisticated among those mentioned classification algorithms. The methodology is described in figure 1.

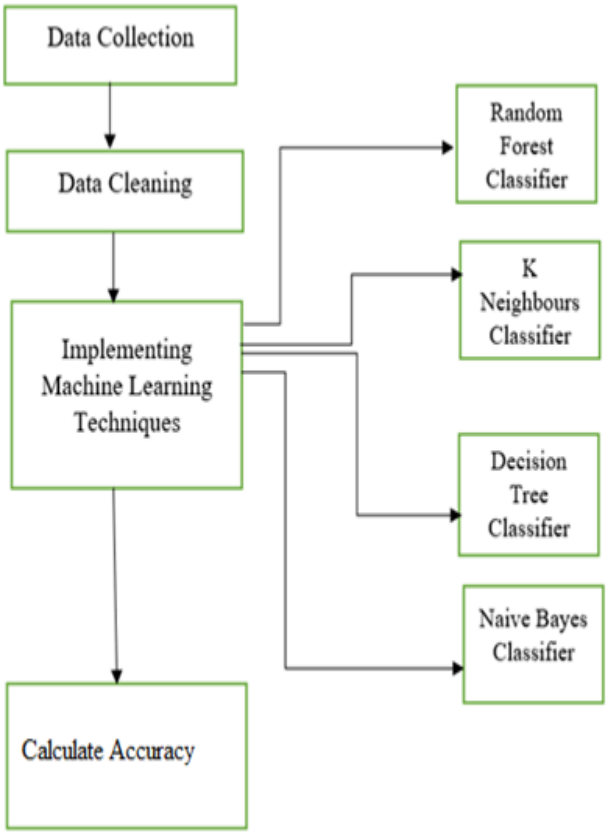

Fig 1: Fall Detection Prediction Model

Data Collection:

The "fall detection" dataset[11]is used for fall detection prediction which is used has the China Activity of elderly patients along with their medical information". The dataset consists of following features: Time, Sugar level, EEG monitoring rate, Blood pressure, Heart beat rate, Blood circulation.

Data Cleaning:

Data cleaning is the important phase as the erroneous data would significantly impact the overall performance of the system. In this phase data is thoroughly inspected to find out any missing values null values and standard statistical measures are used to deal with the null values and missing values.

Implementation and Accuracy:

Fall Prediction Model was implemented in python. After loading the dataset split the data into training and testing data. Using the training dataset train the model using the machine learning classifiers. Confusion matrix is used to test the model. All the features were used to built the classifier. The data split was performed in the ratio of 80 and 20 were 80% was used to training and 20% for testing. For decision tree entropy was used as the splitting criteria. In KNN 7 neighbours were worked for each unseen instance. When building random forest 500 trees were grown. Accuracy was computed based on the confusion matrix which is the familiar metric to evaluate the classifier and the accuracy values of each classifier are shown in the table 1.

IV. RESULTS

Table: 1 Accuracy scores of various classifiers used.

Classifiers	Accuracy
Naive Bayes Classifier	0.83
Decision Tree Classifier	0.89
K NN Classifier	0.7
Random Forest Classifier	0.92

The above table shows the accuracy values of each classifier and Random Forest has outperformed the other classifiers used with an accuracy of 92%. For every classifier the train test split ratio was 80 and 20 respectively as mentioned above.

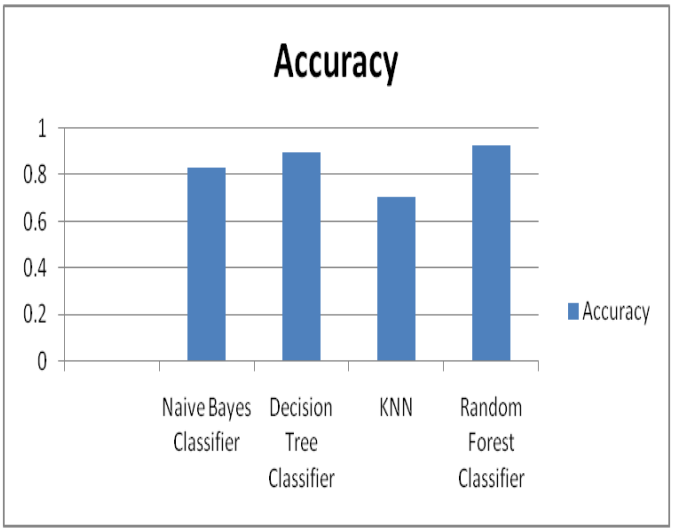

Fig 2: Comparision Chart of accuracy of classifiers

V. CONCLUSION

Out of the four learning algorithms used Decision tree and Random Forest have shown the better results. In future fall detection prediction system can be used to work in real time with regularly modernized datasets from distinct devices in various conditions. Deep Learning Techniques can be used to explore the surveillance data collected of various patients thereby predicting the human fall detection in real time.

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Video Summarization: Keyframe Extraction based on Absolute Difference Method

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Abstract

Due to the technological provoke in the digital era, there is an inevitable exponential growth in the video content generation and utilization for various applications. Browsing the complete video contents is tedious and time-consuming work. Hence, the summary of the video enables the user to browse the video content and proceed further (into the original video content), if interested. Henceforth, this paper aims to propose a video summarization method to extract keyframes from the input video based on the absolute frame difference method. When evaluated on the publicly available video, the examined results stated that the proposed method has improved performance regarding the keyframe extraction.

Keywords *– Video Summarization, Frames, Key Frames, Absolute Difference, RGB Channels*

1. INTRODUCTION

Segmentation, a contemporary technique, plays a significant role in processing the data acquired and making it simpler, meaningful and understandable for the user. In terms of research study, data may include digital media or patterns that aid in the analysis and understanding of video or interpretation of images or video summarization for detailed study. Irrespective of the field of study, interpretation or analysis of information needs to be in place [9]. As a matter of interest, Video Segmentation in digital media processing is practiced in medical imaging, image interpretation, surveillance, computer-guided surgery, motion object recognition, video summarization and many more.

Video segmentation is the method of segregating a video into multiple sets in subsequent frames that are homogeneous to specific criteria. The homogeneity in video segmentation is mostly in terms of pixels. Instances include segmentation of moving objects, object and background identification and so on. The following depicts the applications of video segmentation summarized from [10].

- Video monitoring to improve and track moving objects
- Object recognition to extract the features of the region of interest.
- Data compression to improve quality and reduce visual artifacts
- Computer vision
- Videophone applications to improve the foreground visually
- Digital entertainment to add effects and use for virtual scenes.
-

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2. EXISING METHODS

The following section deals with few of the existing video segmentation methods.

Gopal, Kalpana and Bhose [1] proposed the detection and segmentation of objects in motion from an input video based on frames through Differencing and Summing Technique (DST). Initially, 8 successive frames from a video sequence are read and converted into greyscale for further processing. Consequently, each of the frames is subtracted from the background image and averaged. Further, averaged image is converted into a binary image and the noises in the resultant image are removed by morphological operation. Finally, the object with maximum displacement identified is covered with a bounding box for thorough labeling and scanning of pixels. As the samples for the study included indoor and outdoor videos, DST is robust and efficient in segmenting the object with displacement.

Onur, Ugur, Ozgur [2] claim content-based segmentation from videos by the Fuzzy Color Histogram method. The features of the input frame are computed by linear regression in the opening frame dropping detector step. The noises in the frame are pulled out through the median filter. Further, the mask is generated for the pattern or logos and the boundary is clipped out for the frame. Finally, the Fuzzy color histogram is applied where precision and recall values of other trending algorithms such as Color Histogram, Probabilistic Block intensity, Edge tracking, and Local Keypoint Matching are computed and compared. The technique revealed a 93.67% superior precision rate for color frames but reduced to 75.8% when the frames were transformed to greyscale.

Long and Wu [3] used the Canny Edge Detection technique for frame segmentation and pattern recognition-based technique to extricate the background from the segmented frame. The edge mask obtained in the Canny operator act as input for the pattern recognition technique. The edges are distinguished in either way. The pixel motion is decided based on the presence of an edge in the background or to the moving object. The other way is based on the pixel movement the edges belonging to background and object are decided. The edges that belong only to the object remain to discard the background. Techniques like Histogram, Threshold value help reduce the complexity.

Shigang, Xuegen and Hexin [4] put forth an algorithm fusing Disparity map with frame difference to fragment the object from the input video. The foremost step is to segment based on Disparity map to acquire the initial segmentation object. Then the objects are extracted by the Stereo Vision object Segmentation algorithm where the acquisition of an accurate motion picture is possible. As the disparity maps are of size, 160 X 120, the vision is clear. Less complexity is one of the vital features of this technique.

Chun Yu and Ming Yue [5] segmented the video by combining Kirsch edge operator and three frame difference. Three consecutive frames from a video and its greyscale conversion act as input. The moving object's border is identified obviously by the Three Frame Difference algorithm without noise or light or a shadow or background reappearance. Further, an adaptive Kirsch edge operator detects the edges with discontinuity which is eliminated using mathematical morphology.

Zhongkun, Yonping and Dechun [6] proved the LBP descriptor coding method segmented the video in ease without background construction and uncomplicated computation. The LBP method put forth by the authors is based on 3D spatial-temporal neighborhood value. Further, iterative threshold and morphological filter in binarization of frame ensure noise-free frame. The supremacy of the 3D LBP technique is proved by comparing the result with the difference algorithm.

Kavitha and Shanmugam [7] demonstrate a robust and proficient Edge Detection Technique by comparing Model matching and change detection of edges in Video object Extraction techniques. The comparison proved VOP extraction based on Model matching segmented even overlapped complex motion objects with partial occlusion. When combined with the motion vector and Haunsdroff measure improved segmentation results. The major pitfall, boundary inaccuracy in Change Detection Method was partially overcome by the Model Matching method and segmentation was amazing even in muddle background.

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3. PROPOSED METHOD

The proposed video segmentation and key frame extraction method has two phases, namely, Phase-I and Phase-II. The Phase-I comprises the decomposition of video, i.e., the segmentation of input video into frames and write the corresponding frames into a specific directory, whereas the phase-II deals with the extraction of key frames from the generated frames using absolute difference parameter between the consecutive frames. Figures 1 and 2 depict the pseudo code for phase-I and II of the proposed method, respectively.

Input : *Video with ".avi" or ".mp4" format*
Output : *Frames*
Step 1: Read the video and store it in a variable 'v'.
Step 2: Create a destination directory 'd'.
Step 3: Extract the frames 'f' (i.e. the images) from the video 'v' and store it in the directory 'd'

Figure 1 Pseudo code for Phase-I

Input : *Frames from video*
Output : *Keyframes*
Step 1: Start reading the frames 'f' from the directory 'd'
Step 2: Number of available frames is stored in 'n'
Step3: Repeat the following for 'n' frames
Step 3 (a): Read the first frame and store it in 'f'
Step 3 (b): Euclidean norm or Euclidean length is determined for successive frames i.e. 'f1' and 'f2' regarding red, green and blue components and stored in '*eudiff*'.
Step 4: Threshold 't' is determined by calculating the mean value for '*eudiff*' parameter
Step 5: Repeat the following from the second frame to (n-2)
Step 5 (a): if the 'eudiff' of the current frame (j) is greater than the previous frame (j-1), next frame (j+1) and 't', then mark as "Keyframe"

Figure 2 Pseudo code for Phase-II

Initially, loading of input video followed by extracting the frames from it is carried out in the Phase-I. Later, Phase-II deals with the keyframes extraction from the resultant frames of Phase-I. Here, the Euclidean norm or Euclidean length of the successive frames for Red(R), Green (G), and Blue (B) components are determined regarding all the frames. Then, the threshold 't' is determined by the mean value of Euclidean norm values. Whenever the Euclidean norm values of RGB components of the current frame is greater than the previous frame, subsequent frame and determined threshold value 't', then the corresponding prevailing frame is identified as a "Keyframe". The procedure is repeated iteratively until all the frames are processed.

Later, the phase-II procedure is repeated with a frame difference of three; that is, the kth frame is compared with $(k+3)^{th}$ frame.

4. EXPERIMENTAL RESULTS

The proposed work is implemented on MATLAB version 2018(b) installed on the Intel Core I3 2100 CPU @ 3.10 GHz machine with 4GB RAM. A 'Tom and Jerry' video is downloaded from the World Wide Web (WWW) [8], which plays for two minutes and fifty-nine seconds. In phase-I, the input video is divided into 5378 number of frames. The phase-II is made to execute twice with the frame difference one and three and extracted the keyframes from the input video. Table 1 shows the number of keyframes extracted for one and three frame difference methods.

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Table 1 Keyframes extracted in the proposed method

Sl. No	Name of the input video	Duration of the Video	Extracted keyframes with a frame difference of	
			One	Three
1	Tom and Jerry Show – Beach Bully (1975).mp4	2 minutes and 59 seconds	143	47

Further, the efficiency of the proposed keyframe extraction method is assessed by Compression Ratio (CR) [11]. CR is defined as the ration of total frames in the input video to the extracted keyframes as represented in Equation 1.

$$CR = \frac{\text{total frames in the input video}}{\text{extrated keyframes}} \quad (1)$$

CR of keyframes extraction method based on single frame difference= $\frac{5378}{143} = 37.608$ and CR of keyframes extraction method based on three frame difference = $\frac{5378}{47} = 114.425$

Observing Table 1 and extracted frames (manually), extraction based on the absolute difference of three subsequent frames method resulted in better performance than the single frame difference method. Table 2 shows the comparison of extracted keyframes with one and three frame differences. With respect to frame difference of one and three, the number of extracted frames is 143 and 47, respectively. Table 3 depicts the resultant 22 extracted common frames between the frame difference of one and three with their frame numbers.

Table 2 Comparison of Extracted Keyframes with Frame difference of one and three

Sl. No.	Description	Number of Frames	Extracted Frame Numbers
1	Input Video	-	5378
2	Extracted keyframes with a frame difference of One	143	41, 94, 173, 194, 208, 210, 228, 281, 285, 287, 289, 292, 294, 297, 299, 317, 383, 487, 543, 545, 547, 638, 757, 826, 935, 1009, 1064, 1276, 1288, 1290, 1316, 1526, 1592, 1662, 1746, 1776, 1814, 1994, 2090, 2096, 2101, 2198, 2230, 2276, 2344, 2404, 2459, 2579, 2650, 2652, 2654, 2659, 2661, 2687, 2733, 2773, 2842, 2847, 2874, 2880, 2882, 2887, 2889, 2891, 2894, 2896, 2899, 2904, 2914, 2921, 2938, 2953, 2959, 2961, 2971, 3010, 3035, 3037,3084, 3102, 3178, 3188, 3191, 3193, 3196, 3199, 3201, 3203, 3214, 3216, 3218, 3220, 3235, 3238, 3240, 3243, 3262, 3264, 3266, 3269, 3271, 3274, 3276, 3280, 3303, 3353, 3380, 3387, 3390, 3392, 3394, 3396, 3422, 3462, 3590, 3709, 3902, 3966, 3969, 3971, 3974, 3976, 4036, 4038, 4127, 4134, 4273, 4387, 4515, 4634, 4703, 4739, 4755, 4799, 4844, 4847, 4862, 4891, 4899, 4901, 4921, 5060, 5371
3	Extracted keyframes with a frame difference of Three	47	543, 545, 547, 755, 757, 824, 1007, 1316, 1662, 1744, 1774, 1776, 1814, 1993, 2196, 2198, 2276, 2403, 2458, 2577, 2771, 2889, 2969, 3082, 3084, 3176, 3392, 3460, 3462, 3708, 4127, 4132, 4273, 4386, 4513, 4515, 4703, 4753, 4755, 4797, 4799, 4860, 4862, 4919, 5058, 5060, 5370

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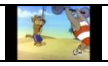
Table 3 Resultant Extracted Common Frames between Frame Difference of One and Three

Frame No	543	545	547	757	1316	1662	**1776**
Frames							
Frame No	**1814**	**2198**	**2276**	**2889**	**3084**	**3392**	**3462**
Frames							
Frame No	**4127**	**4273**	**4515**	**4703**	**4755**	**4799**	**4862**
Frames							
Frame No	**5060**						
Frames							

5. CONCLUSION

The proposed method aimed to extract the keyframes from the input video using an absolute keyframe difference method. There are two phases, namely, (1) the first phase extracted the frames from the input video and (2) the second phase extracted the keyframes from the generated frames. The keyframes were determined using the absolute keyframe difference method with the frame difference of one and three frames. Experimental results concluded that the three frame difference method outperformed the one frame difference method regarding the extracted frames. Since the major pitfall of this approach is the execution time (the execution time grows exponentially with respect to the number of frames) Clustering-based technique and dimensionality reduction technique would be the choice for future enhancements in the keyframe extraction methods.

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An Efficeint Associated Secured Biometrcit Authentication for Iot

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Abstract

The Internet of Things (IoT) is that the capability to produce regular dailyproductsby the approach of reorganization and otherwise by communicating with other devices. The main element of IoT application stream is extremely massive together with sensible homes, sensible cities, wearable, e-health etc. Therefore tens plus many billions of productsis going to be associated. Such product has sensible abilities to gather, investigate and create selections with non-human collaboration. Safety may be anabsolute demand for these conditions, associated specially verificationis given main importance given by malicious unauthenticated product in IoT system. Fingerprint based mostly biometry authentication approaches can enhance the protection in several industries and endless applications reminiscent of police work, automotive business, sensible town development, sensible home etc. This paper presents the fingerprint {basedmostly primarily based mostly} identification for breakdown the protection challenges in IoT based applications.

The abstract is to be in fully-justified italicized text as it is here, below the author information. Use the word "Abstract" as the title, in 12-point Times New Roman, boldface type, centered relative to the column, initially capitalized. The abstract is to be in 11-point, single-spaced type, and may be up to 3 in. (18 picas or 7.62 cm) long. Leave two blank lines after the abstract, and then begin the main text. All manuscripts must be in English.

***Keywords*:** *Fingerprint Biometrics; net of Things; Multifactor Authentication; Security attacks.*

1. Introduction

Technological revolution in info and communication Technology sector is being increased to facilitate the users of advanced and intelligent services. It integrates the event of sensible devices and IoT services. IoT predictsanupcomingnetworkmodel and repair orientating set-up within by spatially scattered physical substances are going to be arranged to make info networks to enableinnovative and intellectualfacilities [1]. The devices cited as "things" could embrace numerous types of sensors, actuators, RFID, mobile devices and sensible appliances. Researchers estimate that IoT can encompass fifty billion objects by 2020[2]. Maximum IoT devices are often examined and control by sensible productpresentations. IoT devices and applications are

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interfaced and accessed solely by genuine users. Authentication systems are also physical devices or logical model. The best implementations of physical authentication devices are sensible cards and secret tokens. Compared to those ancient ways of authentication, biometry based mostly authentication is a lot of convenient and quicker. It's safer to use biometric based mostly authentication to access our personal devices.

2. IoT Generic design

Same time ancient administration net associate persons to an network, IoT holds totally distinctive method inside where that gives Machine-to-Machine (M2M) furthermore Human-to-Machine (H2M) property, for mixed manifestations of machine with the goal Similarly as on help type about provisions (e. G. , distinguishing, discovering, tracing, observing, also supervising) [8]. Interfacing an expansive mixed bag for heterogeneous machines [9] brings about an enormous traffic, In this way the need will wrist bindings the capacity from claiming tremendous majority of the information [10,11].

Thus, the TCP/IP design, utilizes an extended phase for network property, doesn't ensemble wants of IoT relating to numerous features together with isolationplussafety (e.g., info secrecy, machine's safety, information privacy, encoding, and network safety) [12], measurability, dependableness, ability, and quality of service [13].

Though various designsare planned for IoT even though there is a necessity for demo design [14,15], the fundamental design ideal planned within the works may be a three-layer design [13,16–18],here fig 1a having application layer, network and perception

Discernment layer: its those physical layer that faculties setting to see all those physical belongings (e. G. , heat, moistness, rapidity, position, and so forth throughout this way, observing and stock arrangement of all instrumentation may be enha.) exploitation end-nodes, but livelihood for dissimilardetecting innovations (e. G. , RFID, GPS, NFC, and so on.).

Network Layer: it's the layer guilty of obtaining information from presentation layer and transmission it to the appliance layer over numerous network technologies it's conjointly accountable of information managingas ofloading to process by assistance of middle-wares reminiscent of cloud computing.

Another planned superimposed design is that the five-layer design (Figure 1b) [13,16–18]. Here 5 layers are business layer, processing layer, application layer, presentation layer and finally transport layer.

Those capacities about presentation, transport (i. E. , organize layer) and application layers are An comparable Similarly as inside the 3 layer plan. The remaining layers are given as:

Processing layer: conjointly referred to as the middle-ware layer, it's accountable of given that numerous forms of facilities, principally loading, investigating, and process information by relation to machine consequences.

Benefits of the business layer: Its fill in blankets those IoT framework activities Also practicality. The machine layer sends the data of the benefits of the business layer whose part will be to make business models;graphs and flowcharts will research information, thereabouts as should assume an errand for choosing in regards to benefits of the business routes Furthermore road-maps.

Other architectures might additionally make known inside the expositive expression. On [20,21], the creators utilized An five-layer plan upheld administration orientating outline (SOA) that serves those blending from claiming IoT to endeavor administrations. Done [22], those creators considered perfect an non-layered approach for the outline. (e. G. , cloud design, haze design, social IoT, Also configuration underpinned human mind processing).

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For the leftover portion about this paper, we bring a inclination to consider those three-layer outline.

3.1. Security Services

Likewise prior stated, the employment about interfacing Questions for regular people exists will make security issues extreme. The brilliance incorporated under homes, cars, Also electrical grids are frequently interested under hurtful eventualities when misused by hackers. Totally distinctive hacking eventualities provided for inside the secret word a long time delineate the degree for harm that may come about from An security breach, especially for those occasion Furthermore gigantic reception of IoT provisions taking care of delicate data (personal, industrial, governmental, and so forth).
The fundamental IoT safety considerations are: verification, permission, honesty, privacy, nonrepudiation, availableness and security.
Authentication: the system for affirming and insuring that personality of Questions. In IoT context, each item ought on need the force to spot and confirm constantly on elective Questions inside the framework (or clinched alongside an exceedingly provided for only those framework with that it relates).
The approval: the system for providing reasonably with connects substance with attempt to alternately need person relic. Integrity: the methodology by givingsteadiness, preciseness Also dependableness of dataabove its entire life cycle. For IoT, the modification about fundamental data alternately Perhaps those implantation about invalid illumination might prompt significant problems, e. G. , in sensible wellbeing frameworks utilization situations it might prompt those demise of the tolerant.
Confidentiality: the method of making certain that the data is just accessed by approved folks. 2 main problems ought to be thought of relating to privacy in IoT: first to safeguard that the thing getting {the information theinfo the information} isn't planning to move the information alternative itemsandby thinking about management.
Non-repudiation: the approach to promising those energy on exhibit that an undertaking or occasion need happened (and toward whom), for the objective that this can't be precluded after the fact. On elective words, that relic can't deny that tenability for chosen majority of the data exchanged. Availability: That system for making sure that the administration needed is advertised anywhere Furthermore anytime to those implied clients. This incorporates clinched alongside IoT, that supply of the Questions to them.

Confidentiality, the method of making certain non-accessibility to non-public info by public or malicious objects.

3. 2. Security tests over IoT Layers

In this section, we bring a inclination with consider the first essential configuration about IoT (three-layer architecture), and examine the insurance considerations, strike And security necessities toward each layer of the outline.
3. 2. 1. Discernment layer security issues And necessities: The observation layer comprises about sensors that arecharacterized by confined procedure control Furthermore stockpiling proficience. A number security issues Also ambush dangers Ascent due to such restrictions. Huge numbers strike on the observation layer need aid noticed:. Hub Capture: hubs (base hub or gateway) would often essentially controlled Toward the attackers. Getting An hub empowers copartner someone not singularly will actuate firmly from claiming science keys and protocol states, Notwithstanding conjointly on clone Also circulate pernicious hubs inside the network, that influences the security of the entirety system.
Denial of service (DoS) Attack: An sort strike that shuts down those framework or organize And keeps affirmed clients from gaining entrance to it. This might make attained by overpowering the framework or organize for great bargain about spam solicitations the greater

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part at a comparative time, subsequently overloading the framework And keeping it starting with delivering those customary administration [34].

Denial of sleep attack: you quit offering on that one On the whole those vital objective for associate IoT system is that the ability for sensing through a escalated consideration mixture of dispersed nodes, each giving work to minimal information, reminiscent of temperature, humidity, vibration, and so on. , at an assembly interim with the goal arranging should rest for you quit offering on that one All the more amount thus Concerning illustration with tolerance the hubs will control to long administration life. Those refusal of rest strike meets expectations on the office the table of the hub with An huge objective should augment those office utilization something like that as on scale once again the administration time period of the hub Toward keeping those hub from setting off sleeping When causation the worthy recognized majority of the data.

Distrubuted denial of service (DDoS) Attack: an oversized gagevariation for dos strike. Those principal troublesome issue may be that the capacity to utilize the enormous amount from claiming IoT hubs with pasquinade movement gathered at those victimized person server. There would signs that those DDoS strike eluded should Similarly as "Mirai" occurring on oct 2016 aidedsincean oversized assortment about IoT hubs.

Fake Node/Sybil Attack: a sort strike wherever the assaulter will convey blunder personalities exploitation blunder hubs. With the vicinity of a Sybil node, those finish framework might produce bad majority of the data alternately possibly those neighbor hubs might accept spam majority of the data Also might lay their security. Those blunder hubs might make acclimated transmit data should "legitimate" hubs heading them to expend their energy,.Which may lead the complete service to travel down?

Replay Attack: during this attack, info is hold on and re-transmitted later while not having the authority to try to to that. Such attacks are normally used against authentication protocols.

Routing threats: this sort of strike may be that those the majority essential strike during the system layer notwithstanding it might happen during the observation layer On majority of the data sending technique. Co partner assaulter will generate a directing circle inflicting the deficiency or development of the directing path, expanding that end-to-end delay, and expanding those slip messages.

Side-Channel Attack: This sort of strike happens for cryptography gadgets by taking advantage of the equipment data wherever the crypto-system will be connected with respect to (chips), reminiscent of those execution time, control consumption, force dissipation, Also attractive energy impedance constructed By electronic units All around those cryptography technique. Such illumination might be investigated to get mystery keys utilized all around the cryptography strategy [44–47].

Mass Node Authentication: the system for authenticating extraordinary arrangement of units to connect IoT system, which needs enormous amount of organize correspondence to the Confirmation Some piece will complete Also this could bring an impact on the execution of the finish framework.

Bringing under thought the first risks, there's a need to hub Confirmation to hinder blunder hub Furthermore dark access, Moreover of the need to encoding will watchman those secrecy about majority of the data while continuously transmitted the middle of hubs (end node, entrance or server). Due to the properties of the hubs with connection to the deficiency of force And thusly the confined capacity capability, there's a need for develop light-weight security schemes that grasp each light-weight science calculations and security conventions.

3. 2. 2. Organize layer security issues And necessities: Those system layer is liable of the dissemination about majority of the data starting with the observation layer of the machine layer. This might make wherever majority of the data directing happens Also on account of the essential majority of the data Investigation. Throughout this layer, a significant number system advances would utilized reminiscent of those Different innovations for portable correspondence generations (2G, 3G, 4G and 5G) Furthermore remote networks (Bluetooth, WiMAX, WI-Fi, Lora WAN, and so forth.). Huge numbers strike Furthermore dangers on the system layer are identified:. Man-in-the-Middle (MITM): for every McAfee [6], those first lasting strike need aid

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refusal about. Administration (Dos) and mamoncillo inside the program (MITB) strike. This latter, nearby those secure attachment layer (SSL) attack, that permits attackers will concentrate will traffic, block attempt it, and parody each finishes of the info, speak to the MITM ambush [48,49].

Refusal of administration (DoS): this sort of strike happens conjointly In those system layer Toward electronic countermeasures the transmission for radio signals, utilizing a blunder node, poignant the transmission or directing for majority of the data the middle of hubs [50,51].

Eavesdropping/sniffing: this sort of indifferent strike offers those intruder the force should think of the non-public correspondence In those correspondence join [52]. The intruder might great make prepared to extricate supportive illumination reminiscent of usernames Furthermore passwords, hub ID number or hub configuration,. Which might prompt elective types of attacks, e. G. , fake node, recharge attack, etc?. Directing attacks: this sort of strike influences then again the messages alternately data ar routed. The intruder spoofs, redirects, misdirects alternately possibly drops packets In the system layer. Those resulting particular strike might a chance to be considered:. Dark Hole: it might additionally be considered perfect Likewise a dos attack, inside which the intruder utilization An blunder hub that welcomes all movement By definitive that its those briefest way. Likewise An result, every one movement is setting off with a chance to be disclosed of the blunder hub that need the force should redirect them will a proxy server alternately possibly drop them [53].

Gray Hole: this sort of strike may be tantamount to the district strike then again as opposed dropping every last one of packets, it exclusively drops designated ones [54, 55].

Worm Hole: Throughout this sort attacks, those intruder makes a companionship between 2 focuses inside the system By Possibly prevailing a base of 2 hubs of the organize alternately including new blunder hubs of the organize. Once framing those link, those intruder collects data from particular case complete And replays them of the inverse complete [56, 57].

Greetings Flood: those point of the assaulter Throughout this sort strike will be with devour the office for hubs inside the framework Toward television howdy solicitation packets Toward a blunder hub on impact every last one of hubs inside the framework that they're inside the same vary, In this manner inflicting every will send packets. Will its neighbor inflicting an expansive movement inside the organize [58–60]. (hello messages would illustrated On exactly directing protocols, with the goal hubs declare themselves will their neighbors.). Sybil: Throughout this attack, An blunder hub displays different identities, In it will management a significant An and only those skeleton By being done a few puts inside the organize at a comparable duration of the time. When l a few sybil hubs need aid inside An comparative network, they're setting off on then send an oversized amount for information denying those customary hubs starting with exploitation those organize [61].

These possibility strike at the organize layer (wired or wireless) result in the meaning of the resulting security requirements: hop-to-hop cryptography, point-to-point authentication, magic understanding Furthermore management, security directing and interruption identification [62].

3. 2. 3. Requisition layer security issues And necessities: The requisition layer is chargeable for giving benefits. It hosts an aggregation from claiming conventions for message death [19,63], e. G. , unnatural requisition Protocol (COAP), message Queuing estimation transport (MQTT), protractile electronic correspondence and vicinity Protocol (XMPP), propelled message Queuing Protocol (AMQP), and so forth. This layer specifically interacts for the client. Once condition that those “traditional” application-layer conventions don't perform great inside IoT, Furthermore since those IoT doesn't have its identity or worldwide standards, a number security issues emerge toward the machine layer [27].

Information approachability Furthermore Authentication: each requisition might need a few clients [64]. Blunder or bootleg clients might have a great sway on the supply of the finish framework. Such decent mixed bag about clients prescribes that totally distinctive consent Also entry administration.

Information protection Furthermore identity: those exceptionally way that IoT associate {different completely totally distinctive totally different} units from different makers brings

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about those machine for Different verification schemes. The blending for the individuals schemes might be An troublesome issue on affirm data security Also personality card.

Managing the supply for immense data: IoT associate an extensive assortment of complete devices, the individuals brings about an extensive amount about majority of the data on be figured out how. This reasons cohort overhead on the machine to explore this data that holds an enormous effect on the supply of the administration given By those machine.

Viewing those security necessities to the machine layer, Confirmation may be required inasmuch as protective the protection of clients (respectively, information). Additionally, there ought to be connect information security oversaw economy topic that features asset administration Also physical security illumination oversaw economy. Table you quit offering on that one offers an framework of the insurance necessities of the three-layers inside the. IoT plan.

Majority of the data security management. On table 1, its reasonable that Confirmation might be a center security component that ought should apply at totally distinctive layers. Connect IoT utilize situation might might want cohort Confirmation the middle of those tip gadgets connected a intermediate gadget (gateway). Those entrance ought on confirm itself while causation majority of the data of the cloud, And Along these lines those requisition (mobile alternately web) ought with be certified of the cloud thus Similarly as to assemble majority of the data to dissection.

4. Taxophytina of IoT verification Schemes

This area displays scientific categorization about IoT Confirmation schemes exploitation various criteria designated backed those likenesses and accordingly the fundamental qualities from claiming the individuals schemes. Likewise prior mentioned, those Confirmation need aid regularly connected In each of the 3 layers of the IoT design, that makes those mixture of the verification systems. These criteria are illustrated clinched alongside figure An couple of Also summarized Likewise takes after.

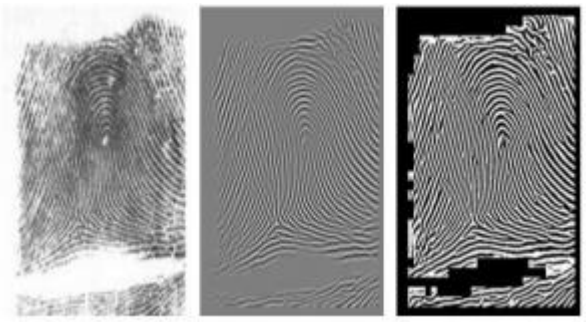

Figure 1.Taxophytina for IoT verification schemes.

1. Confirmation issue. Identity: connect information provided for By one get-together to an alternate to confirm itself. Identity-based Confirmation schemes will utilize you quit offering on that one (or a combination) about hash, interchangeableness alternately uneven science calculations.

Context: which might be:. Physical: Biometric illumination backed physical aspects of a private, e. G. , fingerprints, hand immaculate mathematics, retinal scans, and so forth.

Behavioral: Biometric underpinned behavioral qualities of a private, e. G. , keystroke Progress (pattern from claiming musicality Also transient game plan made When somebody types), walk examination (method acclimated assess the approach we bring An inclination with stroll or run), voice id al-adha (voice Confirmation that employments voice-print), and so on.

2. Utilization of tokens. Token-based Authentication: Authenticates An user/device upheld connect ID number token (piece from claiming information) made By a server reminiscent of OAuth2 protocol or open id al-adha.

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Non-Token based mostaccioli authentication: includes those occupation of the accreditations (username/password) each run through there's An need should trade data (e. G. , TLS/DTLS).
3. Confirmation technique. One-way authentication: over a exceedingly state of undertakings for 2 gatherings wish to talk for one another; only person party could confirm itself of the opposite, while those inverse one remains unauthenticated.
Two-way authentication: its conjointly alluded on as common authentication, inside which each substances confirm each other.
Three-way authentication: wherever An focal power attests those 2 gatherings And serves them to proportionally validate themselves.
4. Verification configuration. Distributed: utilizing a dispersed straight verification procedure between the human activity gatherings.
Centralized: utilizing An incorporated server or a indeed outsider on circulate and wrist bindings those accreditations utilized to Confirmation.
If unified alternately distributed, the verification subject plan will be:. Hierarchical: using a multi-level outline will handle those verification methodology.
Flat: no hierarchal plan may be utilized to oversee the Confirmation technique.
Particle layer: demonstrates the layer In that those Confirmation methodology will be connected.
Observation layer: chargeable for grouping, processing, And digitizing information recognized data Toward the tip hubs in IoT stage.
System layer: chargeable to getting the recognized data from discernment layer And methodology it.
Provision layer: chargeable to accepting majority of the data from the system layer, In this way giving work to benefits asked for Toward clients.
Hardware-based: the Confirmation system might compelling reason those job for physical qualities of the fittings or those fittings itself.
Understood hardware-based: employments the physical qualities of the equipment with support the Confirmation reminiscent of physical Unclonable perform (PUF) or accurate irregular assortment generator (TRNG).
Unequivocal hardware-based: A percentage verification schemes need aid underpinned those livelihood of a indeed stage module (TPM), a chip (hardware) that saves Also forms the keys utilized for fittings verification.

5. Security Challenges In Iot

IoT setting is enabled by open wireless technologies reminiscent of Bluetooth, frequency Identification (RFID), embedded sensors, actuators, moreover as Wi-Fi for dominant the connected devices. IoT setting is collaboration of assorted technologies and distributed and distributed devices. Because the numbers of connected devices will increase, new challenges may also be accrued. Security necessities can differed by the employment of applications and methods. If any of sensible devices are lost or purloined, it's simple for the hacker to retrieve all the sensitive info from the devices. There are many potential attacks which can be masquerading, spoofing, Middleman attack, do's attack, and secret changes. it's necessary to think about of these attacks and things within the IoT setting. Moreover, existing ways aren't enough to beat the challenges. Security challenges within the setting of little embedded devices should be simple to implement and value effective. Mechanisms for enhancing the protection in Iota setting should provide by well unnatural authentication.
Biometric Based Mostly Authentication And Iot Domain: Biometrics based mostly authentication has been receiving in depth attention within the Iota network society due to its dependableness and growing would like of security. It offers higher security and fewer likelihood of spoofing associated is tried to be an economical and correct answer to the matter [6]. Many surveys and studies are conducted by many researchers targeted on imposing the protection by biometry in Iota setting [7]. As unauthorized users aren't ready to show a similar distinctive physical properties to possess a positive authentication, dependableness are going to be ensured.

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This can be far better than the standard ways of victimization passwords, tokens or personal positive identification (PINs) at a similar time provides a price effective convenience approach of getting nothing to hold or keep in mind [8]. Most of the schemes target the key institution between the user and entry node. identification need not been considered perfect for particle provisions to 2 fundamental reasons; 1) particle architectures point toward automatization with no human intercessions 2) mixture from claiming particle gadgets need confined registering capabilities, inasmuch as burdensome And delicate biometric confirmation routes grasp a considerable measure of convoluted calculations to deciding, personality card prediction classifiers, meta-biometric prediction classifiers.

6. Implementation

Finger impression ID number Fingerprints would made of a arrangement about edges And furrows on the surface of the finger Furthermore bring An center around which examples like swirls, loops, or arches would bended to guarantee that each print will be exceptional [13]. A curve will be a design the place the ridges enter starting with person side of the finger, Ascent in the focus shaping an arc, et cetera retreat the opposite side of the finger. The circle is An design the place the ridges enter from one side of a finger, manifestation aarc, And need An propensity from claiming to passageway starting with the same side they enter. In the whorl pattern, ridges type circularly around An essential issue on the finger. The ridges And furrows would portrayed By irregularities known as minutiae, the different characteristic whereupon whatever remains of finger checking innovations are built. Minutiae focuses are neighborhood edge aspects that happen In whichever An edge bifurcation or An edge finishing. The edge completion will be those side of the point at which An edge terminates. Bifurcations would focuses at which An absolute edge parts under two ridges. Minutiae Also designs would extremely critical in the Investigation of fingerprints since no two fingers bring been indicated with be indistinguishable twin. There are five phases included in finger-scan confirmation Also identification:

1. Finger impression picture securing
2. Image transforming strategy
3.Placing dissimilar aspects
4.Format production technique
5. Format matching technique

A sensor takes a scientific preview of the user's interesting pattern, which will be At that point spared to An finger impression database. An finger impression upgrade algorithm (that employments gabor filters Likewise band-pass filters will uproot those clamor and preserve genuine inconsistency ridge/valley structures) is included in the minutiae extraction module to guarantee that those execution of the framework is not influenced by varieties for personal satisfaction from claiming finger impression pictures.

Proposed Technique For Fingerprint Based Mostly Identification :A well-performed biometric modality ought to contain the traits reminiscent of individuality, accuracy, richness, easy acquisition, dependableness and user acceptance. Among numerous biometric based mostly authentication methodologies, Fingerprint based mostly authentication is thought to be associate effectual technique for distinguishing persons with high confidence. The planned model of framework for IoT setting by biometric based mostly authentication by fingerprints victimization Star IoT Network is meant.

Illustrates the model involves associate IoT entry node through that the users are connected to perform many activities. The advantage of star IoT network is that every one the quality within the style of the network is managed by a central node or Iota entry Node '$\boldsymbol{GN}$'. As shown within the figure, the planned technique includes a group of entities representing the set of users connected with the help of a relationship set 'SIG'. the link set is mathematically developed as given below.

$SIG \rightarrow (U, R, C)$ ----------(1)

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From (1), the star IoT graph 'SIG' within the planned technique includes the set of users 'U', with the link set denoted as 'RS' and relative constant denoted as 'C' severally. every user 'U' is outlined as below.

$U \in Ui$----------(2)

$Ui \rightarrow Ui \cup fp1, 2, \ldots, fpn$---------- (3)

'Ui ' represent the set of users, where, 'FPi ' represent a fingerprint attribute of the user with finger print feature sets '$fp1$ ', '$fp2$ ' and then on extracted at completely different time settings '$t1$ ', '$t2$ ' severally. the link set within the technique is drawn as 'RS' within the IoT setting, wherever 'U' represents the nodes or users and 'I' corresponds to the link or interactions that connect between the users and IoT devices. Here, the nodes or users are drawn as points whereas the interactions between the users and IoT devices are given as lines. Besides, the constant worth 'C' symbolizes ' $*U \rightarrow r, wherer \in RS$' corresponds to a perform that assigns a relationship kind 'r' between a given user, 'Ui ' and IoT services. The network is associate extended integration of sensible applications, things and open wireless technologies for storing and forwarding a lot of important info. 2 stages within the planned framework ar registration and authentication.Throughout registration stage victimization multifactor fingerprint identities, the user registers their personal digital assistants and devices with the entry. The entry node provides on demand IoT services to the registered user once authentication. Nothing management maintains a register of devices, sensors and actuators which might be accustomed briefly disables or isolates the affected devices till they'll be patched. This feature is especially necessary for key devices reminiscent of entry devices so as to limit their potential to cause hurt or disruption, as an instance, by flooding the system with faux information if they need been compromised. At any time, the user access the Iota devices through network, the system authorizes and validates the user through fingerprint module (i.e. fingerprint images) that are hold on as templates. In alternative words, if the user fails to authorize himself through fingerprint recognition as hold on in templates, he cannot access the IoT devices. This fingerprint module has the aptitude to be integrated with differing kinds of sensors like machine-driven door lock, completely different electronic devices, security devices and then on. In system implementation, a biometric fingerprint security model is developed for sensible home observation. Actions are often applied mechanically employing a rules engine with rules supported vulnerability management policies.

Feature extraction is the greater part characteristic extraction calculations work on the taking after four steps determine a reference point to the finger impression image, decorate the district around the reference point, channel the locale of enthusiasm toward different directions, and, characterize the characteristic vector.

Finger print matching finger print matching alludes all the should discovering the similitude between two provided for finger impression pictures. Because of clamor furthermore twisting presented throughout finger impression catch and the estimated way from claiming characteristic extraction, the finger print representational frequently need missing, spurious, or loud offers. Therefore, the matching calculation ought to further bolstering a chance to be safe with these errors. Those matching algorithm outputs a comparability esteem that demonstrates its certainty in the choice that the two pictures come from those same finger. The existing well known finger print matching systems might a chance to be comprehensively arranged under three classifications contingent upon the sorts of features utilized [8].

A standout amongst the primary challenges in the minutiae-based approach may be that it is exceptionally troublesome on dependably extricate minutiae on a poor personal satisfaction finger impression picture. That simplest correlation-based procedure may be with adjusting those two finger impression pictures also subtract that information picture from the format picture with check whether those ridges relate. For that third approach, matching will be dependent upon a basic calculation of the euclidean separation between those two comparing characteristic vectors, and more consequently is greatly quick.

Algorithm for Preprocessing:-

Step 1: Acquire I/P fingerprint

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Step 2: Perform Normalization on input finger, to adjust the intensity value by adjusting the range of gray level values.
Step 3: Perform Segmentation, to separate the foreground regions in the image from the background regions. The foreground regions consist of fingerprint area containing the ridges and valley and background consist of regions outside the borders of the fingerprint area. If we do not remove background regions from the fingerprint then the extraction algorithm extracts noisy and false Minutiae.
Step 4: Perform Image Enhancement through Fingerprint image was rotated with the difference of 10 degree by selecting arbitrary image rotation option from the image menu till the core of both the images become uniform with respect to each other.(4)The core of fingerprint was kept at 90 degree which was adjusted by selecting image > image rotation > arbitrary image rotation.(5)The core aligning 90 degree was checked with the help of grid option. The straight line of the grid should run parallel to the core line.
Step 5: Converts Enhanced Image into Binary Image through Binarization. It is the process that converts a grey level image into a binary image.

Conclusion And Future Work

IoT technology enhances the prevailing life vogue by desegregation all the devices to a digital level within the in depth directions. The appliance areas of IoT infrastructure are going to be extended from sensible devices to sensible homes, sensible industries, and educational activity establishment's aid organizations, Scientific and analysis industries and sensible town development. Digital users have their own sensible devices with custom-made authentication procedures and completely different security standards for various functions. All told these applications and technologies, usually associate identification of many challenges, many security attacks in IoT setting were analyzed during this article. The planned model of framework for IoT setting by biometric based mostly authentication by fingerprints victimization Star IoT Network is meant. The advantage of star IoT network is that every one the quality within the style of the network is managed by a central IoT entry Node. The planned framework is going to be developed additional and its security analysis and performance measures to be analyzed on IoT context in future.

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Deep Learning CNN Architecture for Automatic Grading of Brain Tumor

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ABSTRACT

Deep Learning is the newest and the current trend of the machine learning field that paid a lot of the researchers' attention in the recent few years. As a proven powerful machine learning tool, deep learning was widely used in several applications for solving various complex problems that require extremely high accuracy and sensitivity, particularly in the medical field. In general, the brain tumor is one of the most common and aggressive malignant tumor diseases which is leading to a noticeably short expected life if it is diagnosed at a higher grade. Based on that, brain tumor classification is an overly critical step after detecting the tumor in order to achieve an effective treating plan. In this paper, we used Convolutional Neural Network (CNN) which is one of the most widely used deep learning architectures for classifying a dataset of 3064 T1 weighted contrast-enhanced brain MR images for grading (classifying) the brain tumors into three classes (Glioma, Meningioma, and Pituitary Tumor). The proposed CNN classifier is a powerful tool and its overall performance with an accuracy of 98.93% and sensitivity of 98.18% for the cropped lesions, while the results for the uncropped lesions are 99% accuracy and 98.52% sensitivity and the results for segmented lesion images are 97.62% for accuracy and 97.40% sensitivity.

Index terms: Convolutional neural networks, medical image analysis, machine learning and deep learning.

1. INTRODUCTION

Machine learning algorithms have the potential to be invested deeply in all fields of medicine, from drug discovery to clinical decision making, significantly altering the way medicine is practiced. The success of machine learning algorithms at computer vision tasks in recent years comes at an opportune time when medical records are increasingly digitalized. The use of electronic health records (EHR) quadrupled from 11.8% to 39.6% amongst office-based physicians in the US from 2007 to 2012 [1]. Medical images are an integral part of a patient's EHR and are currently analyzed by human radiologists, who are limited by speed, fatigue, and experience. It takes years and great financial cost to train a qualified radiologist, and some health-care systems outsource radiology reporting to lower-cost countries such as India via tele radiology. A delayed or erroneous diagnosis causes harm to the patient. Therefore, it is ideal for medical image analysis to be carried out by an automated, accurate and efficient machine learning algorithm. There is a myriad of imaging modalities, and the frequency of their use is increasing. Smith-Bindman *et al.* [2] looked at imaging use from 1996 to 2010 across six large integrated healthcare systems in the United States, involving 30.9 million imaging examinations. The authors found that over the study period, CT, MRI and PET usage increased 7.8%, 10% and 57% respectively. The symbolic AI paradigm of the 1970s led to the development of rule-based, expert systems. One early implementation in medicine was the MYCIN system by Shortliffe [3], which suggested different regimes of antibiotic therapies

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for patients. Parallel to these developments, AI algorithms moved from heuristics-based techniques to manual, handcrafted feature extraction techniques. and then to supervised learning techniques. Unsupervised machine learning methods are also being researched, but most of the algorithms from 2015-2017 in the published literature have employed supervised learning methods,

2. RELATED WORK

Recently, Machine learning (ML) and Deep Learning (DL) methods are widely been used for detection and grading brain tumors using different imaging modalities, especially those acquired using MRI. In this section, the most recent and related research works on the paper topic are presented. Mohsen, Heba, et al. [8] propose a system that combines discrete wavelet transform (DWT) features and deep learning (DL) techniques. They have used fuzzy c-mean method for segmenting the brain tumor, and for each detected lesion the DWT was applied to extract the features, where these features are fed into the principal component analysis (PCA) for feature dimension reduction and finally the selected features are then fed to deep neural networks (DNN). The results show that they achieve an accuracy rate of 96.97% and a sensitivity of 97.0 %. Widhiarso, Wijang, Yohannes Yohannes, and Cendy Prakarsah [10] presented a brain tumor classification system using a convolutional neural network (CNN) and Gray Level Co-occurrence Matrix (GLCM) based features. They extracted four features (Energy, Correlation, Contrast, and Homogeneity) from four angles (0°, 45°, 90°, and 135°) for each image and then these features are fed into CNN, they tested their methodology on four different datasets (Mg-Gl, Mg-Pt, Gl-Pt, and Mg-Gl-Pt) and the best accuracy achieved was82.27% for Gl-Pt dataset using two sets of features; contrast with homogeneity and contrast with correlation. Seetha, J., and S. S. Raja [12] proposed a deep CNN based system for automated brain tumor detection and grading. The system is based on Fuzzy C-Means (FCM) for brain segmentation and based on these segmented regions a texture and shape features were extracted then these features were fed into SVM and DNN classifiers. The results showed that the system achieved a rate of 97.5% accuracy. On the other hand, Cheng, Jun, et al. [13] enhanced the performance of the brain tumor classification process using region of interest (ROI) augmentation and fine ring-form partition. They applied these enhancements to different feature extractions methods which are intensity histogram, GLCM, and the bag-of-words (BoW) where these features vectors are fed into a classifier. The experimental results showed that the accuracy enhanced from 71.39% to 78.18%, and 83.54% to 87.54%, and 89.72% to 91.28% for intensity histogram, GLCM, and BoW respectively.

3. PROPOSED SYSTEM

Currently, CNNs are the most researched machine learning algorithms in medical image analysis [4]. The reason for this is that CNNs preserve spatial relationships when altering input images. As mentioned, spatial relationships are of crucial importance in radiology, for example, in how the edge of a bone joins with muscle, or where normal lung tissue interfaces with cancerous tissue. As shown in Fig. 2., a CNN takes an input image of raw pixels, and transforms it via Convolutional Layers, Rectified Linear Unit (RELU) Layers and Pooling Layers. This feeds into a final Fully Connected Layer which assigns class scores or probabilities, thus classifying the input into the class with the highest probability. CNNs are currently the most widely used deep-feed forward neural networks that can treat different types of data inputs either 2D images or 1D signals. In general, CNN consists of many layers namely, input layer, convolution layer, RELU layer, fully connected layer, classification layer, and output layer. CNN is basically based on two processes; convolution using a trainable filter which has a pre-specified size, and weights that adjusted during the down sampling process in the training phase to achieve a high accuracy. In this research, the

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cropped and uncropped brain tumors images are stored as a database and three folders are created, each one consists of the images for specific class glioma, meningioma, and pituitary tumor. The database is partitioned into training and testing data, where 70% of the data is utilized in the training stage and the rest is used in the test stage. A new CNN architecture is employed in this paper. The next sections will explain the structure of the proposed CNN architecture. In this paper, we have proposed and used a newly designed CNN architecture. The architecture consists of 18 layers to enable the classifier to grade the brain tumor effectively. In this paper the architecture is modified and transferred to be applied on three different images dataset; cropped, uncropped, and segmented and the performance of the architecture was evaluated. Figure 2 illustrates the structure of the used CNN architecture.

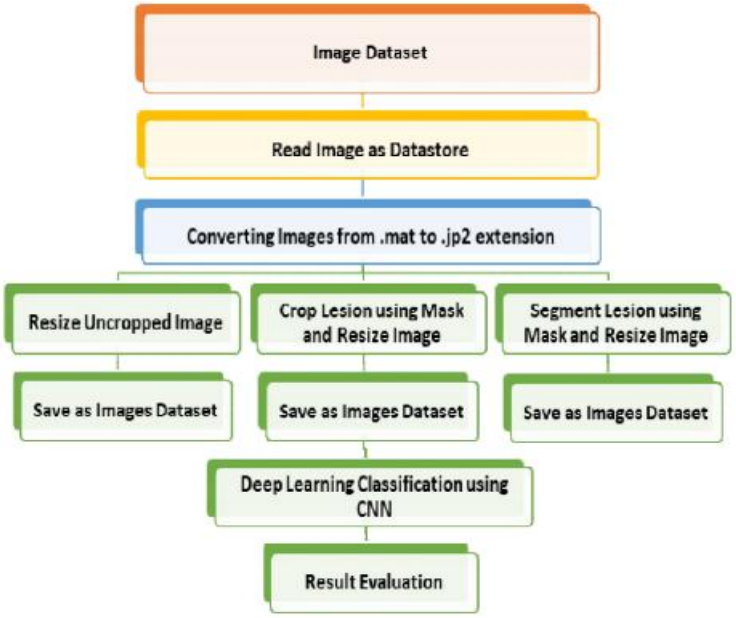

Figure 1: Block Diagram of the Proposed Methodology

The main aim and motivation behind this research paper are to provide a new CNN architecture for grading (classifying) brain tumors using T1-weighted contrast-enhanced brain MR images. Figure 2 Shows the Block diagram of the proposed methodology. In this section, the following sub-sections are discussed in detail, the used dataset, and the proposed methodology. To evaluate the performance of the proposed CNN architecture in grading the brain tumor in both cases; cropped and uncropped image, the confusion matrix for all cases (cropped, uncropped, and segmented) were generated, and a comparison between the CNN architecture outputs with its corresponding original image label was carried out based on these generated confusion matrices. In general, using these generated confusion matrices we can calculate the accuracy, sensitivity, precision, and specificity, to measure how precisely the brain tumor being graded.

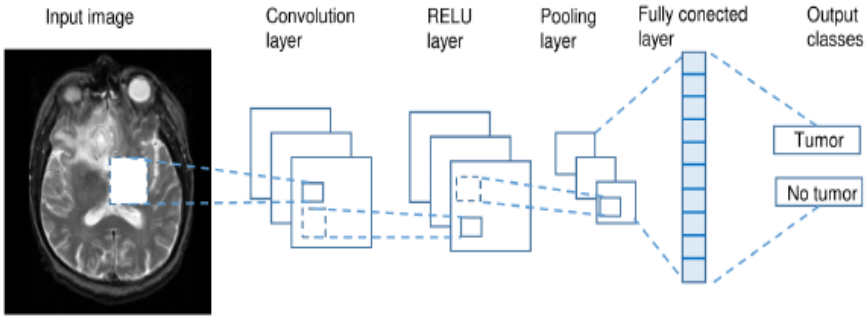

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Figure 3: CNN approach

Convolution Layer: A convolution is defined as an operation on two functions. In image analysis, one function consists of input values (e.g. pixel values) at a position in the image, and the second function is a filter (or kernel); each can be represented as array of numbers. Computing the dot product between the two functions gives an output. The filter is then shifted to the next position in the image as defined by the stride length. The computation is repeated until the entire image is covered, producing a feature (or activation) map. This is a map of where the filter is strongly activated and 'sees' a feature such as a straight line, a dot, or a curved edge. Unlike some neural networks where every input neuron is connected to every output neuron in the subsequent layer, CNN neurons have sparse connections, meaning that only some inputs are connected to the next layer. By having a small, local receptive field (i.e., the area covered by the filter per stride), meaningful features can be gradually learnt, and the number of weights to be calculated can be drastically reduced, increasing the algorithm's efficiency.

ReLU Layer: The ReLU layer is an activation function that sets negative input values to zero. This simplifies and accelerates calculations and training and helps to avoid the vanishing gradient problem. Mathematically it is defined as: f (x) = max(0, x). where x is the input to the neuron. Other activation functions include the sigmoid, tanh, leaky ReLUs, Randomized ReLUs and parametric ReLUs.

Pooling Layer: The Pooling layer is inserted between the Convolution and RELU layers to reduce the number of parameters to be calculated, as well as the size of the image (width and height, but not depth). Max-pooling is most used; other pooling layers include Average pooling and L2-normalization pooling. Max-pooling simply takes the largest input value within a filter and discards the other values; effectively it summarizes the strongest activations over a neighborhood. The rationale is that the relative location of a strongly activated feature to another is more important than its exact location.

Fully Connected Layer: The final layer in a CNN is the fully connected layer, meaning that every neuron in the preceding layer is connected to every neuron in the fully connected layer. Like the convolution, RELU and pooling layers, there can be 1 or more fully connected layers depending on the level of feature abstraction desired. This layer takes the output from the preceding layer (Convolutional, RELU or Pooling) as its input, and computes a probability score for classification into the different available classes. strongly activated features that would indicate the image belongs to a class. For example, on histology glass slides, cancer cells have a high DNA to cytoplasm ratio compared to normal cells. If features of DNA were strongly detected from the preceding layer, the CNN would be more likely to predict the presence of cancer cells. Standard neural network training methods with backpropagation and stochastic gradient descent help the CNN learn important associations from training images.

4. EXPERMENTAL RESULTS

All experiments were executed using a desktop computer with Intel Core-I7 processor and 16 Gb RAM. Both image dataset cropped and uncropped were run with a minibatch size of 64, ADAM optimizer as optimizing method, and with learning initial rate of 10-3 which results in 1600 iterations. The dataset was divided into three subsets: training, validation, and testing with a percentage of 70%, 15%, and 15% respectively. The following sections report the results of the proposed two image datasets using the designed CNN architecture. Figure 4 shows the accuracy variation overtraining and validation process during the CNN training and Training and.

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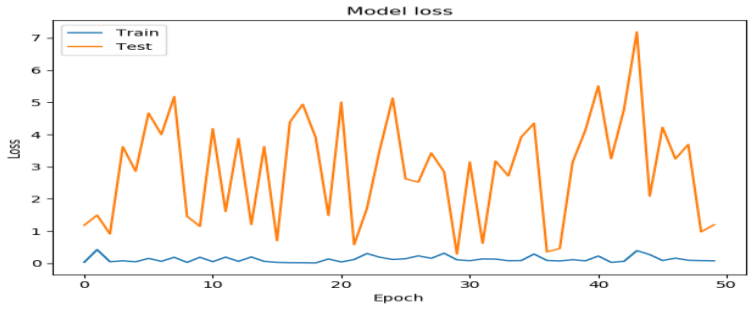

Figure 4: The Variation of Accuracy for Training and testing process

```
In [16]: import numpy as np
    ...: from keras.preprocessing import image
    ...: test_image = image.load_img('validationtest/brain_tumors.jpg', target_size = (64, 64))
    ...:
    ...: test_image
Out[16]:
```



```
In [20]: if result[0][0] == 0:
    ...:     prediction = 'Benign'
    ...: else:
    ...:     prediction = 'Malignent'
    ...:
    ...: print("Detected tumor type is %s"%prediction)
Detected tumor type is Malignent
```

Figure 5: detection and classification of tumor

Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 62, 62, 32)	896
max_pooling2d_1 (MaxPooling2	(None, 31, 31, 32)	0
conv2d_2 (Conv2D)	(None, 29, 29, 32)	9248
max_pooling2d_2 (MaxPooling2	(None, 14, 14, 32)	0
conv2d_3 (Conv2D)	(None, 12, 12, 32)	9248
max_pooling2d_3 (MaxPooling2	(None, 6, 6, 32)	0
flatten_1 (Flatten)	(None, 1152)	0
dense_1 (Dense)	(None, 128)	147584
dense_2 (Dense)	(None, 1)	129

Total params: 167,105
Trainable params: 167,105
Non-trainable params: 0

Figure 6: CNN properties

The dataset that has been used in this paper contains three types of brain tumors; benign and Meningioma. In this work, an efficient automatic brain tumor classification is performed by using the proposed convolution neural network. Various manners have been applied to the dataset, such as segmented, cropped and uncropped tumors.

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5. CONCLUSION

In this paper, we have presented a new convolutional neural network (CNN) architecture for automated grading (classification) of a brain tumor in three brain datasets: uncropped, cropped, and segmented region of interest (ROI). Our architecture succeeded in grading the brain tumor three classes with high performance in accuracy and sensitivity in all dataset cases: uncropped, cropped, and segmented. The system can significantly grade the tumor into three levels: meningioma, and benign tumor using T1 weight contrast-enhanced brain MR images. This architecture grading efficiency may even be further improved by including more brain MR images with different weights and with various contrast enhancement techniques to allow the architecture to be potentially more generalized and robust application for larger image databases.

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Enhanced Data security through Deep Data Classification in the Cloud Computing

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ABSTRACT

Data is a valued asset especially when data moving to the cloud. Cloud computing model attracts different users because of its various benefits such as scalability, simplicity, expense reduction, and high resource resistance. Cloud computing is a wide-ranging architecture based on different models for providing different software services and hardware services. There may be different types of data and the degree of protection needed for all the data is also may vary. Data privacy and data security is the major area of research and development in the cloud computing. Privacy protection and data leakage became essential thing for so many organizations moving on to cloud. Several classification methods that are expressed various parameters based on different dimensions for providing the data security can be based on the level and are required protection. But, the latest approaches introduced by the cloud, related to distributed resources, multi-tenancy idea, computation outsourcing, high dynamism of the model, data warehousing and the non-transparent style of cloud increase the security and privacy concerns and makes building and maintaining trust among cloud service providers and consumers is a serious security issue. In this paper, we proposes a new approach to improve security of data in cloud computing. It proposes a classification model to classify data before being presented into a suitable encryption system based on the category. Because data in cloud has not the same sensitivity level, encrypting these different types of data with the same algorithms can lead to a lack of security or resources. By this scheme, we can achieve high security for our data, and can optimize the computation cost and resource consumption while ensuring data confidentiality.The efficiency of the proposed classification scheme is analysed with the sample dataset collected.

Key words: Cloud computing, Cloud storage, Data security, Data privacy, Data classification, Data sensitivity.

1. INTRODUCTION

In general data can be represented as set of raw facts. Data is a big asset of any organization. Data could be in any of the forms like numbers, letters, words, images, audio, video etc. Data privacyand security is a key issue for any organization. Data can be structured or unstructured. Majority of organizations maintain their data as structured manner, so that very easy to classify, manage, and access. Usually classification process of structured data found in spreadsheets and databases are less complex and time consuming to manage than those of unstructured data such as source code, documents, and email. Irrespective of whether structured data or unstructured data, it is very important for organizations to manage the data sensitivity. When data classification properly implemented, it ensure that sensitive or confidential data assets are managed with greater mistake than data assets that are considered public or free to distribute.

The cloud computing refers to a model for supportingflexible and convenient, global, on-demand network access to a sharable group of configurable computing resources (e.g., servers, storage, networks, applications, and services) that can be quickly provisioned and released with minimal efforts to manage or service provider interaction [1].It lessens the need of user involvement by complicating technical details such as licenses, software upgrades, and maintenance from their clients [2]. We can understand clearly about the cloud and its environment through the figure1 shown in below.

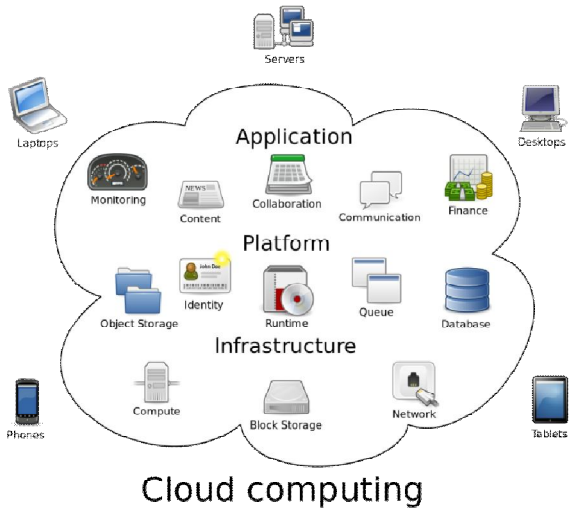

Figure 1: Cloud Computing Environment

Though, the innovative methods presented by the clouds, related to outsourcing computation, multi-tenancy concept, distributed resources, high dynamism, data warehousing and the non-transparent model of cloud maximize the security and privacy issues and makes a critical security challenge [3] forconstructing and hold trust among cloud service providers and cloud consumers.

When a user stored his data in cloud or to use a cloud service whereever his data is involved, majority times, he cannot pay attention to know the details of the security risks faced there; attacks, vulnerabilities, malware information and security policies established in the cloud. For instance, an attacker can introduce a piece of code into web application to ignore access control mechanisms, to gain free access to all customer's data, authorized data, tokens and also plaintext passwords by cross locate scripting attack. Also, attacks such as denial of service(DoS) attack, flooding attack, Wrapping attacks, XML Signature and others lead to taking the administrative rights of the cloud user or to making data unavailable [4]. In these scenarios the user loses the control of his data and especially the cloud service provider or an external party can read and use it for their benefit. To touch a high privacy and security goals associated to data and cloud services, cloud service provider(CSP) establish a Service Level Agreement (SLA) to the cloud consumers, but unfortunately no standard procedure provided to conceive an SLA. SLA reports associated to the approved services, which is very helpful for both consumers and provider. However, these SLA reports do not fully conform to the consumer needs in terms of security. Several cloud providers does not provide sufficient SLA to assure that user data is fully secure [5]. If cloud computing is feasible alternative to the traditional systems and gain user's trust, cloud's infrastructure must implement and provide a security at a level that ensure the data protection and guarantee to its confidentiality,data integrity and availability. Consequently, a more awareness is required about tools and measures to take in order to avoid malicious activities that target data.

In [15], Frank Simorjay et al. given some clarification on the different parameters or factors from which we should know how to achieve the data security and confidentiality,such as data access control, Authentication, Authorization ,etc. They described about them as follows:

Data access Control

To control the data accessing from the user, we use Authentication and authorization. Sometimes Authentication and authorization are confused with each other and their roles misinterpreted. In reality they are quite different, as shown in figure below:



Figure 2: Difference between Authentication and Authorization.

Authentication usually consists of at least two things: a user ID or username to identify a user and another is a token such as a password, to confirm that the username credential given is valid or not. it verifies that the user is a valid user or not. Authorization is a process of providing the ability to access data set, data file, an application, or some other object to an authenticated user. Assigning the rights for use, modify, or delete items to authenticated users that they can access, needs care to data classification. The difference between Authentication and Authorization is described in the figure2 very well. The validity of data in the sense, data which is recorded and used with respect to related requirements that should be valid over a given period of time. Relevance means, the data captured should be used with respect to relevant requirements. Completeness of data means data should be complete or fulfilled with respect to its usage. Data accessibility deals with the access of data with respect to time, scope and cost. Data consistency deals with the uniformity of the content which is stored with respect to changes made by transactions that used data.

Basic security issues of data comprise confidentiality, availability and integrity. Data confidentiality deals with the privacy of data that comprises authentic and authorized accessibility of sensitive data. Data integrity deals with data consistency and data accuracy which are required to achieve integrity. Data availability issues relating to fool proof storage, storage type, requirements for disaster recovery and also backup plan.Data availability is most important issue to any organization moving to the cloud. Security issues concerning data increases when moving to the cloud. User controls about data, data protection technique and data availability are some of the issues that user requires to know before using the cloud for data storage. The data stored on the cloud should be protected from unwanted malicious disaster that may be man-made or natural. A cloud provider should know and accordingly need to provide measures to achieve data availability.

Data Classification Process

Many organizations understand the need of data classification and want to implement it is a basic challenge. One effective and simple implement of data classification is by using the PLAN, DO, CHECK, ACT model from MOF. The figure3 below shows the tasks that are needed to implement successfully in data classification model.

Select a suitable model that addresses your needs

Many types of processes are present for classifying the data, like manual processes, location-based processes that classify data based on a system's or a user's location, application-based processes such as database-specific classification, and automated processes used by various technologies.They introduced two generalized terminology models based on well-used and industry-respected models. Both of these terminology models, provide three levels of classification sensitivity, which are shown in the table1 below.

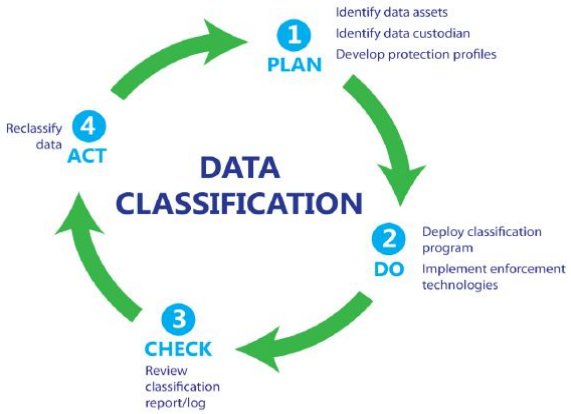

Figure 3: Steps in classification process

Table1: Levels of classification sensitivity

Sensitivity	TerminologyModel 1	TerminologyModel2
High	Confidential	Restricted
Medium	For internal use only	Sensitive
Low	Public	Unrestricted

Data Ownership

To provide the security for the data it's important to launch a clear chain of ownership for all the data assets. The table2 given below identifies different data ownership roles in data classification and their relevant rights.

Table 2: Data ownership roles and their relevant rights

Role	Create	Modify/delete	Delegate	Read	Archive/restore
Owner	X	X	X	X	X
Custodian			X		
Administrator					X
User*		X		X	

The data owner is the original creator of the data file, who can give ownership and assign a guardian (called custodian) . When a file is created, the owner should assign a classification, they have a responsibility to understand what needs to be classified as confidential data based on their organization's policies. Data of all owners can be auto-classified for internal use only (sensitive) unless creating or owning confidential (restricted) data types. Frequently, the owner's role will change after the data is classified.An **administrator** is a user who is responsible for ensuring the data integrity, but they are not a data owner, custodian, or user. The administrator role includes backup, restoration, maintaining records of the data,, and choosing, obtaining, and operating the devices and storage that stores the data assets. The **asset user** is anyone who is granted access to data or a file, access assignment is often given by the owner to the custodian.

To implement these classification process, we need to consider details about who, where, when, what, and why a data asset would be used, changed, deleted or accessed. Sometimes reclassifications also need to be done. Reclassifying is a changing of classification state of a data when a user or system defines that the data risk profile or importance has changed. This reclassification is very important for ensuring the classification status continues to be current and valid. Reclassification can be done either manually or automatically.

The classification of data process has been used for decades by large organizations such as Microsoft, governments, private organizations, and military entities to manage the integrity of their data. Organizations which are assessing cloud computing for future use or organizations that are presently using cloud services and looking for ways to optimize data management will benefit from this paper. Data Classification is a method of defining different data levels and determining a level of sensitivity to it. It is a crucial activity at different stages as data is being created, stored, modified, or transmitted. The classifications of the data determine up to what extent the data needs to be secured and its value in terms of Business Resources. Data classification can be done based on the different aspects. Some based on the risk related with the disclosure are public, internal, confidential (or highly confidential), restricted, regulatory, or top secret. And some based on its way of creation are user personal data, their usage patterns etc.

To provide the access control and authorization, classifying data based on security levels, many organizations felt it as area of interest by using or providing cloud services. In this paper, we have studied a set of classifications procedures given in the literature survey and recognized a set of parameters based on the security needs for cloud data. We have analysed some sample data sets that provide the security based on their usage and access control with respect to cloud computing environment.In the literature, we mentioned several mechanisms implemented in the cloud infrastructure to protect data. Moreover manymethods were proposed to secure the data at various levels, on different platforms and different domains such as network, hardware, software, hypervisors, storage, access control, classification model to classify the data before being presented into an applicable encryption system. Because data in the cloud has not same sensitivity level, encrypting it using same algorithms can lead to lack of resources or of security. Hence,it is needed to optimize computation cost and the resources consumption while ensuring the data confidentiality.

2.PROPOSED SYSTEM MODEL

The system model of our proposed scheme is given in below figure4. In the cloud virtual environment, the data can be taken from the different local servers to store into the cloud. Before storing that data into the cloud,it is classified based on the application areas belonging that data, then reclassifying it deeply based on its sensitivity and its properties. Finally, the fully classified data can be store into the cloud environment as different type of clusters in such a way that, it is possible to apply security algorithms on a specific data set , so that it can be high protected.

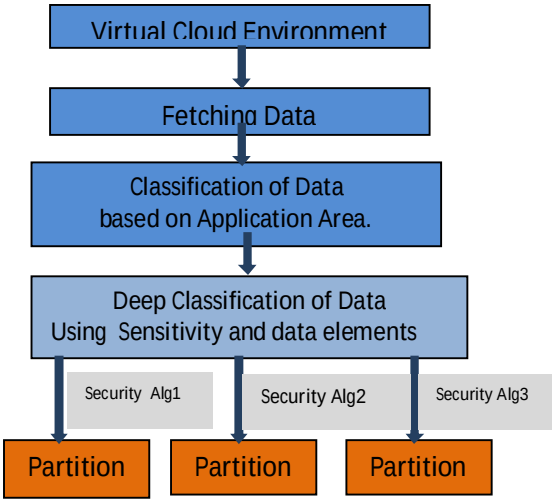

Figure 4: Cloud simulation Environment

Data security is the key issue in cloud computing. Though, several experimentations had been done to solve this issue,still different data leakage problems are facing in the cloud. In this paper we concentrate on the data stored in the cloud and to secure it by adopting a classification method. Weobserved that different types of data are loading through the cloud infrastructure. Some customers need more security and some needs more confidentiality and protection than other for their data. But reality exist in the in cloud environment is different; a cloud provider accomplishes the same models or mechanisms for security for different types of data, or sometimes simply they uses same security procedures for allclient's needs. Itleads to waste of time, a loss of cost; and a misuse of resources. We identified some of the research work existing in the literature related to this paper.The main idea is the classification of data before applying to any security technique that optimize its security.

Barker et al. proposed a new privacy data model based on data classification. They recommendto build a system that should have the capability of protecting user privacy by using the three fundamental aspects such as purpose, visibility and granularity. They spited granularity into the four sub-aspects (None, Existential, Partial, and Specific). The visibility is also divided into the five sub-aspects (None, Owner, House, Third party, All/Work). And for the Purpose, they proposed five alternatives aspects (Single, Reuse same, Reuse selected, Reuse any, and Any) [6].

3.LITERATURE SURVEY

In [1], the sensitive data is outsourced to a cloud service provider with the authorisation of block level modifications. Unplanned mutual belief is established between data owner and user by using third party. Pearson discussed policies and assessment procedures in [2] for privacy enhancement methods and tools. Privacy is provided in terms of legal obedience and user belief, data leakage for sensitive data. Ji Hu and Klein A, in [3] gave a benchmark to secure the data-in-transit in the cloud. And also protecting the data during migration is discussed via benchmark for the encryption overhead and security. Additional encryption is needed for high security but it needs more computation. So a benchmark provides balance for the security and also encryption overhead.Tetsuya M, Kazuhiro S and Hirotsugu, K. provided a large scale search system for the information exchange between the internet communities that leads to formation of hidden Channels [4]. An agent based security model used to control data from hidden channel is presented. It may solve the problem of data leakage in the cloud.In [5] discussed aboutthe privacy issue by holding data control to user to increase confidence, also discussed cloud computing attacks and some provisions to overcome from the same.

In [6], aninnovative patient-centric framework is presented for data access control of Patient Health Records,where data is stored in semi-trusted servers. Attribute based encryption techniques used to encrypt each patient's Health Record file to achieve fine-grained and scalable data access control.In [7], data characteristics are studied with respect to the online social networks.They have identified the information and its leakage at the time of data sharing in the network. For this purpose they also used third party check.

Data protection organisation is proposed in [8] by considering several aspects. A case study is inspected by providing the solution for data protection in terms of questionaries' like who needs protection, what has to be protected etc. A restriction to data accessibility by the third party applications is proposed in the form of framework in [9]. Policies are applied for restricted access and therefore the privacy of user confidential data is achieved from the third party applications.Data privacy is achieved to the user that makes use of the hotspots for the internet access in [10].

In [11],a three dimensional vision for data taxonomy is proposed. This classifies the data as per visibility, and Granularity. Various levels of data are defined along these dimensions to achieve the data privacy. Taxonomy for social data is presented in [12], which classifies the data based on the way data is generated in the social network, and hence the privacy and access rights have to be applied. Data classification at various phases in a social network is presentedin [13], which classifies the data based on security parameter confidentiality in a network. This classification applies in several phases of data like collection, processing, dissemination and invasion.

In [14], data security andvarious security issues areanalysed, and a trust based solution is proposed for the same. Here data security concerns have identified and attempted to provide security by classifying the data. Many dimensions are identified along which security and protection level can beapplied to different data. Sometimes security need to check in the different levels like PaaS,SaaS and IaaS,Dr.N.Srinivasu et al. in[20] found threats at all these levels and resolved them by using the security mechanisms..

In [16], RasmeetKour et al. proposed a classification mechanism to classify thedata depending upon the security elements of the data.Thiswill divide data into two parts-sensitive and non-sensitiveby improved bagging and boosting technique.In [17], Kumar Pal Singh et al. proposed a mechanism for data classification based the data

sensitivity. Depends on the sensitive rating of the data in terms of confidentiality, integrity and availability, data can be classified into three categories:low impact, moderate and high impact. Hence the security algorithms can be applied on to the data based on suitability. It is also giving good results.In[15], RizwanaShaikh et al. given the data classification mechanism through that they classified the date based on the three properties: Access control, Content and Storage. Each property again divided into sub-properties as given in figure5.This method given detailed classification up tosome level. The value of data is identified based on their usage and access control restrictions.

Data Classification Properties		
Access Control	**Content**	**Storage**
Frequency of Access Frequency of Update Visibility and Accessibility Retention	Precision Accuracy Reliability/Validity Degree of Completeness Consistency and Auditability	Storage-encryption Communicationencryption Integrity Access Control Backup and recovery plan Data Quality Standards

Figure.5: Data Classification Properties

Content of data have several properties with respect to its modification such as Precision/ Accuracy, Reliability/ Validity, Degree of Completeness, Consistency, Auditability,
Data storage policies can be applied based on the norms and constrictions applied to the different types such as Storage-encryption, Communication-encryption, Integrity, Access Control, Backup and recovery plan, Data Quality Standards. Access Control category defines the access restrictions we can applied on data. That includes Frequency of access, Frequency of update, Visibility and Accessibility, Retention etc.

They Simulated the classification of data based on personal data set elements like name, addresses etc. is taken as sample data and analysed. They have used the subjective criteria to classify them and based on that, security requirements for the storage and communications can be incorporated. These criteria can be transformed to values and threshold can be set for objective evaluation.

Garigipati,N.et al. presented a study on the data security and the query privacy in cloud in [27], thru that we can get some security issues. In [28] Keerthi,G et al. presented the source based privacy for the confidential data in the cloud based e-healthcare systems. In [29], Mane,P.M et al. presented a method to achieve confidentiality and efficient access control of data in cloud using CP_ABE.

After classifying the data, we need to apply the security mechanisms to obtain the high security for our data. For instance, in [21], N.Srinivasu et al. proposed a security algorithm named Honey Encryption which is a different technique that solve the brute force problems also.Some techniques are used to enforce the security mechanisms like used in [24].Babukarthik et al.proposed a mechanism for data owners to execute their security policies to confirm data confidentiality and integrity, which also enable trusted data sharing through untrusted cloud providers.In[25],different decisional learning parity with noise (DLPN) named as key-Ordered DLPN based security algorithm is proposed, here DLPN is extended to an even-odd-order mechanism for the encryption, in this, odd and even bits are input integer values for the key generation algorithm in that security method.

In centralized controlling cloud, the Host Controller(HC) manages the resources such as virtual machine (VM) and physical hosts across hosts in the Data Center (DC).If HC is down,the services hosting by several hosts in DC also will down. Hence, decentralized VM management used to avoid by taking one of the hosts from DC as HC to keep DC in running.The host's in DC does VM migration across various hosts incorporate the security mechanism on hosts to protectdata in migration[22]. It is mandatory to allocate the resources and using good and suitable scheduling algorithm to complete the given task in the cloud in minimal amount of time. In [23], S.Phani Praveenet. al, proposed a method with two phases as resource allocation and tasks scheduling. Efficient resource allocation is done using social group optimization scheme and tasks scheduling using shortest-job-first scheduling algorithm. In [30],Naresh et al. presented the method to optimize the resourceschedule in the cloud.Sometimes we need to prevent the data attacks like, In [26], Chaitanya,G.K., et al. proposed a method to prevent data theft attacks inIaaS cloud through the trusted computing

4.PROPOSED CLASSIFICATION METHOD

From the above literature, we can understand that data classification is very essential method to enhance the data security in the cloud both at storage level as well as access level. So, in this paper we proposed a mechanism for achieving the security to the next level, by classifying the data into some more deep.
Data can be classified into different categories based on its sensitive level or rating as low sensitivity, moderate sensitivity and high sensitivity. The data should be stored and maintained based on its context. The sensitivity level can be defined to the different type of data whether it is public, private, personal, official, health related data, criminal issues data etc.For example, some sample data is shown in the table3 and table4 with their sensitive levels.

Table 3: Different Type of data and its Sensitivity (For sample)

Type of data & its Sensitive level	
Type of data content	**Sensitivity level**
Public data	Low
Private data	Moderate
Personal data	High(Restricted)
Official data	Moderate
Health related data	High
Criminal issues data	High
Hospital Data	High
Research Data	High

In addition to the sensitive level, we described some properties of data in terms of security, integrity, availability of data as said in [15]. If the data classification is applied according these properties and based on the above specified

sensitive level at the storage level of cloud, then very easy to maintain and access it. After the data classification is done with these properties and sensitivity, we can apply the suitable security algorithms to achieve optimal security of the out sourced data. Instead of applying the security mechanisms on the entire data blindly without concentrating on the type and sensitivity of the data, if we apply based on the specific type and sensitivity of the data, we can achieve the optimized security. Once the data is outsourced to the cloud, in general auditing can be done to verify the data integrity as done in [18].

Table 4: Sample Data content and its Sensitivity.

Data content	Sensitive level
Voter name	L
Voter Address	H
Voter age	M
Voter gender	M
Voter ID	M
Voting booth name	H
Movies name	L
Story of the movie	H
Schedule of movie	H
Director of movie	M
Profit of movie	H
Remunerationof director	M
CoursesOfferingUniv,	L
Course fee	M
Course duration	M
Course Content	H
Course material	H
Questionson the course	H
Shopping malls addr,	L
Malls staff details,	H
Malls profit	H
Mall offer coupons	H
Vaccine name	L
Vaccine life time	M
Vaccine formula	H
Vaccine purpose	M
Patient Name	M
Patient age	M
Patient disease	M
Patient report	H
Doctor of Patient	M
Treatment taking	M
Govt officials name	L
Govtofficials Designation	M
Govt officials address	H
Govt officials schedule	H
Govt officials salary	H
Govt officials files	H

Table 5: Data classification parameters: Man= Mandatory; R= Restricted; Mod= Moderate; FU= Frequency of Update; FA= Frequency of Access; CE= Communication Encryption; SE= Storage Encryption; Int.= Integrity; Con/Aud=Cosistency/ Audibility; DoC= Degree of Completeness; R/V= Reliability/Validity; P/A= Precision /Accuracy. H-High

Data set / properties	Properties related with Security				Properties related with datacontent				Properties require for cloudStorage			
Data Elements	**FA**	**FU**	**Visibility**	**Accessi Bility**	**P/A**	**R/ V**	**DoC**	**Con/ Aud**	**SE**	**CE**	**Int.**	**AC**
Name	More	Never	All	All	Hig h	High	Man	Yes	Less	Moderate	Less	No Control
Mother name	Moderate	Never	R	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Father Name	Moderate	Never	R	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Permanent Address	Moderate	Never	R	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Commn Address	Moderate	Less	R	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Qualificatn	Moderate	Less	All	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Profession	Less	Less	All	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Salary	Moderate	Less	R	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Designation	Moderate	Less	R	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Phone	Moderate	Less	R	R	H	High	Man	Yes	Strong	Strong	Strong	RBAC
Mobile	More	Less	R	R	H	High	Optional	Yes	Strong	Strong	Strong	RBAC
DOB	Less	Never	R	R	H	High	Man	NA	Strong	Strong	Strong	RBAC
Place of Birth	Less	Never	R	R	H	High	Optional	Yes	No	Less	Less	RBAC
Caste	Less	Never	R	R	H	High	Optional	Yes	Strong	Strong	Strong	RBAC
Sex	Moderate	Never	All	All	H	High	Man	NA	Less	Moderate	Less	No Control
Nationality	Less	Never	All	All	H	High	Man	NA	No	Less	No	No Control
Blood	Less	Never	R	R	H	High	Optional	Yes	Less	Moderate	Less	RBAC

Group												
Height	Less	Never	R	R	H	High	Optional	Yes	Less	Moderate	Less	RBAC
Weight	Less	Never	R	R	H	High	Optional	Yes	Less	Moderate	Less	RBAC
Marital status	Moderate	Less	All	All	H	H	Man	Yes	Less	Moderate	Less	No Control
Adhaar No	Less	Never	R	R	H	H	Man	Yes	Strong	Strong	Strong	RBAC
PAN	Less	Never	R	R	H	H	Man	Yes	Strong	Strong	Strong	RBAC
Voter Number	Less	Never	R	R	H	H	Man	Yes	Strong	Strong	Strong	RBAC
Passport No	Less	Less	R	R	H	H	Man	Yes	Less	Moderate	Less	RBAC
SSN	Moderate	Never	R	R	H	H	Man	NA	Strong	Strong	Strong	RBAC
Email	More	Less	R	R	H	H	Man	Yes	Strong	Strong	Strong	RBAC
Physical Charactrstics	Less	Never	No-one	No-one	H	H	Optional	Yes	Moderate	Strong	Moderate	No-one
Dept.	Moderate	Less	All	R	H	H	Man	yes	Moderate	Strong	Moderate	No-one
Eye Color	Less	Less	No-one	No-one	H	H	Optional	NA	Strong	Strong	Strong	No-one
Biometric	Less	Less	No-one	No-one	H	H	Man	NA	Strong	Strong	Strong	No-one
Income	Less	Less	R	R	H	H	Man	yes	Strong	Strong	Strong	No-one
No.of Children	Less	Less	R	R	H	H	Man	yes	Strong	Strong	Strong	No-one
Health Status	Less	Less	R	R	H	H	Man	yes	Strong	Strong	Strong	No-one
Police Cases	Less	Less	R	R	H	H	Man	yes	Strong	Strong	Strong	No-one
Office data	Less	Less	R	R	H	H	Man	yes	Strong	Strong	Strong	No-one

5. ANALYSIS

By observing the literature survey, we can say that, some mechanisms are providing security only based on the security algorithms on the entire data, some are providing only based on classification, some are providing based on both classification and security mechanisms. Though they are providing security, which may not give as optimal, since they are doing only basic level classification The classification process given in this proposed method will definitely will give optimal level security for our data which is outsourced to the cloud, since here classification is doing deeply and then applying the security algorithms on the sensitized and classified data. To perform the data classification automation, we should use any data classification algorithms. If we apply the data classification algorithm and data security algorithm, definitely we can reduce the execution cost of both secure data storage as well as retrieval.

6. CONCLUSION

Data security and privacy is one of the major issues facing while data out sourcing to the cloud storage. Even though somany classification methods exist in the literature survey, they cannot reach to the optimal level security for our data. We proposed amethod, in which we can identify the different type of data with their sensitivity, and we can divide the data into smaller to identify their sensitivity clearly, so that we can store the data into the cloud as clusters and sub-clusters, hence it is possible to access very easily with the proper access rights. Moreover,we identified a set of parameters based on these and data sensitivity, classification can be done deeply and then suitable security algorithm can be applied on a specific data set, not on the entire data. And then data can be stored intothe cloud.So, here we providing security levels based on type of content and accessibility, and in cloud storage as per the required confidentiality and accessrestrictionsforthedataspecified.Wehaveanalyzedfewdataelements andclassifiedthembasedonthe proposed parameters. The classification provisions can be given for storage and communication encryption, integrity and access control mechanisms. Also a regularized backup plan can be decided for disaster and recovery.

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Deep Neural Networks with Transfer Learning Model for Brain Tumors Classification

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ABSTRACT

To investigate the effect of deep neural networks with transfer learning on MR images for tumor classification and improve the classification metrics by building image-level, stratified image-level, and patient-level models. Three thousand sixty-four T1-weighted magnetic resonance (MR) imaging from two hundred thirty-three patient cases of three brain tumors types (meningioma, glioma, and pituitary) were collected and it includes coronal, sagittal and axial views. The average number of brain images of each patient in three views is fourteen in the collected dataset. The classification is performed in a model of cross-trained with a pre-trained InceptionV3 model. Three image-level and one patient-level models are built on the MR imaging dataset. The models are evaluated in classification metrics such as accuracy, loss, precision, recall, kappa, and AUC. The proposed models are validated using four approaches: holdout validation, 10-fold cross-validation, stratified 10-fold cross-validation, and group 10-fold cross-validation. The generalization capability and improvement of the network are tested by using cropped and uncropped images of the dataset. The best results for group 10-fold cross-validation (patient-level) are obtained on the used dataset (ACC=99.82). A deep neural network with transfer learning can be used to classify brain tumors from MR images. Our patient-level network model noted the best results in classification to improve accuracy.

1. INTRODUCTION

The effective decision-support system is very much essential for radiologists in medical diagnostics. According to the World Health Organization (WHO) [1] cancer is the second leading cause of death. Globally, 9.6 million deaths in 2018 due to the cancer disease and about 1 in 6 deaths in the global population. Death from cancer can be prevented with early detection. Brain cancer is much critical than other types of cancer and clinical diagnostic of brain cancer is difficult. In general, unlike cancer, tumor could be benign, pre-carcinoma, or malign. Benign can be removed surgically and it does not affect other organs and tissues. However, brain tumors are meningiomas, gliomas, and pituitary. Meningiomas tumor occurs from membranes (the area that protects the brain and spinal cord), gliomas arise from brain tissues and pituitary tumors are lumps that sit inside the skull at the pituitary gland area. In fact, benign tumors do not spread to other tissues, cells, and organs of the body [2]. The difference between these three types of tumors is that meningioma and pituitary are benign, and glioma is malignant. One of the ways to detect the brain tumor is to examine the MRI images. An experienced radiologist can examine the MRI images and decide the type of brain tumor. This decision depends on the experience of the radiologist and the available data of the patient. Since the identification of tumor depends on the experience of the radiologist and a large amount of data observation is difficult for radiologists or humans. Brain tumor biopsy must require brain surgery. Therefore, it is to develop a computer-based decision-making tool for tumor classification and segmentation from MR imaging [3].

Advanced Machine Learning models based on deep learning and neural networks will be optimized to perform at the edge [4-7]. These models provide useful assistance for many medical applications and medical imaging. Several deep learning methods for classifying images and detecting regions in MR images. The advanced decision support system for machine learning can serve as a second opinion for radiologists before going for biopsy of the tumor.

Many researchers have been implemented tumor segmentation and classification on various datasets, which are publicly available in internet. Most of the datasets are very small in size. In addition, implemented models are concluded in small datasets. But advanced machine learning models based on deep learning and neural networks demands large volume of data to perform optimally. Since, researchers are claiming that better results with small number of input observations. In the literature, image classification, segmentation, and image analysis are implemented in various advanced deep learning techniques and modified pre-trained networks. Different approached are developed in MR imaging datasets of brain tumors. These approaches are discussed in the Literature Review section of this paper. This paper focuses mainly on the deep learning networks. In particularly, convolutional neural networks (CNN) with transfer learning with the same dataset, which is used in this paper.

Convolutional Neural Network based models need large volume of data to note the optimal results in the taken application area. For MR imaging, it is required to have different planes (views) of same patient to increase the size of

dataset. Further, data augmentation and pre-processing are used on the images before feeding into CNN models [8-11]. The main advantage of the deep convolutional neural network (DCNN) is that data augmentation and pre-processing do not required. DCNN can be able to extract the specific to subject feature from the images without pre-processing techniques. Pre-processing procedures may take extra resource to perform the segmentation and classification. This paper proposed DCNN with transfer learning. The advantage with transfer learning is that pre-trained model provides the generalized features and these features are combined with specific features of MRI images.

The objective of this research is to investigate the effect of deep neural networks with transfer learning on MRI images for tumor classification and improve the classification metrics by building image-level, stratified image-level, and patient-level models. In addition, our results are compared with other works which are carried out on same database of images and in same approaches. We have tested the designed model on pre-processed and original image database. In addition, we examined the performance of network to show how the various validation strategies yield the performance metrics results.

In this paper, we proposed DCNN based transfer learning (InceptionV3 pre-trained model from imagenet) architecture for brain tumor classification of three kinds (meingioma, glioma and pituitary) from T1-weighted MRI images. The performance of the architecture is tested using hold out, 10-fold cross validation, stratified 10-fold cross validation and group 10-fold cross validation in the combination of cropped image dataset and uncropped image dataset. The performance evaluation is done using the classification metrics such as accuracy, loss (error), precision, recall, kappa and AUC. Finally, we made a comparison study with state-of-the-art methods to discuss our results.

2. LITERATURE REVIEW

Several approaches to the classification of brain tumors using MRI images have been developed in recent years. Unlike basic machine learning architectures, we have used transfer learning to concentrate on DCNN-related literature. Cheng et al. [12] implemented tumor classification using augmented tumor region of interest. He is first person presented the image database, which is used in our research work. He also presented the work in the augmented tumor region is split into increasingly fine ring-form subregions. Finally, he was made the accuracy of 91.28% for MRI image tumor classification. Badza et al. [13] present a new CNN based model for brain tumor classification of three tumor types. The performance of the network is evaluated in four approaches in the combination of two 10-fold cross validations and two databases (original database and augmented database). This work presented the accuracy of 96.56% in tumor classification from MRI images. Hossain et al. [14] proposed a method to extract brain tumor from MRI images using Fuzzy C-mean clustering algorithm followed by CNN model. This work was implemented in keras & tensor flow and gained an accuracy of 97.87%. Özyurt et al. [15] presented a hybrid method using Neutrosophy and Convolutional Neural Network (NS-CNN). In this proposal, features of brain tumor are extracted using CNN and classified using KNN and SVM. The network was evaluated in 5-fold cross validation and gained the classification accuracy of 95.62%. Kaur et al. [16] presented explored the capabilities of various pre-trained models with transfer learning for brain tumor images. This work was evaluated using holdout validation (in the ratio of 60:40, training, and testing). The networks were tested on three types of databases and gained the results of 100%, 94% and 95.92% using pre-trained Alexnet. Phaye et al. [17] propose Dense Cap- sule Networks (DCNet) and Diverse Capsule Networks (DCNet++) by replacing CNN, which leads to learning of discriminative feature maps. DCNet achieves state-of-the-art performance an accuracy of 99.75% on MNIST dataset and DCNet++ performs better than CapsNet on SVHN dataset an accuracy of 96.90%. Balasooriya et al. [18] proposed CNN based model for brain tumor type identification. This work is claimed an accuracy of 99.68% for tumor recognition. Sobhaninia et al. [19] developed tumor segmentation using CNN and gained dice score of 0.79. Seetha and Raja [20] proposed an automatic brain tumor detection using convolutional neural networks and achieved an accuracy of 97.5%. Sultan et al. [21] presented brain tumor classification using deep learning based CNN network on two databases of MRI images. For two databases, they achieved overall accuracy of 96.13% and 98.7%. Afshar et al. [3] presented modified CapsNet for brain tumor classification with access to the tumor surrounding tissues, without distracting it from the main target. In this mode, they used tumor coarse boundaries as extra inputs to achieve the outperformance. Gumaei et al. [22] proposed an accurate brain tumor classification with hybrid feature extraction method and regularized extreme learning. They evaluated the model using holdout validation and achieved an accuracy of 94.23%. Kurup et al. [23] analysed the effect of pre-processing in disease classification. Hence, they proved that data pre-processing improves the brain tumor classification from MRI images in capsulenet architectures.

In this research, we proposed brain tumor classification using deep neural network with convolutional neural network and achieved an accuracy of 99.82% from MRI image database. We developed multi class classification, which is more challenging and complex task than binary classification. We have adopted the T1-weighted MRI image database from figshare and used by Cheng et al. in 2017. This database of MRI images is publicly available to everyone and it is very small in size compared to general image datasets. Therefore, working with small image datasets in deep learning is more challenging and leads to overfitting when the networks are trained from scratch. To overcome these issues from the deep learning models, we have adopted transfer learning pre-trained models, which are trained from natural images (ImageNet). Finally, based on the generalisation capabilities to extract the features of images of InceptionV3 pre-trained model. We used InceptionV3 for taking general image features and combined with specific features of MRI image features by adding last layers in the network. The full-length details of the network are discussed in 3.2.3 proposed CNN architecture model.

3. PROPOSED METHODOLOGY

3.1 Dataset

The T1-weighted MRI brain tumor dataset is publicly available for research community at https://figshare.com/articles/brain_tumor_dataset/151242. This image data was initially used by Cheng. et al. in 2017 [12]

for tumor type classification. The MRI image dataset contains 2-D images of three brain tumor types (1. menigioma, 2. glioma, and 3. Pituitary). In addition, the database consists three plane views (i.e. axial view, coronal view, and sagittal view) of three types of brain tumors, which are shown in the Figure 1). As shown in the Table 1, the dataset contains 3064 MRI images from 233 patients over all three views and three tumor types. The dimensions of each MRI image are 512x512 pixels. All the statistical details of the MRI image dataset are given in the Table 1.

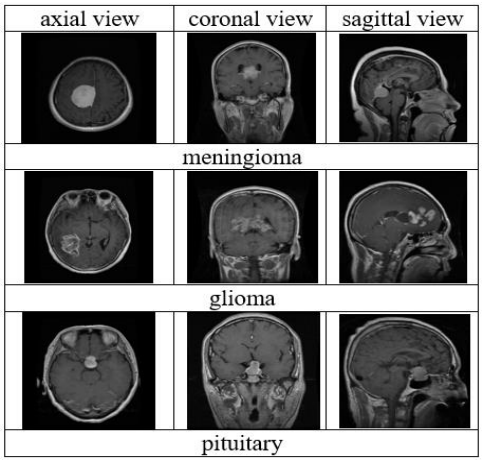

Figure 1. The various types of tumors in different plane views

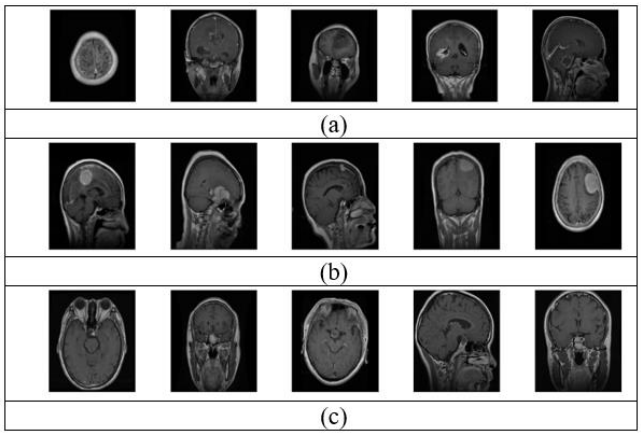

Figure 2. Uncropped images for tumor (a) meningioma (b) glioma (c) pituitary

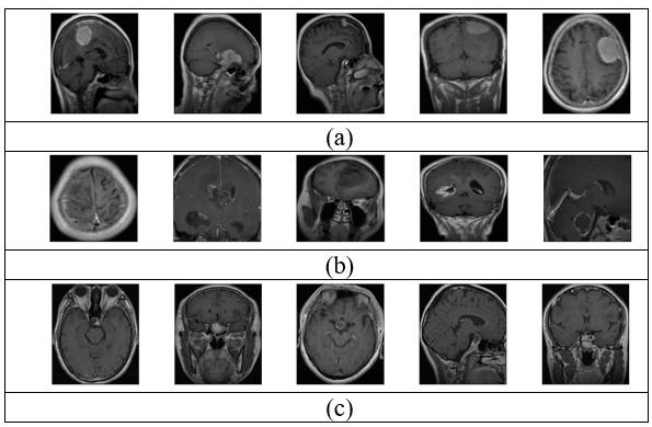

Figure 3. Cropped images for tumor (a) meningioma (b) glioma (c) pituitary

Table 1. The details of dataset (T1-weighted MRI Images)

Type of Tumor	MRI View	Number of MR images	Number of patients
Meningioma	Axial	209	82
	Coronal	268	
	Sagittal	231	
Glioma	Axial	494	89
	Coronal	437	
	sagittal	495	
Pituitary	axial	291	62
	coronal	319	
	sagittal	320	
Total		2064	233

3.2 Methodology

3.2.1 Pre-processing

We have generated two datasets from the original image dataset. One dataset with cropping operation around the brain view in the MRI image and another one without cropping operation. The variation between two datasets shown in the Figures 2 and 3. Two datasets are normalized and resized to 256x256 pixels. The original size of the image is 512x512 pixels. We have used two size of images for input layer of the network. We did not identify any noted improvement in the accuracy rate of classification and consumed more resources in terms of memory and processing time for the dataset of 512x512 pixels compared to the dataset of 256x256 pixels.

3.2.2 Convolutional Neural Networks

CNNs or ConvNets are widely used to do image classification, image recognition and object detection. Deep learning CNN (DCNN) models contain series of layers with filters to perform feature extraction and dimensional reduction. Technically, DCNN passes an input through series of convolution layers with kernels (filters) to classify an object. Models make a probabilistic value between 0 and 1 for given input. In general, DCNN architectures contain a series of convolution layers with filters, pooling, DropOut, ReLu and fully connected layers and finally softmax or sigmoid function to do classification. Sigmoid function is used for binary classification. Softmax function used in multi class classification problems. The CNN models perform automatic feature detection and extraction with high performance.

In this research, we used DCNN with transfer learning with pre-trained InceptionV3. The mechanism of transfer learning is briefly illustration in Figure 4. IncpetionV3 model contains 311 layers and 1,60,36,416 trained weights. The model needs large dataset for training and result optimization. But getting big datasets in the medical applications is very difficult and usually, small datasets will suffer from overfitting. Hence, weights for the model are initialized from IncpetionV3 pre-trained model. Therefore, weights will be transferred from pre-trained model for fine tune.

There are three versions of inception deep convolutional architectures are developed by Szegedy et al. [24]. InceptionV1 is also galled GoogLeNet. InceptionV1 was refined using batch normalization to decrease the computational time and error rate (by Szegedy et al. [24]) and it is named as InceptionV2. Later, they added factorization with second version and named as IncpetionV3. The architecture of InceptionV3 shown in the Figure 5. InceptionV3 focuses on to use less computational power compared to previous versions. This version of deep

convolutional architecture adopted various convolutions to burn less computational resources such as factorized convolutions, smaller convolutions, asymmetric convolutions, auxiliary classifier and grid size reduction [24].

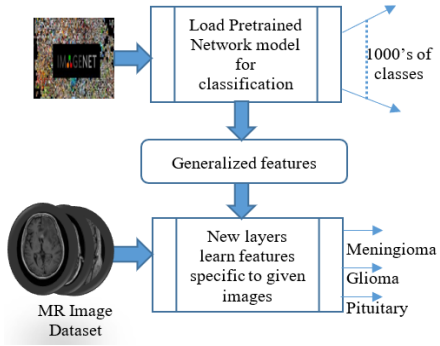

Figure 4. Deep Neural Network with transfer learning

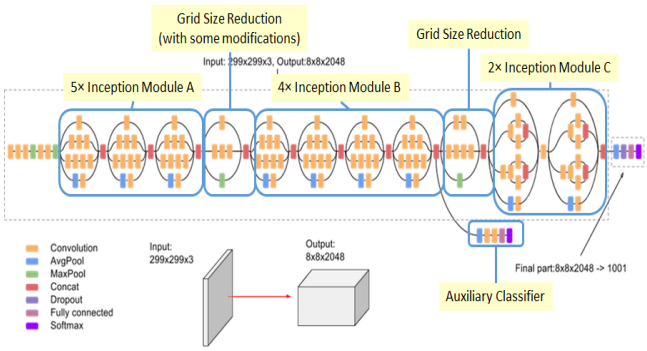

Figure 5. InceptionV3 architecture

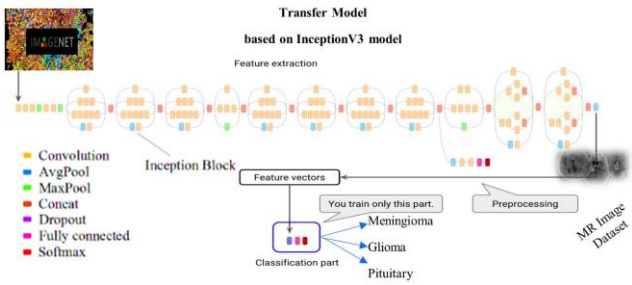

Figure 6. Illustration of transfer learning-based model

3.2.3 Proposed CNN Architecture Model

The proposed CNN architecture was developed in Keras and Tensorflow. The network architecture consists of pre-trained InceptionV3 model trained from ImageNet (311 layers), Fully connected layer with 256 neurons (ReLu activation function), Dropout layer with 20%, softmax classification layer and ouput. From pre-trained model general image features extracted to the fully connected layer. This extraction gives good discriminative representation for trained images. These general image features combined with MRI image features from the fully connected layer. Later, 20% dropout will be applied on the values of ReLu activation of previous layer. In last layer, the number of hidden units is equal to the number of the classes of brain tumor. The schematic representation of proposed CNN architecture shown in the Figure 6. The last layer of InceptionV3 is composed of 1000 hidden units corresponds to classes in the ImageNet dataset. Therefore, the last layer of InceptionV3 replaced with a layer with 3 hidden units according to classes in the MRI image dataset.

Transfer Learning has become increasingly popular, as it greatly decreases training time and needs much less data to train in order to improve efficiency. We used all the layers in the pre-trained model except the last fully connected layer as it is specific to the ImageNet contest. Staring layers of pre-trained models contain the generic feature and last layers contain domain specific features. We made all the layers of pre-trained model frozen to learn MRI tumor image specific features. The loss metric and optimizer in the model are categorical_crossentropy and RMSprop with a learning rate of 0.0001 respectively. While passing the input to the model, images were resized to 256x256 pixels form original size (512x512 pixels). we have fine-tuned the network with above said hyperparameters and achieved an accuracy of 98.82% from selected dataset.

3.2.4 Performance evaluation

Classification is one of the most used machine learning problems for various industrial applications, face recognition, YouTube video categorization, content alteration, medical diagnosis, text classification, hate speech detection on twitter. Some of the most popular classification models such as logistic regression, decision trees, support vector machine (SVM), random forest, convolutional neural network, recurrent neural network. There are various ways to evaluate a classification model. The classification accuracy is interrelated with sensitivity and specificity which utilize the terms: true positive (TP), true negative (TN), false negative (FN), and false positive (FP). One of the important concepts in classification performance is confusion matrix. It is tabular visualization of the model predictions and truth labels. In confusion matrix, rows represented with predicated class and columns represented with actual class. The diagonal elements of confusion matrix denote correct predictions of classification and non-diagonal elements denote the misclassification. The dimension of confusion matrix is number of classes x number of classes in an application for classification. All the terms such as true positive (TP), true negative (TN), false negative (FN) and false positive (FP) are derived from the elements of confusion matrix. These terms are used to calculate accuracy, precision, recall, sensitivity, and specificity to estimate classification performance.

Classification accuracy: The primary performance evaluation metric for classification is accuracy. It is the number of correct predictions divided by the total number of predictions and multiplied with 100.

$$Accuracy = \frac{(TP) + (TN)}{(TP) + (FP) + (TN) + (FN)} \quad (1)$$

Precision: If the data set contains imbalanced observation points then the accuracy of the classification is not a good indicator of model performance. In this case, even if you predict all samples as the most top class, you 'd get a high accuracy rate which makes no sense at all. The model, therefore, does not know anything, so it only forecasts anything as the highest level. Hence, class specific performance metric must require for validation. Precision is one of such metrics, which is defined as:

$$Precision = \frac{True\ Positive\ (TP)}{True\ Positive\ (TP) + False\ Positive\ (FP)} \quad (2)$$

The above mathematical formula applied for each class of the model and validate the performance. When the precisions of all classes are almost the same then it can be inferred that model has trained equally for all classes.

Recall: It is another essential metric, defining as the fraction of observation points from a class that the model correctly predicts.

$$Recall = \frac{True\ Positive\ (TP)}{True\ positive\ (TP) + False\ Negative\ (FN)} \quad (3)$$

F1-Score: Combining precision and recall into a single metric is another important measure. It is the harmonic mean of precision and recall. Mathematical definition of F1-Score is defined as:

$$\mathrm{F1-Score} = \frac{2 * \mathrm{precision} * \mathrm{recall}}{\mathrm{precision} + \mathrm{recall}} \quad (4)$$

Kappa: Cohen Kappa tells you how much better your model is than the random classifier that predicts class frequencies based on it.

$$\mathrm{Kappa} = \frac{\mathrm{Accuracy} - \mathrm{randomAccuracy}}{1 - \mathrm{randomAccuracy}} \quad (5)$$

$$\mathrm{randomAccuracy} = \frac{(\mathrm{TN} + \mathrm{FP}) \times (\mathrm{TN} + \mathrm{FN}) + (\mathrm{FN} + \mathrm{TP}) \times (\mathrm{FP} + \mathrm{TP})}{\mathrm{Total} \times \mathrm{Total}} \quad (6)$$

The area under the curve (AUC): It is an aggregate measure of a binary classifier 's performance over all possible threshold values. AUC calculate the area under the ROC (recursive operating characteristic curve). ROC is a plot which shows the performance of a binary classifier of tis cut-off threshold. AUC is as the probability that the model ranks a random positive observation more highly than a random negative observation. The higher AUC value of a model can give better results.

4. RESULTS ANALYSIS

Brief information about the experimental setup and the results obtained is presented in this section. The experimental setup includes the details used in the present work about the model training and the software platform.

4.1 Experimental setup

We made four types of validation on two datasets (cropped and uncropped) of the proposed pre-trained model with transfer learning. Validation types are list in the Table 1 and 2. The data set was partitioned into a ratio of 70:30, in holdout validation. 70 percent of the dataset is used for training, and the remaining 30 percent are used for testing. 10-fold validation was done in three variations such as image level only, stratified image level and patient level. Further, the comparison study with the current state-of-the-art research is made in the discussion section.

The proposed model was developed with tensorflow platform in keras and implemented in colab pro environment. Google Colab is a valuable resource for the online sharing of work for data scientists and AI researchers. Users can write and execute Python on the web with zero configuration, free GPU access, and easy sharing using the very same Google Drive interface, within the collaborative environment of a Colaboratory. The transferred models were trained using loss metric and optimizer in the model are categorical_crossentropy and RMSprop with a learning rate of 0.0001 respectively. The mini-batch size was taken as 20 and the maximum number of epochs was 25. We validated the design model with same hyperparameters on two datasets in four validation types.

4.2 Results

The results of our model are summarized in Table 2, Table 3, graphical Figure 6, and graphical Figure 7. Four validation type performance metrics on cropped dataset of designed transfer model are illustrated in Table 2. Similarly, Table 3 illustrates metrics on uncropped dataset. These results indicate that uncropped dataset with group10-fold patient level cross validation achieves the best results over all other combinations. The attained values of accuracy, precision, recall, f1 score, kappa, and AUC are 99.82, 97.57, 99.47, 98.40, 94.60, and 99.50 respectively. The second-best combination over other is uncropped stratified 10-fold image level cross validation. The attained values are shown in the Table 3 3rd row. In our case of research on Figshare dataset, precision and recall values are little better in uncropped image level 10-fold cross validation and stratified 10-fold cross validation. The performance metrics value indicates the benefit of transfer learning in reducing overfitting and increasing the convergence speed. We can state that DCNN-based transfer learning models may not require the cropping of images to have classification of tumors.

The graphical Figure 7 and 8 show performance metrics of four types of validations on cropped and uncropped datasets. Figure 7 (a1, a2, a3) presents the holdout validation confusion matrix, training accuracy vs validation accuracy and training loss vs validation accuracy for cropped dataset. Similarly, Figure 7(b1, b2, b2), 7(c1, c2, c3), and 7(d1, d2, d3) presents the graphical representation for 10-fold, stratified 10-fold, and group 10-fold cross validation training progress curves on cropped dataset. All the training and validation progress curves in accuracy and loss clearly shows that there is no overfitting in the model. In four types of validations, our classification model does not suffer from overfitting. Figure 8(a1, a2, a3), 8(b1, b2, b3), 8(c1, c2, c3) and 8(d1, d2, d3) present the training and validation progress curves for classification performance metrics on uncropped MRI images dataset.

Table 2. Performance metrics from 4 types of validations on cropped images dataset

Validation Type	Accuracy	Precision	Recall	F1- Score	Kappa	AUC
Hold out	95.07	91.53	92.05	91.77	88.38	98.89
10-fold (Image Level)	99.10	98.85	98.38	98.57	97.92	99.88
Stratified 10-fold (Image Level)	99.23	98.60	98.82	98.68	98.20	99.84
Group 10-fold (Patient Level)	99.27	98.67	99.53	99.07	99.70	99.70

Table 3. Performance metrics from 4 types of validations on uncropped images dataset

Validation Type	Accuracy	Precision	Recall	F1- Score	Kappa	AUC
Hold out	96.7	95.70	93.98	94.69	92.43	99.55
10-fold (Image Level)	99.10	98.11	98.71	98.33	97.85	99.82
Stratified 10-fold (Image Level)	99.32	98.95	98.87	98.88	98.42	99.85
Group 10-fold (Patient Level)	99.82	97.57	99.47	98.40	94.60	99.50

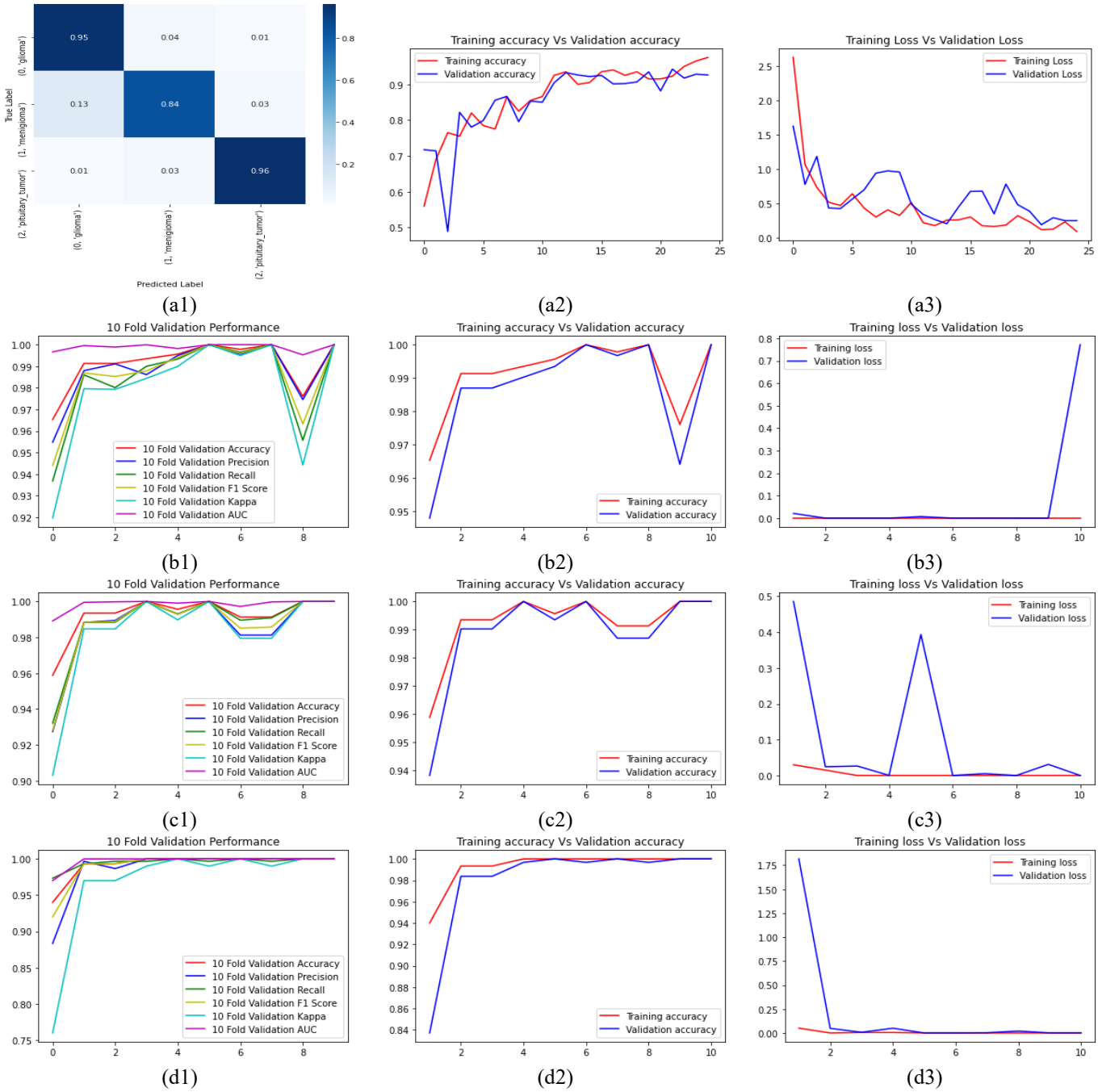

Figure 7. Proposed model performance metrics, accuracy and loss history of cropped images (a1,a2,a3) holdout validation (b1,b2,b3) 10-fold cross validation(image-level) (c1,c2,c3) stratified 10-fold cross validation (image-level) (d1,d2,d3) group 10-fold cross validation (patient-level)

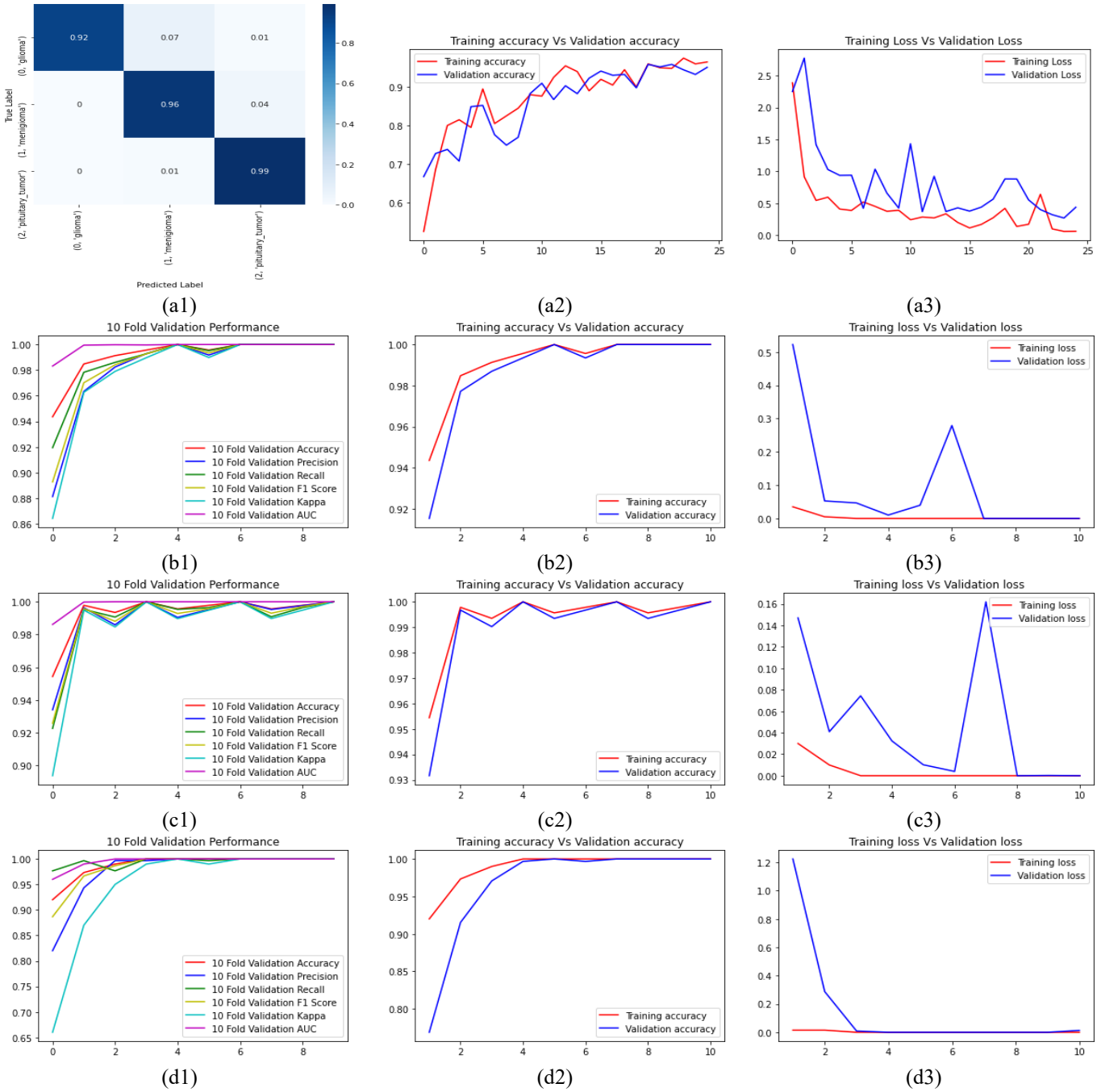

Figure 8. Proposed model performance metrics, accuracy and loss history of uncropped images (a1,a2,a3) holdout validation (b1,b2,b3) 10-fold cross validation(image-level) (c1,c2,c3) stratified 10-fold cross validation (image-level) (d1,d2,d3) group 10-fold cross validation (patient-level)

5. DISCUSSION

Table 4. Comparison of results with existing state-of-the-art works using Figshare dataset

Existing Reference	Accuracy	Precision	Recall	F1-Score	AUC
Afshar et al. [3]	86.56	-	-	-	-
Phaye et al. [17]	95.03	-	-	-	-
Sultan et al. [21]	96.13	96.06	94.43	-	-
Gumaei et al. [22]	92.16	-	-	-	-
Pashaei et al. [25]	93.68	94.60	91.43	93.00	-
Proposed (cropped dataset)	99.27	98.67	99.53	99.07	99.70
Proposed (uncropped dataset)	99.82	97.57	99.47	98.40	99.50

This section presents the comparison of the best performed transferred DCNN models with existing state-of-the-art works on the same dataset for brain tumor classification. To compare our findings with those of previous studies, we selected only

those papers that built a neural network based on DCNN, used whole images as classification inputs and checked their networks using holdout and k-fold cross validation methods, as shown in Table 4. Unlike previous studies which recorded the performance in terms of overall accuracy, the best performing transferred model achieves the higher accuracy value under the fixed partition and the cross-validation scenario. This obtained an accuracy value of 96.70% and 99.82% higher than current state-of-the-art systems for holdout and 10-fold cross validations.

6. CONCLUSION

We compared our model with various DCNN models that focused on the classification of MR brain images. A ceiling classification standard was reached in our approach of using pre-trained InceptionV3 DCNN model. We have shown that no pre-processing or classification segmentation of the tumors was needed. In addition, the network has a very good execution speed of 15s per epoch. To check the network, we used both cropped and uncropped data sets with holdout (70:30 ratio) and 10-fold cross validation at the image level & patient level. The patient-level models increased the classification accuracy dramatically from the four evaluated models. Through making a 99.82% classification accuracy for figshare MRI data set, our model has proven to be the finest.

Future works will be focused on other approaches to database augmentation and other ways to perform pre-processing of data to improve the more generalization capability of the network. We want to work on the best turning hyperparameters of network architecture for tumor classification. Further, it could be used during brain operation, classifying, and accurately locating the tumor. Hence, Tumor detection in the operating room will be performed in real-time and in real-world conditions. In the future, we want to apply our designed DCNN architecture model on various medical images and find the adaptability of the model in the real-world scenarios.

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DEPARTMENT OF INFORMATION TECHNOLOGY

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A New Cross Layer Design for Efficient Routing Protocol using Ant Colony Optimization

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Abstract

In military applications mobile ad-hoc network plays very important role because it is specifically designed network for on demand requirement and in situations where set up of physical network is not possible. This special type of network which takes control in infrastructure less communication handles serious challenges tactfully such as highly robust and dynamic military workstations, devices and smaller sub-networks in the battlefield. Therefore, there is a high demand of designing efficient routing protocols ensuring security and reliability for successful transmission of highly sensitive and confidential military information in defence networks. With this objective, a power efficient network layer routing protocol in the network for military application is designed and simulated using a new cross layer approach of design to increase reliability and network lifetime up. But here PDO-AODV approach does not support to optimal path selection. So, we propose a new ACO-DAEE (Ant colony optimization with delay aware energy efficient) for optimal path selection and mitigating the delay time in network system. The main goal is to maintain the optimal routes in network, during data transmission in an efficient manner. Our simulation results indicate that ACO-ADEE performs extremely well in terms of packet delivery ratio, end to end delay, and throughput. Simulation results through NS2 software to verify the effectiveness of our method.

Keywords: *Mobile Ad-Hoc Network, Cross layer design, ant colony optimization*

1. Introduction

The gigantic technological rejuvenation of wireless communiqué [1] has been emerged in the system of mobile ad hoc networks (MANETs) in current decade. MANETs are excellent networking structure that is based with no settled framework. Because of the highly dynamic, extremely mobile and self-configurable nature of its autonomous nodes, performance of this network is outstanding in terms of transmission, throughput and reliability. Mobile ad hoc networks [1] have very important application and operations in battle fields and in disaster situations such as deployment of networks, high security measures in the network, any end to end transmission, mobile connectivity without failure, anti jamming mechanism, etc. All network activity must be done spontaneously without any link failure even in microsecond level. The soldiers during online battle should be able to remain continuously connected with each other to get any latest information, or command from their chief or to discuss before any action. Sometimes penetration of the satellite signals is not desirable to caves or dense forest or under sea places where it is again challenging to sustain connectivity. Many research works have focused on the security of MANETs. Most of them deal with prevention and detection

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approaches to combat individual misbehaving nodes. In this regard, the effectiveness of these approaches becomes weak when multiple malicious nodes collude together to initiate a collaborative attack, which may result to more devastating damages to the network.

2. Related Work

In previous works [2], power delay optimized AODV protocol is a routing engine that is the controller of all functions in the mobile workstation. Sequentially it performs three important tasks during static or mobile position of a node and after a packet arrives to a node such as the channel sensing, the mini database handling module and the intelligent decision taking sub module. In the first sub module of channel sensing, status messages are transmitted periodically with formal interruption of time by the node to broadcast presence of that node in the channel. In the next sub module, a small database is maintained to reserve and recall routing information's regarding a path, which can be referred next time data transmission takes place between same sender and receiver. A threshold value is calculated procedure to select the next hop station as per the algorithm as given below, which will be used in the routing decision module to finally select a suitable station. We existed a cross layer mechanism between the data link layer and the system layer by introducing a friendly packet between the two layers. To reduce the overhead of route finding in terms of delay and power consumption we suggest that this friendly packet provides necessary information from the data-access link layer to its upper network layer. Developed an improved channel access technique at the MAC layer make it compatible to work with PDO-AODV.

3. Proposed Framework

In this section, we present our model, **ACO B**ased **E**fficient **R**outing protocol for MANET with **D**istance, **E**nergy, and **L**ink quality. The model is shown in figure 1 which consists of three main components -Trust Model, Optimal Forwarder Selection Function and Improved Pheromone Update Model.

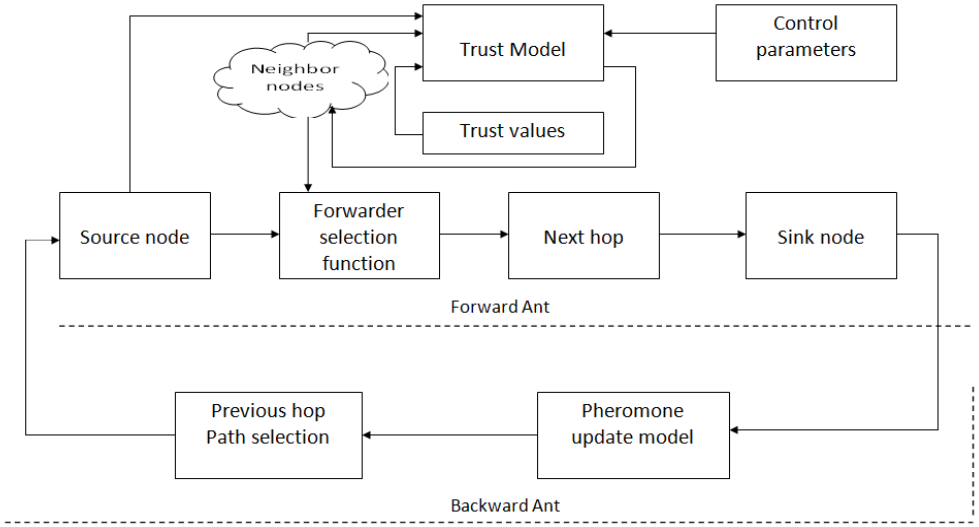

Figure 1. ACO based efficient routing framework

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3.1. Trust model

In Trust Model, nodes rate each other by using the information of their own direct interactions with their neighbors. This is termed in the literature as First-Hand Information (FHI). To make the rating unbiased, the nodes also collect their neighbors' interactions with that node being rated considered as indirect interaction. This rating information collected from the neighbors is also known as Secondhand Information (SHI). The simulation period is now divided into 'n' slots where each slot consists of two sub-periods -Forwarding and Monitoring Interval, TFMI followed by Update Interval TUPI.

3.2. Forwarder selection function

Forwarder Selection Function is a probability function that is used at every node along the path from source to sink node in the network to select the best next neighbor to forward the packet to the sink node. The Forwarder Selection Function must always choose an optimal path from source to the sink to forward the packets with the sole objective to improve the Network Lifetime by balancing the energy among the nodes in the network to ensure that some nodes along the path do not get depleted fast and at the same time selecting good quality links along the path to guarantee that node energy is not wasted due to too frequent retransmissions.

With these objectives in mind, we have used the Forwarder Selection Function, FSF, a probability function to select the best forwarder node among the neighboring nodes of the current node, which is based on Pheromone Trail (PT) and heuristic function involving two parts representing Node Energy level (EN) and node link quality (LP) functions. Pheromone Trail (PT) represents the concentration of pheromone deposited on the path between the nodes considering Energy, distance and link quality along the path (containing the link between current and neighboring nodes) from source to destination. In other words, higher PT represents the better good quality path from source node to the destination in terms of energy, distance and link quality. Node Energy (EN) function represents energy level of the neighbor node and Link quality (LP) function represents the quality of the link between the current node and the neighbor node under consideration.

The Forwarder Selection Function is a probability function which must always choose an optimal path from source to the sink to forward the packets with multiple objectives:

- To provide a secure trustworthy path from source to sink by avoiding insider attacks,
- To improve the Network Lifetime by balancing the energy among the nodes in the network to ensure that some nodes along the path do not get depleted fast (resulting in Network disconnections or partitioning)
- At the same time selecting good quality links along the path to guarantee that node energy is not wasted due to too frequent retransmissions.
- Further, selection of shorter paths involving less number of nodes resulting in further saving of energy due to less number of nodes participating in packet forwarding.

Forwarder Selection Function, FSF (n_i, n_j) to select the best forwarder node n_j among the neighboring nodes of the current node n_i can be defined as

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FSF (n_i, n_j) =

$$\begin{Bmatrix} \frac{[PT(n_i,n_j)]^{\alpha}[EN(n_j)]^{\beta}[LP(n_i,n_j)]^{\gamma}[TR(n_i,n_j)]^{\delta}}{\sum n_j \in NBS(n_i)[PT(n_i,n_j)]^{\alpha}[EN(n_j)]^{\beta}[LP(n_i,n_j)]^{\gamma}[TR(n_i,n_j)]^{\delta}} & if\ n_j \in NBS(n_i) \\ 0 & otherwise \end{Bmatrix} \quad (1)$$

Where NBS (n_i) represents the set of neighboring nodes of n_i, PT (n_i,n_j) represents the concentration of pheromone deposited onthe path between the nodes n_i and n_j, EN (n_j) represents the energy level of the neighbor node n_i. TR (n_i,n_i) represents the Trust rating of the neighbor node n_j as given by node n_i.

LP (n_i, n_j) represents the quality of the link between nodes n_i and n_j, i.e., link probability. The Expected Transmission Count, ETX is a measurement of the transmission link which is calculated based on the past events occurred on that link.

Then the link probability LP (n_i, n_j) between nodes n_i and n_j is given by the expression:

$$\text{LP}(n_i, n_j) = \frac{1}{\text{ETX}(n_i,n_j)} \quad (2)$$

α, β, γ, δ are the parameters to control the significance or importance of pheromone trail of the path, node energy level, link quality between nodes and node trust rating.

When α= β =γ = δ =1, all four parameters PT, EN, LP, TR are given equal importance in the selection of the forwarder node. If one is interested in giving higher importance to TR, node trust rating, then one could make α=β =γ =2,δ =1, similarly α=2, β =1,γ =δ =2 to raise importance of EN, Node Energy Level, α=2, β =δ=2,γ =1 to make importance of link quality more significant in the selection of forwarder node.

Let EI (n_j) be the initial energy of node n_j and ER (n_j) be the Remaining (Actual) Energy of node n_j, then the Node Energy level, EN (n_j) is defined as

$$EN(n_j) = \frac{ER(n_j)}{EI(n_j} \ Where\ ER(n_j) > E_{th} \quad (3)$$

3.3. Pheromone Model

It has been observed that the amount of pheromone computed to be placed on the path during return journey is not proper to reflect that path as the optimal during the simulation period. Strongest path should have largest amount of pheromone whereas weakest path should have least amount of pheromone or almost zero. Among the competing stronger paths for selection, the variations in pheromone concentration should be such that always strongest path is selected. Keeping these in mind, pheromone update model has been designed considering the parameters the forward ant has collected during its travel from source to the destination. Once the forward ant reaches the destination, the following parameters collected by the forward ant are analyzed.

4. Result and Discussion

Our experiments are conducted using the NS-2.34 simulator. We conduct the experiments in two steps. The initial step is to check the viability of our plan, and then deeper study is investigation is done to assess the delay and throughput in more detail. In

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the first step, there are 40 mobile nodes in the network, and communication starts from source to destination. Here hop to hop communication occurs and we can calculate the distance based on position of an individual node. The individual communication between user to user, numbers of data flows measured. Here we can know the transmission rate of every node based on pheromone values. In our work, we can maintain power and delay for individual nodes and finding the optimal path for selection of a routing. The connections among mobile nodes are UDP connections, and we send CBR (Constant Bit Rate) traffic in each communication channel. The CBR rate of the connections is 512Kb/s. The size of the scenario field is 1500m x 1500m. The routing protocol we use is a revised AODV routing protocol that integrates our ACO-DAEE, PDO-AODV methods.

Table II. Simulation parameters

PARAMETER	VALUE
Application traffic	CBR
Transmission rate	5 packets/sec
Radio range	250m
Packet size	1000 bytes
Channel data rate	2Mbps
Maximum speed	20m/s
Simulation time	10secs
Number of nodes	40
Area	1500x1500
Routing protocol	AODV
Routing methods	PDO-AODV, ACO-DAEE

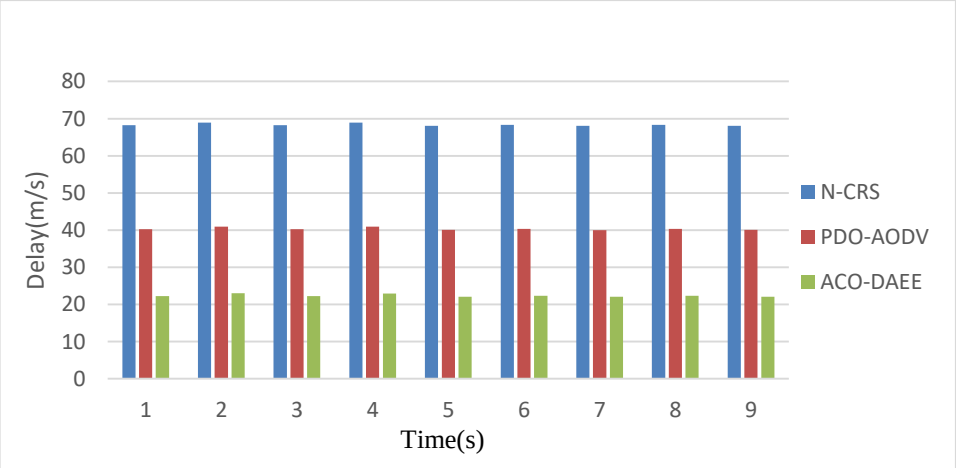

Figure 2. Network Routing delay

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The above graph represents the delay time in network, and it depends on time to vary the output. It depends on number of packets travelling and delivered as per process. Here each packet travelling time based on that delay time measured. The performance of the ACO-DAEE decrease the delay time in network compare to PDO-AODV method and Cross Layer Power Control method.

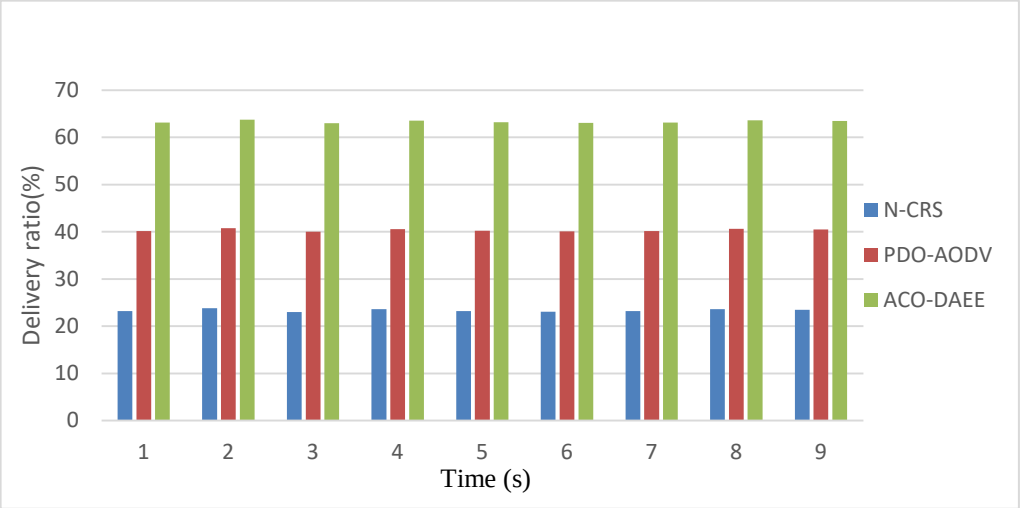

Figure 3. Packet delivery ratio

Figure 3 represents packet delivery ratio performance, which depends on time to vary the output also depends on number of packets travelling and delivered as per process. The performance of the ACO-DAEE improves the delivery ratio compare to PDO-AODV method and Cross Layer Power Control method.

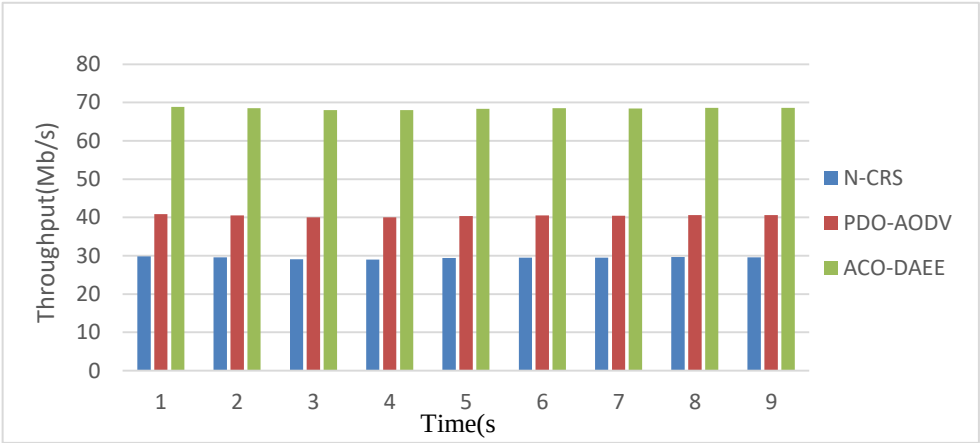

Figure 4. Network performance

Performance of throughput is demonstrated in Figure 4, where it depends on time to vary the output. The performance of the ACO-DAEE improves the throughput compare to PDO-AODV with DDOS attack algorithm and Cross Layer Power Control method.

5. Conclusion

This article inspected the issue of power efficiency, node selection and unfair load balancing for mobile ad-hoc networks using an interaction based cross layer mechanism. They focused on optimizing link cost based on power and delay metric to mitigate this severe issue restoring precious network resources. In addition to this we have used a

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friendship-based handshaking utility as a cross layer approach between data link layer and network layer to accelerate the routing layer process. Here collection of data and delay on routing more so we proposed ACO (ant colony optimization) with delay aware energy efficient method. This protocol solves the resource constraint problem of ad-hoc network and the simulation study shows that it shows better performance than other leading MANET protocols based on similar cross layer approach. We also conducted simulation by using NS2 and exploratory outcomes demonstrate that our ACO-DAEE is practical for the discriminate delay aware nodes and improve the performance ratio in network.

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A Novel, Distributed, and Reliable Search Policy for Unstructured Peer-to-Peer Networks

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Abstract

Finding a document or resource in an unstructured peer-to-peer network can be an exceedingly difficult problem. In this paper we propose a query routing approach that accounts for arbitrary overlay topologies, nodes with heterogeneous processing capacity, e.g., reflecting their degree of altruism, and heterogenous class-based likelihoods of query resolution at nodes which may reflect query loads and the manner in which files/resources are distributed across the network. The approach is shown to be stabilize the query load subject to a grade of service constraint, i.e., a guarantee that queries' routes meet pre-specified class-based bounds on their associated a priori probability of query resolution. An explicit characterization of the capacity region for such systems is given and numerically compared to that associated with random walk-based searches. Simulation results further show the performance benefits, in terms of mean delay, of the proposed approach. Additional aspects associated with reducing complexity, estimating parameters, and adaptation to class-based query resolution probabilities and traffic loads are studied.

Keywords: *P2P network, Query routing and Capacity region*

1. Introduction

Peer-to-Peer (P2P) systems continue to find increasing and diverse uses as a distributed, scalable and robust framework to deliver services, e.g., file sharing, video streaming, expert/advice sharing, sensor networks, databases, etc. One of the basic functions of such systems is that of efficiently resolving queries or discovering files/resources. This is the problem addressed in this paper. There is a considerable body of work exploring the design of efficient search/routing mechanisms in structured and unstructured P2P networks, see e.g.,[1]–[10]. In structured networks, peers/files/resources are organized to form overlays with specific topologies and properties. Search mechanisms that perform name resolution based on distributed hash table (DHT) coordinate systems can be devised to achieve good forwarding-delay properties, see e.g.,[2]. In such systems, the query traffic may depend on how keys are assigned. So, load balancing requires proactive/reactive assignments of keys to peers and data/service objects, e.g., [11], and possibly exploiting network hierarchies [10]. Fundamentally, in such networks the difficulty of search/discovery is shifted to that of maintaining the structural invariants required to achieve efficient query resolution particularly in dynamic settings with peer/content churn or when reactive load balancing is required. Unstructured networks, by contrast, are easier to setup and maintain, but their mostly *ad hoc* overlay topologies make realizing efficient searches challenging. In a purely unstructured P2P network, a node only knows its overlay neighbors. With such limited information, search techniques for unstructured networks have mostly been based on limited-scope flooding, simulated random walks, and their variants [3]–[5]. Much research in this area has focused on evaluating these search techniques based on the contact time, i.e., number of hops required to find the target, using the spectral theory of Markov chains on (random) graphs, see e.g., [4]–[6].

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Unfortunately, in heterogenous settings where service capacity or resolution likelihoods vary across peers, such search techniques perform poorly under high query loads. The inefficiencies of purely unstructured networks can be partially addressed by hybrid P2P systems, e.g., Fast Track and Gnutella2. Such systems use a simple two-level hierarchy where some peers serve as 'super-peers.' These are high degree nodes which are well connected to other super-peers and to a set of subordinate nodes in a hub-and-spoke manner [12]. Though such systems have advantages in terms of scalability, proposed search techniques are still based on variants of flooding and random walks. The work of [7] proposes an approach where peers cache the outcomes of past queries as informed by reverse-path forwarding. The idea is to learn, from past experience, the best way to forward certain classes of queries, i.e., to intelligently "bias" their forwarding decisions by correlating classes of queries with neighbors who can best resolve them. This approach involves considerable overhead, is not load sensitive, and has not yet given guarantees on performance. Although, as will be clear in the sequel, our results are not exclusive to hybrid P2P networks, these will serve as the focus of the paper. We assume that each super-peer contributes a possibly heterogenous amount of processing resource for resolving queries for the network—incentives for doing so are outside of the scope of this paper, see e.g., [8], [9]. Super-peers serve their subordinates by resolving queries or forwarding them to other super-peers. Super-peers can resolve queries by checking the files/resources they have, as well as those of their subordinate community. In our approach we also introduce a notion of query classes. These might, for example, represent types of content, such as music, films, animations, documents, or some other classification of files/resources relevant to the application at hand. The idea is that such a grouping of queries into classes can be used as a low overhead approach to make useful inferences on how to relay queries. Given a hybrid P2P topology and query classification, we propose a novel query resolution mechanism which stabilizes the system for all query loads within a 'capacity region', i.e., the set of loads for which stability is feasible. Essentially, our policy is a biased random walk where forwarding decision for each query is based on instantaneous query loads at super-peers. To balance the load across heterogeneous super-peers, the policy aims at reducing the differential backlog at neighboring super-peers, while taking into account the class and history information to improve the query's resolvability. Our policy draws upon standard backpressure routing algorithm, which is used to achieve stability in packet switching networks, e.g., see [13], [14].

In previously studied backpressure-based systems, the goal is to deliver packets to the corresponding destinations. By contrast, our aim is to provide a grade of service in resolving queries with no fixed destinations. The random nature of the location of query resolution in the network leads us to deal with expected queue backlog instead of current queue backlog. Further, in P2P systems, the probability of resolution of a query at a given node depends on the query's history, i.e., the path that led it to the current node. These characteristics of P2P systems are not captured in previous works on backpressure by Tassiulas and Ephremides [13] and the subsequent enhancements, see e.g., [14]–[21]. To summarize, our approach differs from standard work on backpressure in that we incorporate the following different issues that arise in P2P search: (a) we model the uncertainty in the locations where a query may be resolved depending upon where the file/object of interest are placed, (b) we guarantee a grade of service to each query under such uncertainties, (c) we incorporate the information about a query's resolvability available through the knowledge of its history

2. Existing System

- In a purely unstructured P2P network, a node only knows its overlay neighbors. With such limited information, search techniques for unstructured networks have

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mostly been based on limited-scope flooding, simulated random walks, and their variants.

- Much research in this area has focused on evaluating these search techniques based on the contact time, i.e., number of hops required to find the target, using the spectral theory of Markov chains on (random) graphs, see e.g., Unfortunately in heterogenous settings where service capacity or resolution likelihoods vary across peers, such search techniques perform poorly under high query loads.
- The inefficiencies of purely unstructured networks can be partially addressed by hybrid P2P systems, e.g., FastTrack and Gnutella2.

Disadvantages

- In structured networks the difficulty of search/discovery is shifted to that of maintaining the structural invariants required to achieve efficiency.
- In query resolution particularly in dynamic settings with peer/content churn or when reactive load balancing is required.
- Standard backpressure-based routing our policies suffer from a major drawback: each node needs to share the state of its potentially large number of non-empty queues with its neighbors.
- Complexity problem will be also raised.

3. Proposed System

Given a hybrid P2P topology and query classification, we propose a novel query resolution mechanism which stabilizes the system for all query loads within a 'capacity region', i.e., the set of loads for which stability is feasible. Essentially, our policy is a biased random walk where forwarding decision for each query is based on instantaneous query loads at super-peers. To balance the load across heterogeneous super-peers, the policy aims at reducing the differential backlog at neighboring super-peers, while taking into account the class and history information to improve the query's resolvability. Our policy draws upon standard backpressure routing algorithm, which is used to achieve stability in packet switching networks. Further, proposed a query forwarding mechanism for unstructured (hybrid) P2P networks with the following properties. It dynamically accounts for heterogeneity in super-peer's 'service rate,' reflecting their altruism, and query loads across the network. To the best of our knowledge, this is the first work to rigorously account for such heterogeneity in devising a search mechanism for P2P networks. It is based on classifying queries into classes. This classification serves as a type of name aggregation, which enables nodes to infer the likelihoods of resolving class queries, which, in turn, are used in learning how to forward queries. Our approach is fully distributed in that it involves information sharing only amongst neighbors, and achieves stability subject to a Grade of Service (GoS) constraint on query resolution. The GoS constraint corresponds to guaranteeing that each query class follows a route over which it has a reasonable 'chance' of being resolved. We provide and evaluate several interesting variations on our stable mechanism that help significantly improve the delay performance, and further reduce the complexity making it amenable to implementation.

Resource discovery is a challenging issue in unstructured peer-to-peer networks. Blind search methods including flooding and random walks, are the two typical algorithms used in such systems. Blind flooding is not scalable because of its high communication cost. On the other hand, the performance of random walks approaches largely depends on the random choice of walks. Some informed mechanisms use additional information, usually obtained from exciting queries, for routing. Such approaches can reduce the traffic overhead, but they limit the query coverage. We propose a simple index scheme to enhance search in unstructured P2P network. The index scheme uses a data structure

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"Bloom Filters" to index files shared at each node, arid then gossip to one another to change their Bloom filters. In effect, each node indexes a random set of files in the network, thereby lowing every query to have a constant to be successfully resolved within search space. We propose two schemes which can be used to improve the search performance in unstructured peer-to-peer networks. The first one is a simple caching mechanism based on resource descriptions. Peers that offer resources send periodic advertisement messages. These messages are stored into a cache and are used for routing requests. The second scheme is a dynamic Time-To-Live (TTL) enabling messages to break their horizon. Additional aspects associated with reducing complexity, estimating parameters, and adaptation to class-based query resolution probabilities and traffic loads are studied.

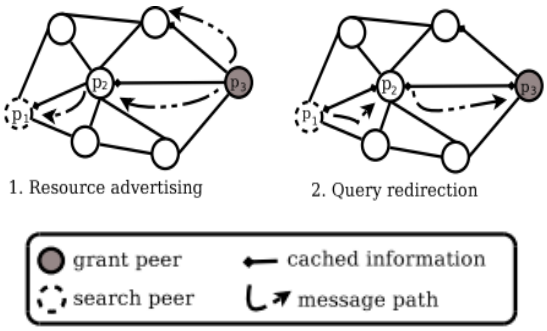
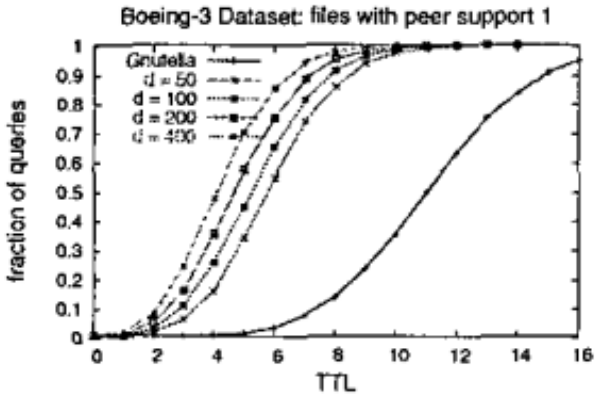


Figure 1. The basic operations of routing approach

Advantages

1. A simple but efficient cache system based on resource description.
2. A cache-based routing scheme aiming at forwarding messages towards resource location.
3. A dynamic TTL which enables messages to break their horizon when necessary while still maintaining a low overhead.
4. A set of schemes which can be used to improve the performance of existing search protocols based on caching and TTL.

Performance of Surrogate Queries to study how many queries should he reissued in the "Surrogate Queries" algorithm. The setting is similar to the previous one. Note that security is treated as a separate issue in the paper. Because peers are quite autonomous, all peer-to-peer networks are vulnerable to various security attacks, e.g., a peer responds with a 'poisoned' file, or blocks queries and fakes search results.



4. Conclusion

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To summarize, we provided a novel, distributed, and reliable search policy for unstructured peer-to-peer networks with super-peers. Our backpressure-based policy can provide capacity gains of as large as 68% over traditional random walk techniques. We also provided modifications to the algorithm that make it amenable to implementation.

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A PRIVACY-PRESERVING AND PROVABLE USER AUTHENTICATION SCHEME SECURING IOT DEVICES AND STRONGLY

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Abstract

Internet of Things (IoT) is a fairly disruptivetechnology with inconceivable growth,impact, and capability.We present the role of REST API in the IoT Systems and someinitial concepts of IoT, whose technology is able to record andcount everything. We as well highlight the concept ofmiddleware that connects these devices and cloud. Theappearance of new IoT applications in the cloud has broughtnew threats to security and privacy of data. Therefore it isrequired to introduce a secure IoT system which doesn't allowattackers infiltration in the network through IoT devices andalso to secure data in transit from IoT devices to cloud. Weprovide the details on how Representational State Transfer(REST) API allows to securely expose connected devices toapplications on cloud and users. In the proposed model,middleware is primarily used to expose device data throughREST and to hide details and act as an interface to the user tointeract with sensor data.

I. INTRODUCTION

The Internet of Things interconnects computer devicesintegrated in everyday objects through the Internet, allowingthem to send and receive data.There are two-fold advantages,we can empower our computers to gather information aboutsurroundings without depending on humans and by processing the information collected we can reduceextravagance, loss, and cost.The Internet of Things allowsfor interaction between the physical world and the digitalworld.The digital world interacts with the physical world viasensors and actuators. These sensors collect information that must be stored and processed. Data processing can take placeat the edge of the network or at a remote server or cloud.The storage and processing capabilities of an IoT objectare restricted by the resources available, which areconstrained due to size limitation, energy, power, andcomputational capability. So thesesystems rely on IoTmiddleware to provide needed capabilities.

A. REST for machine-to-machine connectivity and IoTAPIs allow to expose the connected device to users in asecure manner. RESTful APIs are widely being used in theodern web. Data transfer is

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usually done using JSON orXML over HTTP. It is a good model for the heterogeneoussystems. REST API makes the device information easilyavailable. They can standardize on a way to create, read,update, and delete this data. All these operations will be
input to the REST query calls. REST APIs allow to delegateand manage authorization. The API can authenticate on theserver and the server can authenticate to the API to preventtheman-in-the-middle attacks.

B. IoT Middleware architecture

One way to handle such heterogeneous applications isthat we can have a middleware platform that will become thebridge between things and applications in the cloud.Middleware packages and abstractshardware, and providesapplication programming interfaces (APIs) forcommunication, data processing, computing, privacy andsecurity.Figure 1 gives the overall picture of the role ofmiddleware in I oT.In the broad category, there are fourmain components of an IoT System – things itself, the localnetwork which can include a gateway, middleware, loud(for user access control, Business Data Analysis etc.).

II. SECURITY CHALLENGES IN IOT

IoT applications are becoming part of personal lives anddata collected is rather sensitive and private to an individual.Privacy and Security issues must be addressed in all of theseenvironments. As in the health sector, health data is highlyritical for personal privacy, therefore it should not beaccessed by an unauthorized entity.The recent voluminousDDoS attacks (October 2016) on DYN's servers thatbrought down many popular online services in the US,
letting us know what can happen when attackers are able toleverage up to 150,000 unsecure IoT devices as maliciousterminals [1]. To understand the overall approach to datasecurity, there is a need to know about the securityrequirements for all key components of IoT system i.e. IoT
devices, IoT users, Middleware/ IoT gateway,communication channel, and cloud applications.

A. Security Challenges in Constrained IoT DevicesIoT systems are made of resource-constrained devices.

• Public key infrastructure is not suitable for IoTenvironments as it becomes a computationallyexpensive task to calculate cipher text because of thelarge key size.

• Once the system is compromised, it is difficult toupdate it. In addition, shutting down a potentiallycompromised systems, reinstalling or restartingsoftware, or replacing components or subsystems isnot suitable for multiple IoT systems, as this can alsoresult in severe business loss and disruption. It isalso impractical and infeasible to use a securefirewall for IoT devices. [2].

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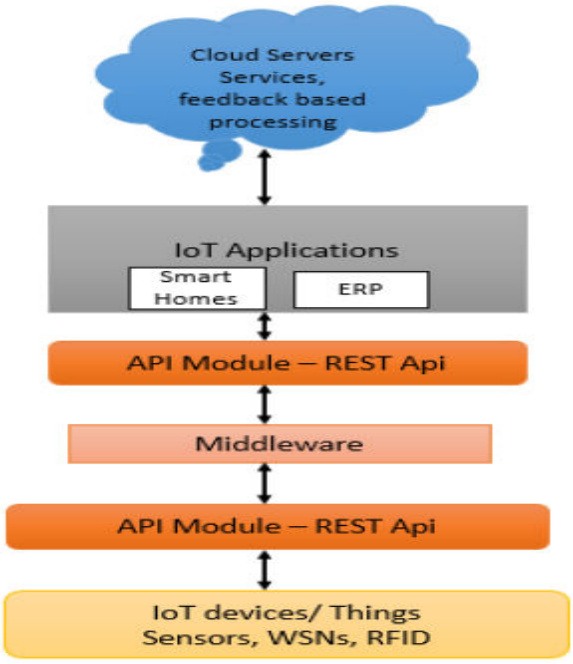

Figure 1: IoT Middleware Architecture

B. Need for Trusted Devices

IoT middleware needs to manage a trust relationship withdevices so that these devices can be authenticated andauthorized to share data. It needs to enforce authenticationprior to communication with any device enabling proof ofthe origin of data. These devices are assigned uniqueidentitiesthat disallow the reuse of security credentials acrossdevices.

C. Connecting IoT devices to Middleware.

There is a requirement to connect a large number ofheterogeneous smart devices like connected cars, connectedwearable, smart cities etc. IoT devices are typicallyconnected to the Internet through an IP stack. This stack nowhas its own complexity and requires a lot of power and
memory from connected devices.

D. Security of Communication channel.

IoT Data needs to be secured while at rest as well aswhile in transit to ensure data integrity. Security solutionsare implemented in a way to detect unwanted intrusions andprevent malicious attacks on the communication layer. Alsosecuring against attacks like Replay attacks, offline id
guessing attacks, unauthorized login, user anonymity, andsensor node anonymity.Figure 2 gives an overview ofsecurity requirements for different pillars of IoT system.

III. RELATED WORK

There are multiple solutions available to cater to differentsecurity requirements of an IoT System. The first andforemost requirement is mutual authentication between theIoT device and gateway within the resource-constrainedenvironment of IoT System.Recently, many authentication schemes for IoT havebeen proposed. In [3], the author suggested arobustanonymity preserving authentication protocol for IoTdevicesthat provides mutual authentication between tag andreader through the server. This scheme uses Elliptic CurveCryptography (ECC) to implement authentication.It is already established that ECC based cryptographicalgorithms are secure. The security of ECC relies on thedifficulty of solving these two problems:-

• Elliptic Curve Discrete Logarithm (ECDL)problem: Let E be an Elliptic curve over a finite
field. Let P and Q be the points in Zq (modulo q). Its difficult to compute the special integer α belongstoZq satisfying Q = α P.

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• Elliptic Curve DecisionalDiffie-Hellman (ECDDH)problem: aP, bP, and cP are three points in G. It ishard to verify if abP = cP.As a method to provide the user the access of sensor or
sensor data, the user is usually authenticated through thegateway. There will be mainly three parties: the user,gateway, and sensor. In [4] the authors proposes a verifiable,provable and privacy preserving user authentication schemefor wireless sensor networks (WSN). Authors point out thattheHsieh and Leu's scheme [13] is not secure because of itsseveral security shortcomings including Insider attack, offlinepassword guessing attack, user forgery attack, and
sensor capture attack. For WSN, a new two-factorauthentication scheme also based on ECC is presented. Thisscheme meets the authorization, confidentiality and integrityproperty for IoT security.Different multi-factor authentication schemes aresuggested for user authentication. Different factors likepasswords, biometrics, and smartcards are used together foridentity authentication mechanism. Like in [5], a three factorauthentication scheme for WSN was proposed (2018). Thethree factors are password, smartcards and fingerprintdentification. Here Gateway is supposed to be a trustedparticipant and bridge between user and sensor. This scheme
successfully register a user and sensor on the gateway,authenticate the user to access sensor andprovides passwordchanging facility tothe user.

Researchers have also proposed some ultra-lightweightauthentication schemes which only involve simple bit-wiseoperations (like XOR, AND, OR, etc.) on tags. Therefore, itis very efficient in terms of storage and communication cost[6].
Razouket. al. suggested a new Security MiddlewareArchitecture based on Fog Computing and Cloud to supportresource constrained devicesfor authentication [7]. IoTconstrained devices communicate through proposedmiddleware which provides access to more computing power
and enhanced capability to perform secure communications.This model is based on usual technologies like the"Constrained Application Protocol (CoAP)" and REST APIfor easy implementation.

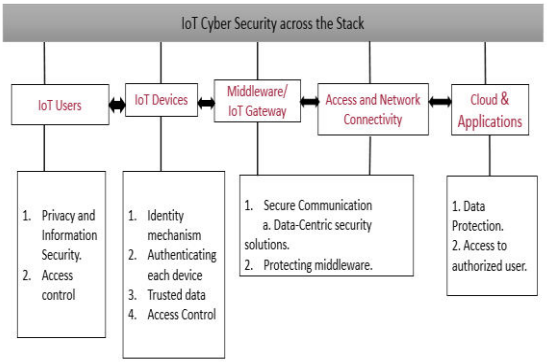

Figure 2: Security Model for IoT System.

IV. PROPOSED MODEL

IoT devices typically connect to the Internet via anInternet Protocol (IP) stack. This stack is very complex andrequires a lot of power and memory from the connecting IoTdevices.In the proposed model IoT devices are connectedlocally through non-IP networks and are connected to theInternet through anintelligentgateway. This gateway

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act as aninterface to the internet for the IoT devices. Because of thesmart gateway devices can be hidden in enterprise behindmultiple firewalls and will not require any inbound ports.The proposed solution provides a middlewarearchitecture that is able to adapt according to applicationrequirements. Middleware is responsible for deviceregistration, identification and database management. It alsoensures the privacy and security of data. The stored data isexposed after authentication and authorization via RESTAPI. Figure 5 summarizes the overall scenario.There are many authorization protocols available. Forexample, OAuth is an open authorization protocol which canallow accessing the resource at middleware using username,password, and tokens. Figure 3 and 4 explainthe architectureto achieve this onboard flow.

Step 1:- Device Registration requires an Authorized userho already has created an online account throughmiddleware.

Step 2:- Whenever an authentication request comes from theIoT device, gateway validates the devices request includingthe device payload by accessing the exposed REST API.Now the gateway will in turn request access to exposed APIwith its own credentials. The request will contain gateway idand secret key as input parameters. The API will bothauthenticate and authorize the gateway and will validate therequest. All methods in REST API requires authentication.

Once the gateway is authorized, a response in an encryptedform containing device details is sent back to the gateway.Now after verifying, gateway gives the access token to thedevice and device can now send real-time data to thegateway.

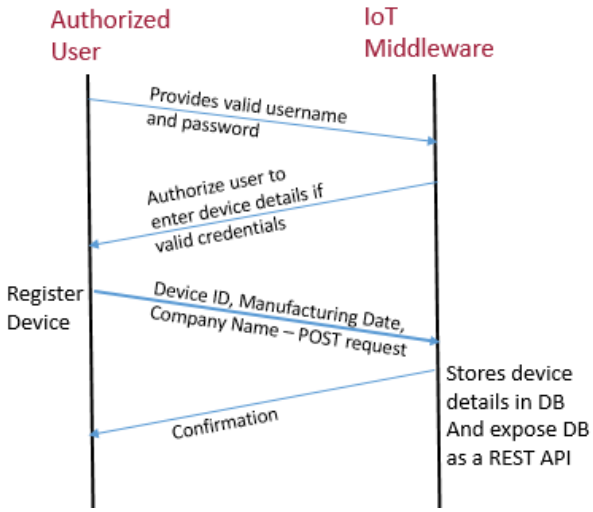

Figure 3: Device Registration

ANALYSIS OF PROPOSED MODEL

In this paper, we proposed a secure IoT framework thatensures end-to-end security from IoT application to IoTDevices. We can evaluate the security of the system byanalyzing the integrity of each component.

• IoT devices are isolated and have no interactionwith the outside world. They are connected to agateway and this gateway act as an interface to theinternet for the IoT devices. Because of the smartgateway devices can be hidden in enterprise behindmultiple firewalls and will not require any inboundports. Therefore there are no chances ofcompromising these devices by an attacker.

• IoT gateway acts an intermediate between IoTdevices and middleware. Gateways are

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enabled tocall REST API and exchange all informationsecurely.

• Communication between IoT gateway andmiddleware is secure with traditional cryptographic
algorithms. There is no need to use lightweightalgorithms because the two parties involved are notresource constrained.

• Authentication and Authorization is taken care byREST APIs which makes the whole process lesscomplex and compatible with industry standards.

```
$.ajax({
        type: "POST",
    url:  "http://localhost:8080/test/webresources
/com.mycompany.test.devicedetails",
    data: JSON.stringify({
    deviceidentifier : self.newDeviceId(),
    devicemanufacturingdate : self.newMDate(),
    uid : self.newUid()
          }),
    headers: {
    'Content-Type': 'application/json'
          },
    success: function() {
              console.log(data);
          },
    error: function(err) {
              console.log("AJAX Error: " + err);
          }
        });
```

CONCLUSION

We proposeda middleware architecture which providesan end-to-end security solution for contributors who uploadsensing data. This approach allows an end to end encryptionof data to secure data in transit. In the proposed middlewaresolution all IoT system constraints are taken intoconsideration. REST API is used for communication anddata exchange. Middleware successfully assists IoTdevelopment by exposing REST API and providing aninterface to the user to register their IoT devices and thensecurely accessing data collected by the device.

FUTURE SCOPE

Our future plan is to provide a multi-factor userauthentication scheme at middleware to provide secureaccess to sensory data to an authorized user. Also to providea privacy solution to prevent any data leakage and databreaches at middleware.

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A Probabilistic and Dual Node failure Detection System in Mobile Wireless Networks

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Abstract

Detecting node failures in mobile wireless networks is incredibly challenging because the network topology can be highly dynamic, the network may not be always connected, and the resources are limited. In this paper, we take a probabilistic approach and propose two node failure detection schemes that systematically combine localized monitoring, location estimation and node collaboration. Extensive simulation results in both connected and disconnected networks demonstrate that our schemes achieve high failure detection rates (close to an upper bound) and low false positive rates and incur low communication overhead. Compared to approaches that use centralized monitoring, our approach has up to 80 percent lower communication overhead, and only slightly lower detection rates and slightly higher false positive rates. In addition, our approach has the advantage that it is applicable to both connected and disconnected networks while centralized monitoring is only applicable to connected networks. Compared to other approaches that use localized monitoring, our approach has similar failure detection rates, up to 57 percent lower communication overhead and much lower false positive rates (e.g., 0.01 versus 0.27 in some settings).

Keywords: *Wireless sensor networks, node estimation, two-node failure detection*

1. Introduction

Mobile wireless networks have been used for many mission critical applications, including search and rescue [17], environment monitoring [11], [20], disaster relief [25], and military operations [18]. Such mobile networks are typically formed in an ad-hoc manner, with either persistent or intermittent network connectivity. Nodes in such networks are vulnerable to failures due to battery drainage, hardware defects or a harsh environment. Detecting node failures is important for keeping tabs on the network. It is even more important when the mobile devices are carried by humans and are used as the main/only communication mechanism (see discussion in Section III). Node failure detection in mobile wireless networks is very challenging because the network topology can be highly dynamic due to node movements. Therefore, techniques that are designed for static networks are not applicable. Secondly, the network may not always be connected. Therefore, approaches that rely on network connectivity have limited applicability. Thirdly, the limited resources (computation, communication, and battery life) demand that node failure detection must be performed in a resource conserving manner. One approach adopted by many existing studies is based on centralized monitoring. It requires that each node send periodic “heartbeat” messages to a central monitor, which uses the lack of heartbeat messages from a node (after a certain timeout) as an indicator of node failure [5], [12], [19]. This approach assumes that there always

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exists a path from a node to the central monitor, and hence is only applicable to networks with persistent connectivity. In addition, since a node can be multiple hops away from the central monitor, this approach can lead to a large amount of network-wide traffic, in conflict with the constrained resources in mobile wireless networks. Another approach is based on localized monitoring, where nodes broadcast heartbeat messages to their one-hop neighbors and nodes in a neighborhood monitor each other through heartbeat messages. Localized monitoring only generates localized traffic and has been used successfully for node failure detection in static networks [15].

However, when being applied to mobile networks, this approach suffers from inherent ambiguities—when a node A stops hearing heartbeat messages from another node B, A cannot conclude that B has failed because the lack of heartbeat messages might be caused by node B having moved out of range instead of node failure. In this paper, we propose a novel probabilistic approach that judiciously combines localized monitoring, location estimation and node collaboration to detect node failures in mobile wireless networks. Specifically, we propose two schemes. In the first scheme, when a node A cannot hear from a neighboring node B, it uses its own information about B and binary feedback from its neighbors to decide whether B has failed or not. In the second scheme, A gathers information from its neighbors, and uses the information jointly to make the decision (see Section V for details). The first scheme incurs lower communication overhead than the second scheme. On the other hand, the second scheme fully utilizes information from the neighbors and can achieve better performance in failure detection and false positive rates. We have evaluated our schemes using extensive simulation in both connected and disconnected networks (i.e., networks that lack contemporaneous end-to-end paths). Simulation results demonstrate that both schemes achieve high failure detection rates, low false positive rates, and incur low centralized monitoring, while our approach may have slightly lower detection rates and slightly higher false positive rates, it has significantly lower communication overhead (up to 80% mlower). In addition, our approach has the advantage that it is applicable to both connected and disconnected networks. Compared to other approaches that use localized monitoring, our approach has similar failure detection rates, lower communication overhead (up to 57% lower) and much lower false positive rate (e.g., 0.01 versus 0.27 in some setting).

2. Existing System

Mobile wireless networks have been used for many mission critical applications, including search and rescue, environment monitoring, disaster relief, and military operations. Such mobile networks are typically formed in an ad-hoc manner, with either persistent or intermittent network connectivity. Nodes in such networks are vulnerable to failures due to battery drainage, hardware defects or a harsh environment. Detecting node failures is important for keeping tabs on the network. It is even more important when the mobile devices are carried by humans and are used as the main/only communication mechanism.

2.1. Disadvantages

1. Node failure detection in mobile wireless networks is very challenging because the network topology can be highly dynamic due to node movements. Therefore, techniques that are designed for static networks are not applicable.

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2. The network may not always be connected. Therefore, approaches that rely on network connectivity have limited applicability.
3. The limited resources (computation, communication, and battery life) demand that node failure detection must be performed in a resource conserving manner.

3. Proposed System

Our network model consists of a set of low-power radio frequency (RF) transceivers which move relative to each other across an irregular terrain subject to RF propagation impairments. The low transmitter power defines a radio coverage which limits the probability of intercept and the number of neighbors but optimizes frequency reuse. The combination of low power and propagation environment produces a network characterized by stochastic link failures.

We propose a novel scheme Link Scanner (LS) for monitoring wireless links at real time. LS issues one probe message in the network and collects hop counts of the received probe messages at sensor nodes. Based on the observation that faulty links can result in mismatch between the received hop counts and the network topology, we are able to deduce all links' status with a probabilistic model. A few distributed solutions have been proposed. In this paper for the detection of node replication attacks, We first analyze the desirable properties of a distributed mechanism. After that we show the solutions for the problem and later for detection of node replication attacks, we propose a self-healing RED protocol. Randomized, Efficient, and Distributed protocol and we see that it meets the requirements. Finally, it shows that our protocol is highly efficient in memory, communication and computation.

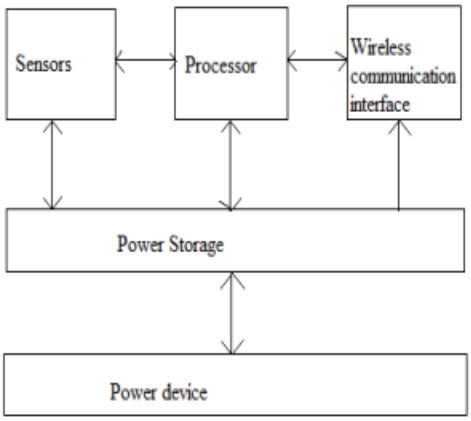

Figure. 1 Proposed network model.

3.1. Advantages

- We proposed a novel and low-cost link scanning scheme LS for faulty link detection. LS infers all links statuses on the basis of data collection from a prior probe flooding process in which we leverage hop count to reflect node in (or) out-going link performances.
- A distributed mechanism and shown the solution and later for detection of node replication attacks, to detect node replication attacks, a self-healing, efficient, and distributed protocol are proposed.

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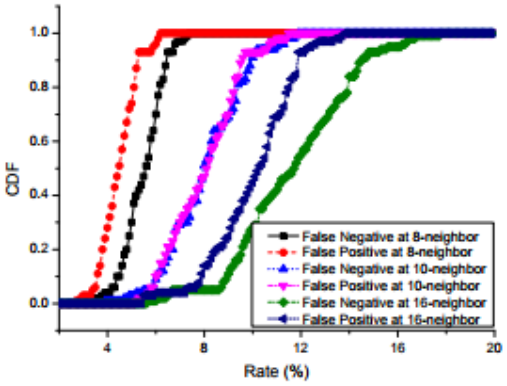
- We are investigating the efficiency and performance characteristics of survivable and adaptive network protocols with computer simulation techniques. Preliminary results will be reported on the evaluation of the algorithm in terms of message delay and acknowledgment overhead for different network sizes and routing restrictions.



Impact of network density: Network density can also significantly change the network topology. What is more, a dense network should suffer more channel collision and packet lost due to hidden terminal, thus may impact the probe flooding process and cover the real link performance. Here we define a network density in terms of average neighbor number. We show three densities in a 60-node network. Clearly, when the network is sparse LS can achieve a false negative rate about 5%, which means there is only one out of 20 normal links reported by LS is faulty in fact, while the false positive rate is only 4.8%. Following the network density increases, each node is expected to receive more probes with the same hop count number, since its neighbors are more centralized around itself. In DLV its corresponding group has a larger size, hence produces more possibilities once the number of probes mismatches the group size

4. Conclusion and Future Work

In this paper, we presented a probabilistic approach and designed two node failure detection schemes that combine localized monitoring, location estimation and node collaboration for mobile wireless networks. Extensive simulation results demonstrate that our schemes achieve high failure detection rates, low false positive rates, and low communication overhead. We further demonstrated the tradeoffs of the binary and non-binary feedback schemes.

As future work, we plan to evaluate our schemes using real world mobility traces and in scenarios with irregular transmission ranges. Our approach relies on location estimation and the usage of heartbeat messages for nodes to monitor each other. Therefore, it does not work when location information is not available or there is communication blackouts (e.g., due to weather conditions). Developing effective approaches for those scenarios is left as future work.

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A Study on Knowledge based Propagation for Query Facets

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Abstract

Important features of a query are generally presented and repeated in the top retrieved documents in the style of lists. Query facets can be extracted by collecting these significant lists. Query facets may provide direct information or instant answers that users are seeking i.e. user can select a particular facet item which he found relevant to his search need. So, the list format style is much more user friendly than displaying searches sentence wise. The scope of this survey is limited to get search results of a query in list format i.e. facets. Previously there has been lot of work done for retrieving more relevant data to users in order to meet their information needs thus improving performance of search engines. Search engine provide the platform for users to describe their information need more clearly by using query facets mining. Different approaches for extraction of query facets from web search results to assist information finding for queries are discussed along with similar techniques used earlier for information retrieval of queries. Query facets represents interesting facets of a query using groups of semantically related terms extracted from search results. This paper reviews techniques that represents interesting facets of a query using groups of semantically related terms extracted from search results along with approaches that are similar to query facets mining.

Keywords: *Query facets, Text mining, Multi- faceted queries, Knowledgebase.*

1. Introduction

Query facet is a collection of items which summarized the content of a query. In conventional method the user can browse a webpage user can view many documents for the information they are seeking, this takes a lot of time and confused the user [6]. Here use an automatic summarization of search result will produce it will help the user to know about the query they are searching without browsing many web pages. Mining query facets is an approach to solve the above-explained problem using text mining algorithms to mine the query facet. Table 1 shows an example of query facet the query is ―Beijing subway is a place in a European country. Its query facets cover aspects of related country lines temple, important city etc. These query facets help users learn about the topic―Beijing subway without browsing so many web pages. Query facets are good summaries of a query and are useful for users to understand the query and help them explore information [1]. Existing algorithm like QD Miner, QF-I, QF-J has used automatically mine query facets by aggregating frequent lists contained in the results. The facet item is extracted as a top search result from a search engine. One problem can arise by using this kind of methods the coverage of facet mined can be limited [6].

To solve this problem, use a knowledge base as a data source to improve the quality of query facet. Knowledgebase contains structured information such as entities and

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properties of the related query [6]. A text mining algorithm can be used to mine the query facet. Text mining is also known as text analytics, is the process of deriving high-quality information from text. Text mining is a process to extract interesting and significant patterns to explore knowledge from textual data sources [4]. Text mining is a multi-disciplinary field based on information retrieval, data mining, machine learning, statistics, and computational linguistics [4]. The user can search for a keyword by using the system.

Table 1. Example of query facet

Query	Beijing subway
1	Line 1, line 2, line 4, line 5, line 10, line 13, batong line
2	xizhimen, jianguomen, dongzhimen chongwenmen
3	Forbidden city, the temple of heaven, Tiananmen square

Then the URL of the search result is retrieved from the web and finally view the summarised search result and the user can download the search result. There are two methods are used to construct the final facet namely Facet Generation and Facet Expansion.

2. Query Facets Mining

2.1. Query Reformulation

The reformulation process is an iterative attempt between users and search engines in getting a satisfactory set of results [4]. Query reformulation is the process of iteratively modifying a query to improve the quality of a search engine results. Reformulations are close to the previous query both syntactically, as sequences of characters or terms, and semantically, regularly involving clear naming conventions [5]. Herdagdelen. et. al. [5] proposed an approach to query reformulation that provide a principled framework for the combination of string similarity and corpus-based semantic association measures using generalized Levenshtein distance algorithms. An exploration of class of models viz. unsupervised, compact and efficient for query reformulation which combines the syntactic and semantic aspects are given. Huang et.al. [4] studied users reformulation strategies in the context of the AOL query logs and describes the human side of query reformulation. A taxonomy of query reformulation strategies is created and built a high precision rule-based classifier to detect each type of reformulation.

2.2. Entity Search

Entity retrieval is the task of finding objects related to an information need [10]. Balog et. al. [10] explore the potential of combining Information Retrieval (IR) with Semantic Web (SW) technologies to improve the end-to- end performance on a specific entity search task. To get the best of both worlds, Balog et. al. [10] proposed to combine text- based entity models with semantic information from the Linked Open Data (LOD) cloud. Approaches to the REF task are described using IR and SW techniques and aim to find a set of entities for each topic. Semantic class construction tries to discover the peer or sibling relationship among terms or phrases by organizing them into semantic classes. Zhang et.al. [11] presented an approach that employs topic modelling for semantic class construction. Given a query q, all raw semantic classes (RASCs) are

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retrieved containing the item to form a collection CR (q) where CR is collection of RASCs. Latent Dirichlet Allocation (LDA) model and probabilistic Latent Semantic Indexing Model (pLSI) are used to generate semantic classes. Offline processing is performed for CR (q) that contains RASCs and store the results on disk, in order to reduce the online query processing time.

2.3. Search Results Diversification

It has been studied as a method that deals with ambiguous or multi-faceted queries while a ranked list of documents remains the primary output feature of web search engine today. Search result diversification tries to diversify the ranked list to account for different search target or query subtopics. A weakness of search result diversification is that the query subtopics are hidden from the user, leaving him or her to guess at how the results are organized. Query facet extraction addresses this problem by explicitly presenting different facets of a queries using groups of coordinate terms. T. Sakai et.al. [15] compare the properties of existing metrics related to the points viz. queries may have multiple intents, the likelihood of each intent given a query is available and graded relevance assessments are available for each intent. Also compared a wide range of traditional and diversified IR metrics for search results diversification after adding graded relevance assessments.

2.4. Facets Extraction according to Data Types

Existing automatic facets extraction methods can be divided into three categories corresponding to the different data types: unstructured, semi- structured and structured. They are explained below.

2.4.1. Facet Extraction of Unstructured Data

Unstructured data refers to information that either does not have a pre-defined data model or is not organized in a predefined manner. Unstructured information is typically text heavy, but may contain data such as dates, numbers, and facts as well. In facet term extraction, the most common form of unstructured data is the natural language text, which is always ambiguous and ill-formed.

2.4.2. Facet Extraction of Semi-structured Data

Semi-structured data is a form of structured data that does not match with the formal structure of data models associated with relational databases or other forms of data tables i.e. does not conform to an explicit data schema but on the other hand contains tags or other markers to separate semantically related elements. Semi-structured data lies somewhere between the structured and unstructured data. Examples of the semi-structured data include HTML pages, XML pages, JSON or JavaScript Object Notation. E.g. A Word document is generally considered to be unstructured data. It is possible to can add metadata tags in the form of keywords and other metadata that represent the document content and make it easier for that document to be found when people search for those terms , the data is now semi-structured. Semi-structured data has an implicit formal structure, which can be exploited to improve the quality of facet term extraction. For example, the hyperlinks of web pages can be used to evaluate the importance of facet terms.

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3. System Analysis

3.1. Existing System

Query facets summarize a query in different aspects. They may help users quickly understand important aspects of the query and help them explore information. Dou et al. first introduced this problem and addressed QDMiner algorithm, which first extracts frequent lists in top search results using predefined patterns, and then weights each list and group them into final facets. Like QDMiner, Kong and Allan developed supervised approaches, namely QF-I and QF-J, to mine query facets. Facet item candidates are extracted from frequent lists which are obtained in a similar way as QDMiner. Then two Bayesian models are learned to estimate how likely a candidate is a facet item and how likely two candidates belong to the same facet. All the existing works are based on top search results; hence the quality of final facets might be limited. If some words or phrases don't appear in a list within top search results, they have no opportunity to be facet items.

3.1.1. Disadvantages

- There are no efficient techniques to generate Query facets like Query Based Summarization.
- There is no option to Provide Protection on User Query facets data.

3.2. Proposed System

In the proposed system, the system proposes leveraging a knowledge base as a complementary data source to improve the quality of query facets. Knowledge bases contain high quality structured information such as entities and their properties and are especially useful when the query is related to an entity. The system also proposes using both knowledge bases and search results to mine query facets in this paper. The reason why we don't abandon search results is that search results reflect user intent and provide abundant context for facet generation and expansion. The system's target is to improve the recall of facet and facet items by utilizing entities and their properties contained in knowledge bases, and at the same time, make sure that the accuracy of facet items is not harmed too much.

3.2.1. Advantages

- Automatic Query Recommendation.
- The system is more efficient due to Query.
- Based Summarization.

3.3. Implementation

3.3.1. Admin

In this module, admin server has to login with valid username and password. After login successful he can do some operations such as View all users and authorize, View all Researchers and authorize and Add category and subcategory, View all all products details based on clusters with rank, rating, reviews and View all products details with rank, rating, reviews, View all users search transaction based on Search type and View

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all user purchased products, View all Keyword Facet by rank and give link to show in chart, View product's rank in Chart

3.3.2. User

In this module, User should register before searching the Website contents. After registration successful the user can login by using valid username and password. After Login successful the user will do some operations Manage Accounts and Query Facet Mining and Faceted Search.

1. Single Facet Query Search

Enter your keyword or keyword+cat, or keyword+cat+Sub Cat, each based on pdesc_Cat+Sub cat and display products Facet details and view details(inc rank), review, Rate, view similar products facets, purchase

2. Multiple Facet Query Search

Select Category and Subcategory and display products Facet details and view facet details(inc rank), review, Rate, view similar products facets, purchase

3.Question Type Query Search

Type some question and match any one word with cat or sub cat or pdesc and diplay products. Facet details and view details (inc rank), review, Rate, view similar products facets, purchase View all search transaction based on Search type and Enter top k value and view searched Keyword facets.

3.3.3. Researcher

In this module, Researcher should register before searching the Website contents. After registration successful the user can login by using valid username and password. After Login successful the researcher will do some operations Select category and sub category and Add products according to category and sub cat with pname, Pdesc(enc), Manufacturer name, Price, Nodel no ,Color, Add image, View all your products details with rank, rating, reviews, View all purchased your products with total bill and View all Keyword Facet by rank.

4. Conclusions

Existing query facet mining algorithms, including QDMiner, QF-I, and QF-J mainly rely on the top search results from the search engines. The coverage of facets mined using this kind of methods might be limited, because usually only a small number of results are used. We propose leveraging knowledge bases as complementary data sources. We use two methods, namely facet generation and facet expansion, to mine query facets. Facet generation directly uses properties in Freebase as candidates, while facet expansion intends to expand initial facets mined by QDMiner in property based and type-based manners. Experimental results show that our approach is effective, especially for improving the recall of facet items.

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An Efficient Framework for Secured Proxy-based Multi-cloud Computing Composition

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Abstract

Today expanding cloud computing services take great opportunities for consumers to take better service and security conveniently new challenges to select the best service reporter out of the huge pool. In the proposed system the trust value is finding with the interaction between the users and the reporter. With the help of the ratings reporter to the cloud service providers by the users trust worthiness is estimated at different level, which is determined by the present interaction and the interaction. Oriented by requirement of trust management in number of cloud environment this paper presents T-broker a trust total service brokering method for efficient matching cloud services to satisfy different user requests. Trustworthiness is computed from personal work gained in direct interactions. Competence is assessed based on transparency in provider's SLA guarantees. We proposed secured proxy-based multi-cloud computing composition take dynamic, on the- fly collaborations and resource sharing many cloud-based services, addressing trust, policy, and security models. We integrate cloud with data confidentiality and the possibility of executing concurrent operations on encrypted data The prototype is implements the proposed cloud scheduler. The trusted Scheduler component it is important to analysis clouds is managed. The Scheduler trusted input trust status of the cloud infrastructure and provides cover new properties the foundation for planned future work. Cloud Trust Management, which provides the scheduler entry in the trust status of the cloud infrastructure

Index Terms*: Scheduling, Trust Management, Resource Allocation, Trusted Computing, - Cloud Computing, Cloud Service Provider (CSP), File Upload, File Download, service level agreement, control, Transparency.*

1. Introduction

Many of today's Information Technology (IT) applications rely on access to state-of-the-art computing facilities. In response to the resulting demand for flexible computing resources, cloud computing has taken the IT industry by storm over the past few years [2]. Cloud computing emerges as a paradigm to deliver on-demand service to customers, much akin to electricity or cable television [3], [4]. The paradigm shift from IT as a product to IT as a service and the accompanying flexibility proliferate the cloud applications [5], [6]. According to [7], [8], the public cloud services market is expected to expand from $109 billion in 2012 to $207 billion by 2016. The same physical resource among several tenants Customer does not have to manage and maintain servers, and in turn, uses the resources of cloud provider as services, and is charged according to pay-as-

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you-use model. Similar to other on-line distributed systems, like e-commerce, p2p networks, product reviews, and discussion forums, a cloud provides its services over the Internet [1]. Cloud service provider provides [9] users the immediate access of a large range of resources. Cloud consumers have a wide range of choice of cloud service providers. Cloud Service Level Agreements (Cloud SLAs) are an important one for the relationship between a cloud service, customer and a cloud service provider [10] of a cloud service. The service provider must have the property like availability, response time and performance. The services and the storage space specified in the SLA are not satisfied and the trust and transparency are not maintained.

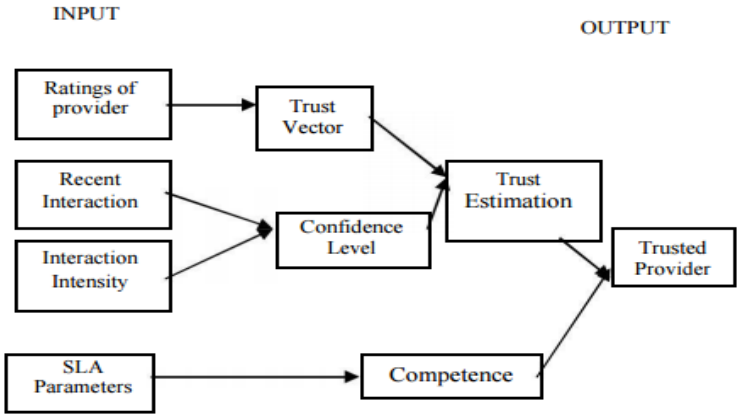

Figure 1. Trust Based System Architecture

Topical progressions in reckoning, storage service-oriented architecture, and network admission have simplified rapid growth in cloud marketplace. For any service a cloud customer may have many service providers to choose from. Major challenge lies in choosing an "ideal" service provider among them. By the term ideal, we suggest that a service provider is trustworthy as well as competent. Range of an ideal service provider is non-trivial because a customer practices third-party cloud services to serve its clients in cost-effective and efficient manner. In this situation from the cloud customer's perspective, persevering to a guaranteed level of service, as negotiated through starting service level agreement (SLA), is crucial Data loss owing to provider's incompetence or malicious intent can never be replaced by service credits.

- Support for customer-driven service management based on customer profiles and QoS requirements.
- Definition of computational risk management tactics to identify, assess and manage risks involved in the execution of applications with regards to service requirements and customer needs.
- Derivation of appropriate market-based resource management strategies that encompass both customer-driven service management and computational risk management to sustain SLA-oriented resource allocation;

2. Related Work

Decision trust is the extent to which one party is willing to depend on another even though negative consequences are possible. In cloud scenario, both notions are prevalent as customer depends on third-party provider, believing that it is reliable enough to

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produce positive utility. Some works [11], [12] have proposed computation models for trust by incorporating the concept of risk. Like trust, reputation has also been studied extensively. From the perspective of social network researchers [13], reputation is perceived as an entity which is globally visible to all members of a social network community. Trust in cloud systems is often subjective and may be calculated using a centralized or distributed approach. When using a centralized approach, a single authority or trust broker collects all ratings from consumers, computes a reputation score for every participant, and makes all scores publicly available. When using a distributed approach, there can be distributed storages where ratings can be submitted, requiring interaction between storages to compute a single trust value for a given provider. A broker-based trust model was proposed in [1] based on SLA violation and user experience where the authors exploited SLA and cloud characteristic parameters such as CPU, number of virtual machines (VMs), and service down time, for evaluating the trustworthiness of providers. This approach is also robust against malicious group of entities performing reputation-based attacks. Recently, Ghosh [14] proposed SelCSP, a risk model which enables clients to select the most reliable CSP by using trustworthiness and competence of each CSP to estimate the provider reliability. SelCSP focuses on metrics such as number of CPUs and VMs, down time and interaction. This is a review paper based on the research work done by the researcher in the field of a new environment in cloud computing i.e. the collaboration of multi-cloud. This will give an overview of the techniques which will be helpful for shifting from the single cloud architecture to multi-cloud architecture, a security model and cost effectiveness of multi-cloud compared to a cloud. This section reviews literature that has been available on cloud computing security issues and other related topics. There were many researches that focused on cloud computing security issues. For instance, in [15] multi-shares were proposed that makes use of secret sharing algorithm Single cloud environment issued in [16] to solve service availability problem. The main issue in implementing multi-cloud is its working in a distributed environment as the services are to be collaborated with different cloud service providers to make it possible a framework is laid in the research work of “Collaboration Framework for Multi-cloud Systems” which specify the use of proxies at different level of collaboration. Trust plays an important role in all commercial grid and cloud environments. It is the estimation of competence of a resource provider in completing a task based on reliability, security, capability and availability in the context of distributed environment. It enables users to select the best resources in the heterogeneous grid and cloud infrastructure. This paper introduces. A novel trust model to evaluate the grid and cloud resources by means of resource broker. The resource broker chooses appropriate grid/cloud resource in heterogeneous environment based on the requirements of user. Our proposed trust management system is implemented with Kerberos authentication and PERMIS authorization to enhance the trust of the broker itself. The proposed trust enhanced resource broker evaluates the trust value of the resources based on the identity as well as behavioral trust. The proposed model considers metrics suitable for both grid and cloud resources. The results of the experiments show that the proposed model selects the dependable and reliable resources in grid and cloud environment.

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3. System Design

User requirements are both hardware and software requirement. Infrastructure properties are availability, reliability, security, privacy concern. Users enter the cloud environment a chain of trust made consisting of username, password and provide some unique ID to enter the cloud. Scheduling perform as committing resource between possible task. Trust management implemented information security, in particular access control policies. Resource allocation are the virtual machine managed by the cloudlet length of resource management. This middleware uses a confidence conscious brokering architecture, in which the broker itself as the TTP acts for the trust management and resource planning. Cloud dispatchers do not consider the entire cloud infrastructure not look at them the entire user and infrastructure characteristics. Virtual resources are hosted using physical resources that meet their needs without getting users to understand the details of the cloud infrastructure involved. The prototype made available implements the proposed cloud scheduler. The trusted Scheduler component, it is important to understand how to have clouds, are managed. The Scheduler trusted input via the trust status of the cloud infrastructure and provides cover other properties the foundation for planned future work. Cloud Trust Management which provides the scheduler entry via the trust status of the cloud infrastructure

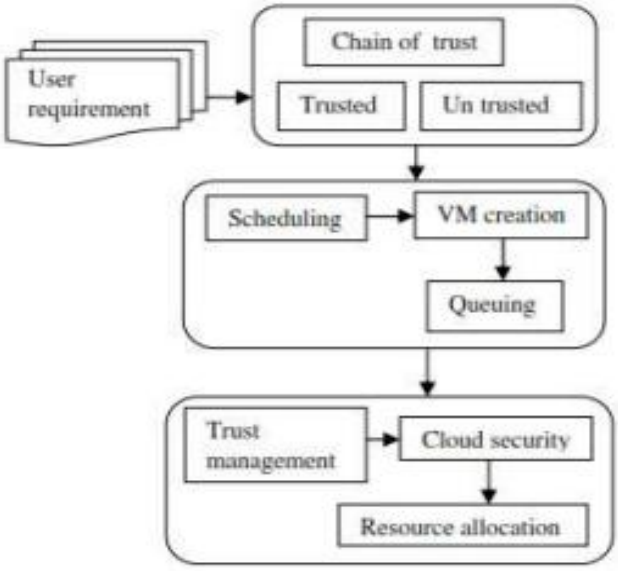

Figure 2.System Design

4. Proposed System

Independent systems dynamically come together to share information for a period of time. No global policy is maintained as interoperation requests are “on-demand” to facilitate dynamic data sharing. In a cloud environment, both tight and loose coupling may take place depending on the nature of collaboration. For example, if different departments of an organization collaborate using cloud services, it is an instance of tightly coupled collaboration. However, if autonomous domains mash-up “on demand” for a limited period of time, it is an example of loosely coupled collaboration. For both collaborations, if multiple collaboration requests are generated within the same period of time or particular session. propose a trust-aware framework to verify the security controls

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considering consumers' requirements [15]. The authors model the security controls in the form of trust properties. Then, they introduce taxonomy of these properties based on their semantics and identify the authorities who can validate the properties. The taxonomy of these properties is the basis of trust formalization in their proposed framework. Furthermore, a decision model is proposed as an integral part of the framework in order to empower consumers to determine trustworthiness of cloud providers. A trust enhanced secure model for trusted computing platforms [11]. The authors argue that given the nature of both binary and property-based attestation mechanisms, an attestation requester cannot be absolutely certain if an attesting platform will behave as it is expected to behave.

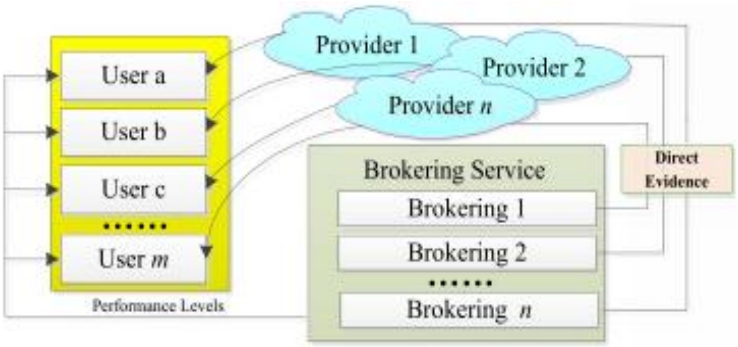

Figure 3. Scenario without user feedback

4.1. Sensor-Based Service Monitoring (SSM)

This module is used to monitor the real-time service data of allocated resources in order to guarantee the SLA (Service Level Agreement) with the users. In the interactive process, this module dynamically monitors the service parameters and is responsible for getting run-time service data. The monitored data is stored in the evidence base, which is maintained by the broker. To calculating QoS-based trustworthiness of a resource [7], [10], we mainly focus on five kinds of trusted attributes of cloud services, which consists of node spec profile, average resource usage information, average response time, average task success ratio, and the number of malicious access. The node spec profile includes four trusted evidences: CPU frequency, memory size, hard disk capacity and network bandwidth. The average resource usage information consists of the current CPU utilization rate, current memory utilization rate, current hard disk utilization rate and current bandwidth utilization rate. The number of malicious access includes the number of illegal connections and the times of scanning sensitive ports.

4.2. Virtual Infrastructure Manager (VIM)

Each cloud provider offers several VM configurations, often referred to as instance types. An instance type is defined in terms of hardware metrics such as CPU frequency, memory size, hard disk capacity, etc. In this work, the VIM component is based on the OpenNebula virtual infrastructure manager [12], [13], this module is used to collect and index all these resources information from multiple cloud providers.

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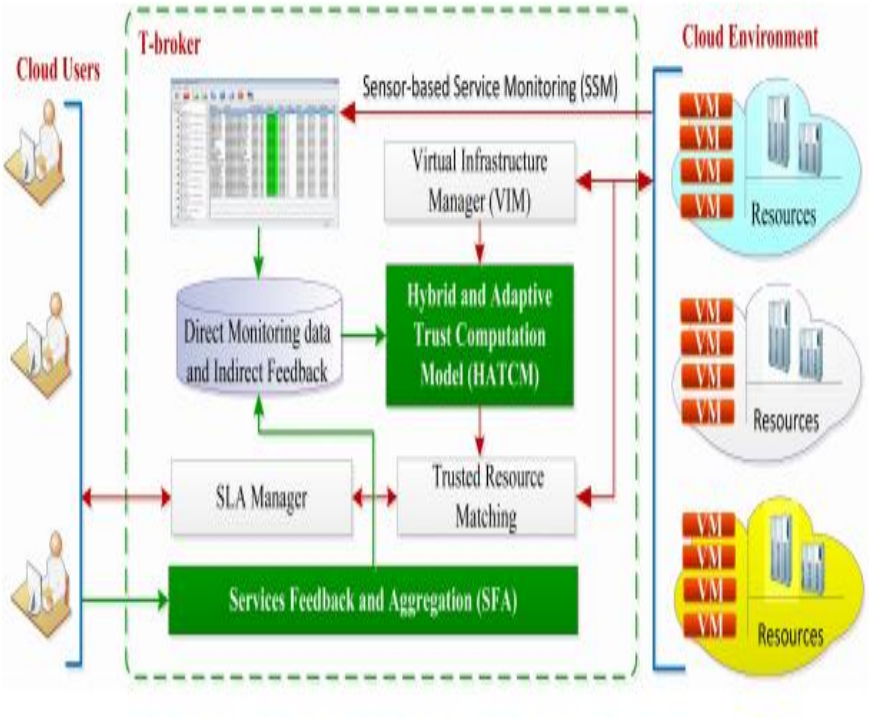

Figure 4. T-broker's Architecture and main function modules

It obtains the information from each cloud provider and acts as a resource management interface for monitoring system. Cloud providers register their resource information through the VIM module to be able to act as sellers in a multi-cloud marketplace. This component is also responsible for the deployment of each VM in the selected cloud as specified by the VM template, as well as for the management of the VM lifecycle. The VIM caters for user interaction with the virtual infrastructure by making the respective IP addresses of the infrastructure components available to the user once it has deployed all VMs.

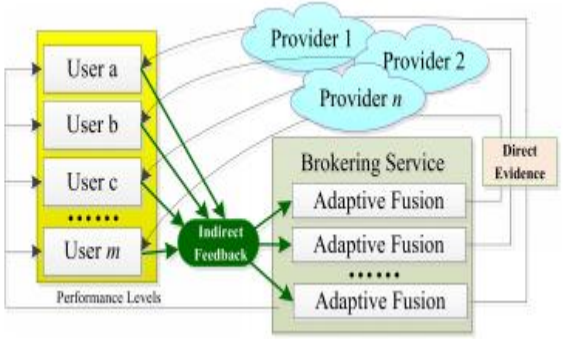

Figure 5. Scenario with adaptive fusion mechanism

4.3. Methods

1) Create Cloud Environment: We provide cloud users and cloud data centers and virtual machines as per our requirement. Job Manager, Cloud Controller also created. The Job Manager is replaced by the customer's orders, which is responsible for planning them responsible and coordinates their execution. It is capable of the cloud server provides the

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interface communicates the instantiation of VMs to control. We call this interface, the Cloud Controller. Using the Cloud Controller Job Manager can configure or deallocate VMs after the current job execution phase.

2) Chain of Trust: A chain of trust is designed to allow multiple users and use the system to create software that would be more difficult if all the keys were stored directly in the hardware. The signing authority will sign only boot programs to enforce the security as they run only programs that are registered, or only allow signed code access to certain features of the machine to have. The final software can be trusted to have certain characteristics, because if it has been changed illegally his signature would be invalid and the previous software would not run it.

3) Scheduling: It is the process of deciding how to commit the resources between the varieties of possible tasks. Shared resources are available at certain times and events are planned at this time. The schedule keeps separation between the users of the resources. Scheduler, often as workload automation, usually offers a single point of control for the definition and monitoring. Scheduling is the method given by the threads, processes or data streams access to system resources. This is done to load normally, a system balance effectively or reach a target quality of service. The need for a scheduling algorithm results from the requirement for most modern systems multitasking and performs multiplexing. Job Scheduling is the most important task in cloud computing environment because the user used to pay for resources, based on time. Thus, an efficient use of resources must be important, and because of this scheduling plays an important role maximum advantage of the resource base.

4) Trust Management: The trust management is an abstract system that processes symbolic representations of social trust, usually automated decision-making support. The automated verification of measures against security policies In this concept, actions are allowed if they show sufficient credentials, regardless of their actual identity, to separate symbolic representation of the confidence of the actual person. Trust management can be used as an icon-based automation of social decisions be seen in connection with trust, where social actors instruct their technical presentations on how to act to make technical presentations while other agents. Further automation of this process can lead to automated trust negotiation in which technical devices negotiate confidence by selective disclosure Credential, defined according to the rules of social agents that represent them.

5) Resource Allocation: Resource allocation is used to allocate the available resources in an economical manner. Resource allocation is the planning of activities and the necessary resources from these activities, while taking into account both the availability of resources. could Resource access to a section of the store computer data in a device interface buffers, one or more files or the required amount of processing power. A single processor can perform only one process at a time, charged regardless of the number of programs by the user.

5. Experimental Results

The Trust Based Cloud Service Provider Selection involves the procedure of finding the cloud service provider for the effective use of their resources by the cloud consumers. The trustworthiness and the competence are said to be determined with the interaction of providers with consumers that are provided as in the form of ratings. The Extended

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Opinion dataset is used in order to find the trust, it contains 5000 user feedbacks in it. The dataset file contains the item id, rating, user ID, date. Trust Based Cloud Service Provider helps to efficiently find the cloud service provider it uses trustworthiness and competence estimating technique in finding the effective cloud service provider. The trustworthiness and competence are said to be determined, calculating the evaluation of the ratings that are provided by the users to the cloud service providers by the interaction with the providers. The trust estimation is determined by calculating the various parameters. The competence is determined by the interaction with the providers and SLA parameters. By comparing the value of the trustworthiness, the trust estimation is said to be calculated. This experimental result shows efficient results by using this trustworthiness and competence estimation.

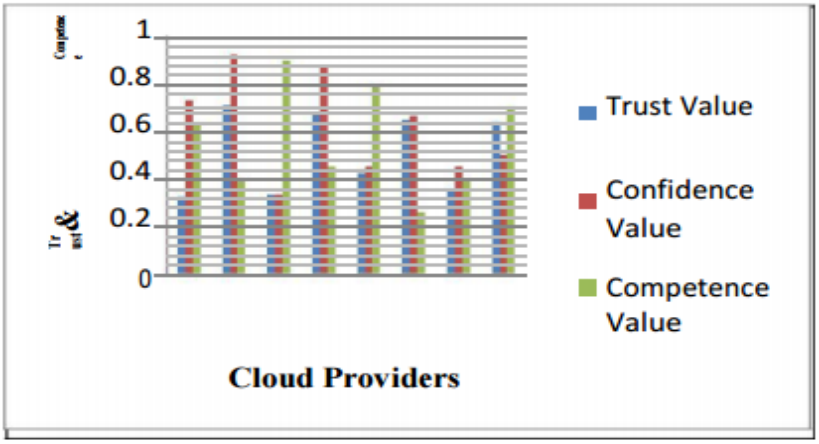

Figure 6. Comparison between Trust and Competence

6. Conclusion

We propose a risk model to characterize data breach for cloud service providers, enabling users to identify parameters of most concern to them and provide a weighting function to priorities them. Multi-attribute utility theory is used to aggregate risk probabilities across the measured parameter. The cloud service providers are determined based on the interaction of the providers and the users. It also considers various parameters like security and availability. The trustworthiness and competence are said to be estimated with the interactions with the users with the cloud service providers and the recent interaction of the providers. The confidence level is established by considering the recent interaction and interaction intensity of the providers with the users. Later the trust network has to be formed, that contains the indirect interaction can also be formed by the users and providers. Then the trust has to be estimated from the social network like Twitter, from that the direct communication and feedback of the users to the providers can be determined. The framework estimates trust worthiness in terms of context specific, dynamic trust and reputation feedbacks. It also computes competence of a service provider in terms of transparency of SLAs. Both these entities are combined to model interaction risk, which gives an estimate of risk level involved in an interaction we implemented a multi-cloud environment where users can store data in multiple clouds. The advantages of this kind of environment include high service availability, low security risks and the insider theft is eliminated to a greater extent.

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In the future it is important for the adoption of public cloud systems, consumers and citizens are reassured that the privacy and security is not compromised. It will be necessary to address concerns expressed the problems of privacy and security in this chapter to provide trustworthy and innovative cloud computing services available and support that are useful for a number of different situations.

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Content-based Image Retrieval System for Bio-medical Images

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Abstract

Content based image retrieval (CBIR) is an imperative and testing errand in numerous fields, for example, military, common, restorative and even in web applications. Here, we introduced novel content based medical image retrieval with decimated bi-orthogonal spline wavelet filter banks. Proposed algorithm is an extension for the existing low-level feature extraction method done by using spline wavelet filters, also utilized iterative partitioning (IP) for extracting the similar patterns of query and database images. Simulation results shows that the proposed method has performed superior to the existing scheme in terms of precision and recall.

Key words: *CBIR, Bi-orthogonal spline wavelets, DWT, segmentation, iterative partitioning and precision*

1. Introduction

Content based image retrieval (CBIR) is an imperative and testing errand in numerous fields, for example, military, common, restorative and even in web applications. Late years there is a fast development in seeking motors, for example, Bing image hunt: Microsoft's CBIR motor (Public Company), Google's CBIR framework, note: does not take a shot at all images (Public Company), CBIR web crawler, by Gazopa (Private Company), Imense Image Search Portal (Private Company) and Like.com (Private Company), image retrieval has turned into a testing undertaking. The interest in CBIR has developed in view of the retrieval issues, constraints and time utilization in metadata-based systems. We can seek the literary information effectively by the current innovation, yet this looking techniques obliges people to portray every images physically in the database, which is unrealistic for all intents and purposes for extremely gigantic databases or for the images which will be generated naturally, e.g. images generated from reconnaissance cameras. It has more disadvantages that there is an opportunity to miss images that utilization distinctive proportional word in the portrayal of images. The systems based on arranging images in semantic classes like "tiger" as a subclass of "creature" can suspend the miss-order issue, yet it will requires more exertion by an utilization to recognize the images that may be "tigers" , however every one of them are sorted just as a "creature". Content-based image retrieval (CBIR) is a utilization of techniques for securing, pre-handling, examining, representation furthermore understanding images to the image retrieval issue, that is the issue of investigating for digital images from extensive databases. The CBIR framework is against customary methodologies, which is known on concept-based methodologies i.e., concept-based image indexing (CBII) [1].

2. Related Work

In the previous decades a few CBIR systems have been proposed, and still the specialists are concentrating on creating augmented CBIR systems with more powerful results. The letter proposed in [4] gives a correlation of various methodologies of CBIR based on comparability measures and image features to recognize the closeness between the images, which gives accurate information to recovering the pertinent images from vast

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database. Wan Siti et.al proposed in [5] thinks about the few medicinal image retrieval systems based on the feature extraction and to enhance the viability of the CBIR framework for restorative images, for example, attractive reverberation (MR) images and computed tomography (CT) images [10]. The significant concept proposed in [5] is to help in the determination, for example, to locate the comparative ailment and observing of patient s advance persistently. B. S. Manjunath et.al displayed in [6] is the combination of shading, surface with consideration of edge minimization for Motion Picture Expert Group (MPEG)- 7 guidelines. Another methodology proposed in [7] utilized diverse shading spaces, for example, HSV and YCbCr clarifies a comparative methodology based on shading and surface analysis. The work proposed in [8] presents another retrieval framework which has done by utilizing wavelet transformation with both shading and surface features together and will perform superior to anything existed condition of craftsmanship algorithms. As of late, retinal image retrieval framework called CBIR for retinal and veins extraction [9] has been broke down by the histogram features of RGB shading components. The multi resolution analysis has connected to the image to gain the surface information. Notwithstanding enhance the execution, morphological operations are connected to concentrate on the state of article. Swati Agarwal has proposed another CBIR framework in [11], which is by utilizing discrete wavelet transform and edge histogram descriptor (EHD). Here the retrieval is based on shading and surface features not by utilizing shading information as a part of the image, input image first deteriorates the info question image into a few sub bands i.e., estimation coefficients and point of interest coefficients, where subtle element coefficients comprises of even (LH), vertical (HL) furthermore the askew information (HH) of the image. A short time later, EHD is utilized to assemble the information of prevailing edge introductions. This blend of 3D-DWT and EHD will enhance the productivity of the CBIR framework.

3. Proposed Methodology

For image retrieval, grouping and indexing both shading and surface have been utilized generally as a part of different applications. Histogram of an image is a graphical analysis of an image, which speaks to the shading information of image. It is a first request factual measure. The significant downside of this histogram-based methodologies is that the spatial conveyance and nearby varieties will be disregarded. Nearby spatial variety of pixel power is regularly used to catch surface information in an image. Wavelet transform is a one of the best ways to deal with locate the low-level features of image which is an expansion for both fourier (FT) and short time fourier transforms (STFT). It utilizes an adaptive window to ensure that the all aspects of the sign or image information will be separated by utilizing the scaling property. Here, we utilized a discrete wavelet (DW) transform with bi-orthogonal spline channels to get the example arrangement of restorative x-beam images.

3.1. Discrete Wavelet Transform (DWT)

Discrete Wavelet Transform (DWT) is an adjusted variant of Continuous Wavelet Transform (CWT). DWT principles are fundamentally the same as the CWT however the wavelet scales and positions are heaps of two.

The fundamental principle of DWT is to pass the info signal through a gathering of channels i.e., low pass and high pass channels to get the low frequency (LF) and high frequency (HF) of source sign. Low frequency substance incorporates LL and these coefficients are known as the estimation coefficients. This means the approximations are gotten by utilizing the high scale wavelets which relates to the low frequency. The high frequency components which are known as LH, HL and HH of the sign are known as the points of interest which will be gotten by utilizing the low scale wavelets which relates to the high frequency.

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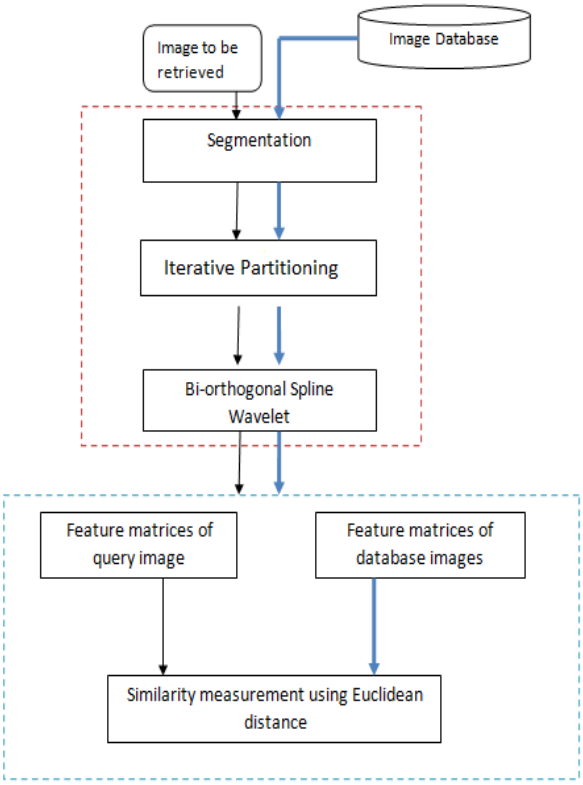

Figure 1. Proposed CBIR flow chart

The procedure of DWT filtering incorporates; first the sign is bolstered into the wavelet channels. These wavelet channels contain both the high-pass and low-pass channel. At that point, these channels will separate the high frequency substance and low frequency substance of the sign. Be that as it may, with DWT the numbers of tests are lessened by scale. This procedure is known as the sub-testing. Sub-inspecting means decreasing the specimens by given element. Because of the detriments forced by CWT which requires high preparing power [11] the DWT is picked due its straightforwardness and simplicity of operation in taking care of complex signs.

3.2. Iterative Partitioning

Step 1: First we will choose the quantity of centroids arbitrarily i.e., relies on upon number of groups

Step 2: Now, allotment the items inside every group

Step 3: It discovers parcels to such an extent that pixels inside every group are as near each different as could be allowed, and as a long way from articles in different bunches as could reasonably be expected.

Step 4: The items are in the group or not will be computed by measuring the separation between the bunch pixels. At the point when the figured Euclidean separation has minima esteem then the pixels will be assembled with the individual group

Step 5: Do the above procedure for outstanding bunches too. At that point, we will get three groups with their comparative pixels.

Step 6: Now, compute the mean of every group and supplant the mean qualities with the centroids

Step 7: Repeat the same procedure with these new centroids by giving the quantity of cycles until unless the joining event i.e., the mean estimation of bunches = group centroid esteem.

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3.3. Proposed Algorithm

The steps involved in proposed scheme are as follows:

Step1: Select and read the inquiry image from the database.

Step2: Apply division with iterative partitioned clustering to the query image.

Step3: Now, select the bi-orthogonal spline wavelet channels and apply decimated wavelet to remove the low-level features.

Step4: Make feature vector by utilizing the above three stages.

Step5: Read all the database images and apply all the three stages which have been connected to the inquiry image to discover the feature vectors.

Step7: Combine all the feature vectors and make it into a solitary feature vector for question image features and database images too.

Step8: Calculate the Euclidean separation for the closeness check, when the likeness between the inquiry and database images will be more than 85%.

4. Simulation Results

In this section we discussed the simulation results of CBIR system for bio-medical images. The proposed algorithm has been tested with few databases and displayed the outputs in the below figures. Fig3 shows that the initial GUI model for retrieving images using proposed CBIR schemes. Proposed retrieval system has been shown in fig4 and 5. As a measure of performance we have used two widely used metrics of Precision and Recall.

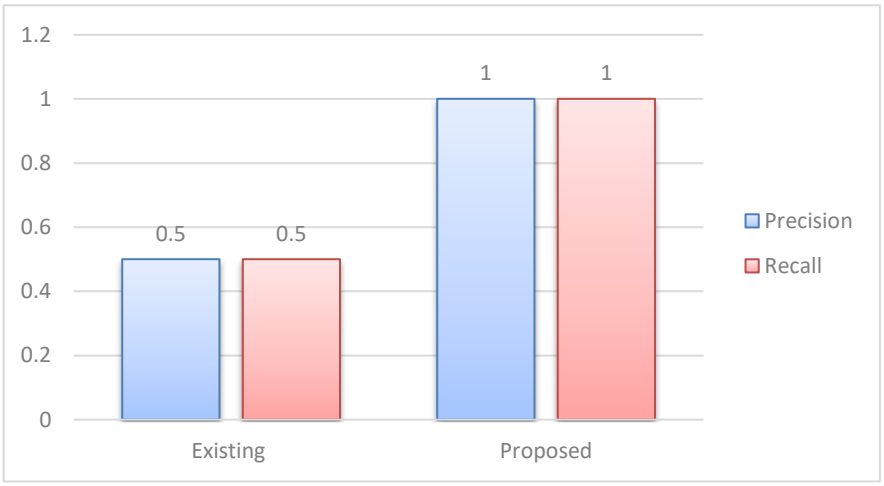

Figure 2. Performance of Proposed and conventional CBIR schemes

Precision is a measure of ability of CBIR algorithm to retrieve only relevant images, while Recall decides the ability of CBIR algorithm to retrieve all relevant images as defined by below equations respectively.

$$P = \frac{Total\ numebr\ of\ relevant\ images\ retrieved}{Total\ numebr\ of\ retrieved\ images}$$

$$R = \frac{numebr\ of\ relevant\ images\ retrieved}{numebr\ of\ relevant\ images\ in\ database}$$

5. Conclusion

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We had proposed an adaptive CBIR scheme for large database systems. Feature vectors have been generated by considering multiple features of images with decimated bi-orthogonal spline wavelet filter banks and iterative partitioning. Euclidean distance is used to measure the similarity between the query and database feature vectors to retrieve the relevant images. By using low level feature extraction and IP, the performance of the proposed CBIR system had improved in terms of the accuracy and computational complexity while improving the system efficiency. The proposed system has proven that this approach has got superior performance than the existing CBIR schemes.

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Design and Analysis of Autonomous Anomaly Detection Models

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Abstract

Recent data mining deviation to recognition data point the expected system to sufficient dataset or is incomparably many data exhibits that as dimensionality increases there exists hubs and anti hubs the points that frequently occur in k nearest neighbor (kNN) lists. Ant hubs are points that uncommonly model in kNN lists. This proposed system to developing and comparing to autonomous anomaly detection models. This proposed method to details about the development and analysis of outlier (anomaly) detection methods is Local Outlier Factor (LOF), and Local Distance Based Outlier Factor (LDOF). Outliers outperforms the results of the previous systems to reference to speed, complexity and efficiency. The classification algorithms are used to finding the corresponding features and classify the criteria in data mining methods. These techniques deteriorate to increasing difficulty, size and variety of data sets. The proposed incremental LOF algorithm takes equivalent finding performance as the iterated static LOF algorithm while requiring less computational time. In addition to this, the incremental LOF algorithm is dynamically change the data of data points. This is a very important application, change data profiles to change over time.

Index Terms: Clustering-based, Density-based and Model-based techniques, Nearest Neighbours, Outlier Detection, Discrimination, Outliers, data mining, Clustering, Neural Network.

1. Introduction

Outlier detection or anomaly detection means identifying the data patterns that do not comply or far from other observations.[5] Outliers can have many anomalous causes. To normal behavior Outliers occur due to changes in system behavior, fraudulent behavior, human error and instrument error or simply through natural deviations in populations. Outliers may contain demanding and actionable information in fraud detection, intrusion detection and medical diagnosis. Data Mining is a non-trivial method of identifying valid, novel, potentially useful and finally understandable patterns [1]. Now, data mining is becoming an important area to convert the data into information. It is basically used in fraud detection, marketing and scientific discovery. Data mining actually refers to extracting the hidden interesting patterns from the huge number of datasets and databases [2]. Mining is basically used to show the patterns of the data, but this can be carried out on the sample of data. The mining process will be completely useless if the samples are not the good representation of the large body of the data. Automated identification of suspicious behavior and objects [3] based on information extracted from video streams is currently an active research area. Other important applications include traffic control, surveillance of commercial and residential buildings. These tasks are characterized by the need for real time processing and by variable, non-stationary and usually noisy environment. Hence, there is necessity for incremental outlier detection that can adapt to

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novel behavior and provide timely identification of unusual events.[4] The errand of distinguishing anomalies can be classified as administered, semi-regulated, and autonomous, contingent upon the presence of marks for exceptions and/or general occurrences. Regulated anomaly discovery procedures have an unequivocal thought of the typical and exception conduct and thus accurate models can be assembled. The downside here is that precisely marked preparing. Among these categories, autonomous methods are more widely applied, because the other categories require precise and representative labels that are usually prohibitively expensive to obtain [5].

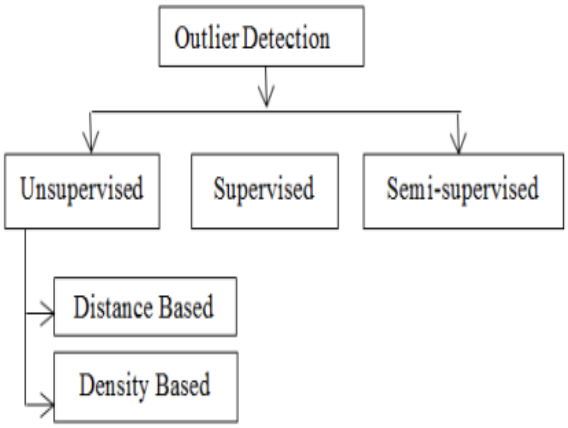

Fig. 1 Modes of operation of outlier detection techniques

Autonomous methods include distance-based methods that mainly depend on a measure of distance or similarity in order to detect anomalies. Formulation of outlier detection relies upon the various factors such as input data sample type and distribution, availability of data and resource conditions introduced by application domain. Detecting unexpected entries in databases which ultimately detect anomalies for data mining, frauds or valid but unexpected entries,[6] Due to so many applications accurate detection of anomalies becomes must. Many outlier detection methods were suggested till date. In this paper, we will categorize and review some of the existing methods in the following sections. The overview of the techniques which will be discussed is given in the figure below:

2. Related Work

The classification and recognition of individual characteristics and behaviors create a preliminary step and is an important aspect in the behavioral sciences. Current statistical approaches do not always give satisfactory results [3]. To improve performance in this area, we present a methodology based on one of the principles of artificial neural networks, the back-propagation gradient. In classification tasks, data set that comply to a certain representation or a classification model was considered. If one were to confuse a few data samples by making small changes to some of their attribute values, the original classification model which represents the data set was modified. Also, if one were to delete those data instances, the original model could change significantly [7], The magnitude of modifications to the original model provided clues to the criticality of such data instances, as more critical data instances tend to impact the model more significantly than data instances that are comparatively noncritical. The hub marvel has been as of late seen in a few application territories including sound and picture Data quickly say hubness

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in the setting of chart development for semi-directed learning. Also, there have been endeavors to dodge the impact of center points in 1-NN time-arrangement order, obviously without clear knowledge about the presence of the wonder (Islam et al.) and to represent conceivable imbalance of the circulation of N1 in converse [8] nearest neighbor look where Nk(x) indicates the quantity of times point x happens among the k closest neighbors of every other point in the Data set. None of the said papers, be that as it may, effectively break down the reasons for hub or sum it up to different applications. Initially proposed outlier detection methodologies determine outliers once all the data records (samples) are present in the dataset. We refer to these algorithms as static outlier detection algorithms. In contrast, incremental outlier detection techniques identify outliers as soon as new data record appears in the dataset. Incremental outlier detection was also used within more generic framework of activity monitoring [18]. In addition, [19] proposed broad requirements that incremental algorithms need to satisfy, [21] used online discounting distributional learning of Gaussian mixture model and scoring based on the estimated probability density function. In [8] propose a outlier ranking depending upon the objects anomaly in a set of relevant subspace projections. It do not include irrelevant projections showing no clear difference between outliers and the relevant objects and find objects which deviates in multiple relevant subspaces. The study in [9] distinguishes three problems occurred by the "curse of dimensionality" in the context of data mining, searching and indexing applications like poor inequity of distances caused by concentration, presence of irrelevant and duplicate attributes, all of which make difficult the usability of traditional similarity and distance measures. Parameter free outlier detection algorithm [10] to compute Ordered Distance Difference Outlier Factor Formulate a new outlier score for each instance by considering the difference of ordered distances. Then use this value to calculate an outlier score.

3. Density Based Approaches

Distance-based approaches are very known to face the local density problems created by the various degrees of cluster density that exist in a dataset. In order to solve the problem, density-based approaches have been proposed. The basic idea of density-based methodology is that the density around an outlier remarkably varies from that around its neighbors [14]. The density of an object's neighborhood is correlated with that of its neighbor's neighborhood. If there is a significant anomaly between the densities, the object can be considered as an outlier. To implement this idea [11], several outlier detection methodologies have been developed in recent past. The detection methods estimate the density around an object in different ways [15], implemented the local outlier factor (LOF), which is amongst the most commonly a used method in outlier detection methodology. LOF is influenced by different variations like local correlation integral (LOCI) [16]. Local distance-based outlier factor (LDOF) [17], and local outlier probabilities (LOP) [18]. Now we will look into some density-based outlier detection methodologies. Many outlier methods are proposed till date, these existing methodologies can be broadly classified as: distribution (statistical) based, clustering based, density based and model-based methodologies [13]. Statistical methodologies [12] assume that the data follows some standard or predetermined distributions, and this type of approach aims to find the outliers which doesn't follow such distributions. The methods in this class always assume the typical example follow a particular data distribution. Nevertheless, we

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cannot always have this kind of priority data distribution information in practice, mainly for high volumes of multidimensional real data sets [13].

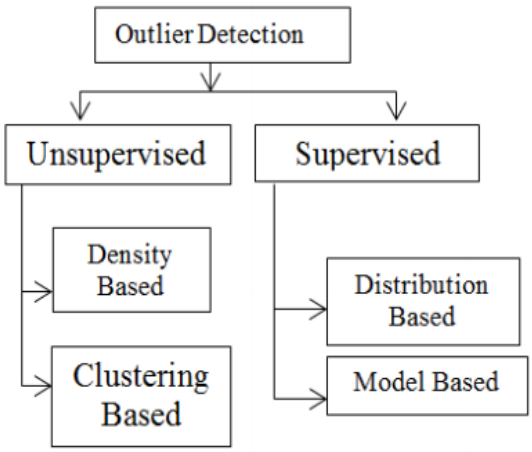

Fig. 2 Classification of Outlier Detection

4. Neural Network Methods

Neural Network methodologies are usually non parametric and model based and suits well to the hidden patterns and are capable of learning complex class boundaries .The entire data set has to be traversed multiple times to allow the network to settle and model the data correctly .Neural Networks are comparatively less vulnerable to the jinx of dimensionality as compared to the statistical methods, the neural networks are further classified into two types – Supervised Neural Methods and Unsupervised Neural Methods[16]. Supervised Neural Networks uses the classification of the data to drive the learning process. If this classification of the data is not available, then it is known as unsupervised neural network.

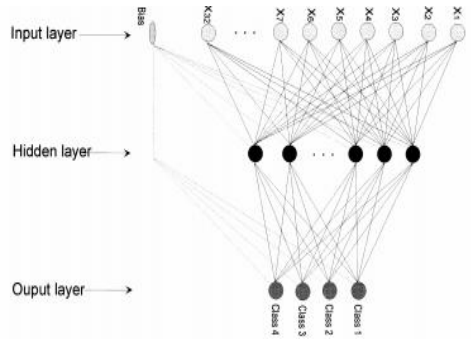

Fig. 3 Structure of a Neural Network

Unsupervised neural networks contain nodes which compete to represent parts of the data set. As with Perceptron based neural networks, decision trees or k-means, they require a training dataset to allow the network to learn. They individually cluster the input vectors through node placement to allow the underlying data distribution to be modeled and the normal/abnormal classes differentiated [18]. They assume that related vectors have common feature values and depend upon identifying these features and their values to topologically model the data distribution. The neural network uses the class to adjust the weights and thresholds to make sure the network that can correctly classify the overall

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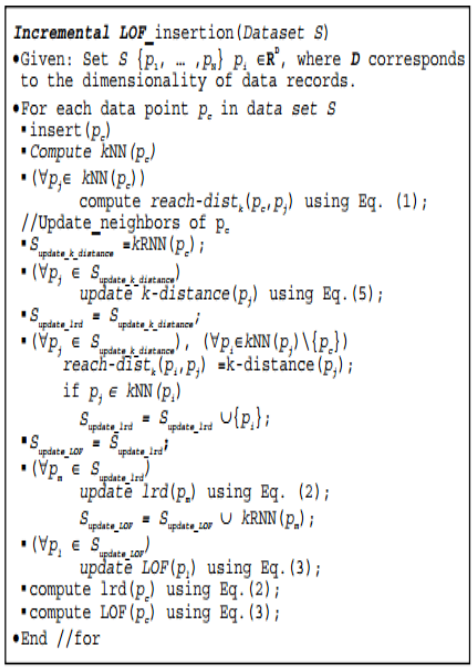
network. These methods are also used to detect the noise and novel data [19]. Neural Network is a very crucial methodology that plays a crucial role in the outlier detection.

5. Outlier Detection Algorithms

Clustering and outlier identification is one of the important tasks in high dimensional data. Clustering methodologies are supported by outlier detections for new optimistic methodologies. The thrust of the new optimistic approach applies nearest neighbor-based clustering method and detect outliers in high dimensional data.

A. Local outlier factor (LOF)

In LOF, compare the local density of a instances with the densities of its neighborhood instances and then assign anomaly score to given data instance. For any data instance to be normal not as an outlier, LOF score equal to ratio of average local density of k nearest neighbor of instance and local density of data instance itself.



Incremental LOF insertion(*Dataset S*)

- Given: Set S $\{p_1, \ldots, p_n\}$ $p_i \in \mathbf{R}^D$, where D corresponds to the dimensionality of data records.
- For each data point p_e in data set S
  - insert(p_e)
  - Compute $kNN(p_e)$
  - ($\forall p_j \in kNN(p_e)$)
    compute $reach\text{-}dist_k(p_e, p_j)$ using Eq. (1);

  //Update neighbors of p_e

  - $S_{update\_k\_distance} = kRNN(p_e)$;
  - ($\forall p_j \in S_{update\_k\_distance}$)
    update $k\text{-}distance(p_j)$ using Eq. (5);
  - $S_{update\_lrd} = S_{update\_k\_distance}$;
  - ($\forall p_j \in S_{update\_k\_distance}$), ($\forall p_i \in kNN(p_j) \setminus \{p_e\}$)
    $reach\text{-}dist_k(p_i, p_j) = k\text{-}distance(p_j)$;
    if $p_j \in kNN(p_i)$
    $S_{update\_lrd} = S_{update\_lrd} \cup \{p_i\}$;
  - $S_{update\_LOF} = S_{update\_lrd}$;
  - ($\forall p_n \in S_{update\_lrd}$)
    update $lrd(p_n)$ using Eq. (2);
    $S_{update\_LOF} = S_{update\_LOF} \cup kRNN(p_n)$;
  - ($\forall p_i \in S_{update\_LOF}$)
    update $LOF(p_i)$ using Eq. (3);
  - compute $lrd(p_e)$ using Eq. (2);
  - compute $LOF(p_e)$ using Eq. (3);
- End //for

To find local density for data instance, find radius of small hyper sphere centered at the data instance. The local density for instances is computed by dividing volume of k, i.e. k nearest neighbor and volume of hyper sphere. In this assign a degree to each object to be an outlier known as local outlier factor. Depends on the degree it determines how the object is isolated with respect to surrounding neighborhood [20]. The instances lying in substantial region are normal instances, if their local density is similar to their neighbors, the instances are outlier if their local density lower than its nearest neighbor. LOF is steadier with top-n manner. Hence it is called as top-n LOF means instances with highest LOF values considered as outliers.

B. Local distance-based outlier factor (LDOF)

Local distance-based outlier factor Measure the objects outlierness in distributed datasets. In this uses the relevant location of an object to its neighbors to obtain the object deviation degree from its neighborhood instances. In this distributed neighborhood is considered. Higher deviation [21] in degree data instance has, more likely data instance as

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an outlier. In this algorithm evaluate the local distance-based anomaly factor for each object and then sort and ranks the n objects having highest LDOF value. The first n objects with highest LDOF values are consider as an outlier

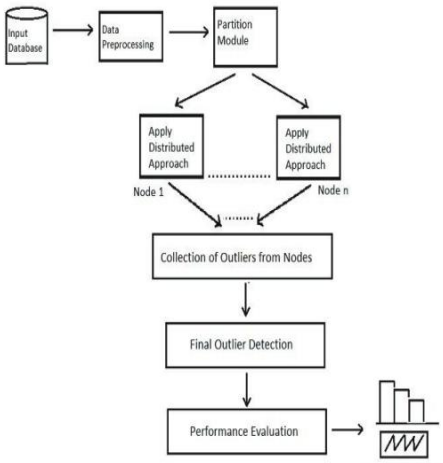

Fig. 4 Proposed System Architecture

6. Novel Boundary Based Classification Approach (NBBC)

The proposed Novel Boundary based categorization including the imputation methods and ordinal classification methods are explained in this section. The detailed description of WDBC dataset as follows. WDBC dataset: The Wisconsin Diagnostic Breast Cancer (WDBC) contains various attributes namely, diagnosis, ID number and real valued features. There are ten real valued features namely, radius, area, perimeter, smoothness, texture, compactness, concave points, concavity, symmetry and fractal dimension computed from digitized image of breast mass.[8] For each class, an added classification representation is built or trained by first deriving data set, which is a separation of the innovative training data set. The new data set was derived by relating a subset of the original data records into two new classes

Training **Procedure:**
Step1: Compute Triangular Area // using eqn(3)
Step:2***For*** I = 1,2,... z ***do***
Step:3 $TA \leftarrow TA_i^c$
Step:4***End For***
Step:5 Compute $\overline{T_i^c} \leftarrow \frac{1}{z}\sum_{i=1}^{z} \overline{T_i^c}$
Step:6 Compute Covariance Matrix Cov^c // using eqn(8)
Step:7 ***For*** I = 1,2, ... z ***do***
Step:8 Compute $MD^{c,i} \leftarrow MD^{c,i}(TA_i^c, \overline{T_i^c})$
Step:9 ***End For***
Step:10 Compute μ
Step:11 Compute σ
Step:12***Return***

A. The Greedy Algorithm

Overview

Our greedy algorithm takes the number of desired outliers (supposed to be –k) as input and selects points as outliers in a greedy manner, Initially the set of outliers (denoted by OS) is specified to be null and all points are marked as non-outlier we need k scans over the dataset to select k points as outliers[3]. In each scan, for each point labeled as non-

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outlier, it is temporally removed from the dataset as outlier and the entropy object is recalculated. A point that achieves maximal entropy impact the maximal decrease in entropy experienced by removing this point, is selected as outlier in current scan and added to OS.The algorithm terminates when the size of OS reaches k. In the initialization phase of the greedy Algorithm each record is labeled as non-outlier and hash tables for attributes are also constructed and updated (step 01- 04). In the greedy procedure, we need to scan over dataset, we read each record t that is labeled as nonoutlier,its label is changed to outlier and the changed entropy value is computed. A record that achieves maximal entropy impact is selected as outlier in current scan and added to the set of outliers (step 05-13).In this algorithm, the key step is computing the changed value of entropy. With the use of hashing technique, I o(1) expected time ,we can determine the frequency of an attribute value in corresponding hash table. Hence, we can determine the decreased entropy value in o(m) expected time since the changed values is only dependent on the attribute values of the record to be temporally removed [17].

One of the simplest methods for showing that a greedy algorithm is correct is to use a "greedy stays ahead" argument. This style of proof works by showing that, according to some measure, the greedy algorithm always is at least as far ahead as the optimal solution during each iteration of the algorithm. Once you have established this, you can then use this fact to show that the greedy algorithm must be optimal.

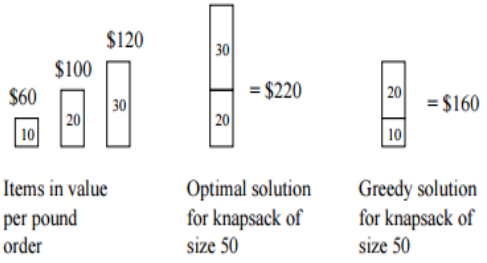

Fig. 5 Greedy Algorithm Example

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```
Algorithm
Input:   D   // the categorical database
         k   // the number of desired outliers
Output:  k identified outliers

/* Phase 1-initialization */
01  Begin
02      foreach record t in D
03          update hash tables using t
04          label t as a non-outlier with flag "0

/* Phase 2-Greedy Procedure */
counter = 0
05      Repeat
06          counter++
07          while not end of the database do
08              read next record t which is labeled "0    //non-outlier
09              compute the decrease on entropy value by labeling t as outlier
10              if maximal decrease on entropy is achieved by record b then
11                  update hash tables using b
12                  label t as a outlier with flag "1
13      Until counter = k
14      End
```

For the comparable fractional problem, however, the greedy strategy, which takes item 1 first, does yield an optimal solution. Taking item 1 doesn't work in the 0-1 problem because the thief is unable to fill his knapsack to capacity, and the empty space lowers the effective value per pound of his load. In the 0-1 problem, when we consider an item for inclusion in the knapsack, we must compare the solution to the sub problem in which the item is included with the solution to the sub problem in which the item is excluded before we can make the choice. The problem formulated in this way gives rise to many overlapping sub problems--a hallmark of dynamic programming, and indeed, dynamic programming.

7. Experimental Setup and Results

System Requirement Our algorithms have performed on high dimensional dataset that is Cover Type dataset from UCI machine learning Repository The experiment was performed on an Intel core i5 CPU at 2.53 GHz and RAM 4 GB , having a Windows 7 as its operating system. The algorithms were implemented in Java to process data instances in high dimensional data. Results The figure 6 shows the data insertion time required in five datasets and figure 7 shows the comparative study of outlier detection rate with existing and proposed algorithms for outlier detection.

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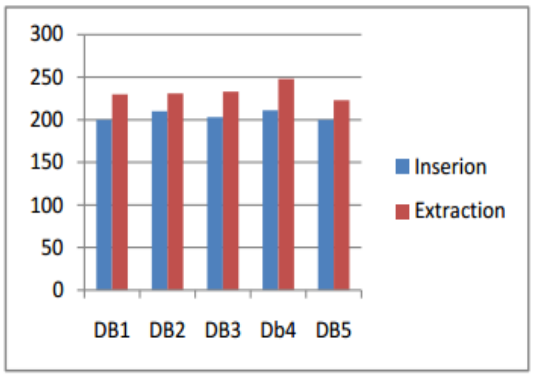

Fig. 6 Data insertion time required

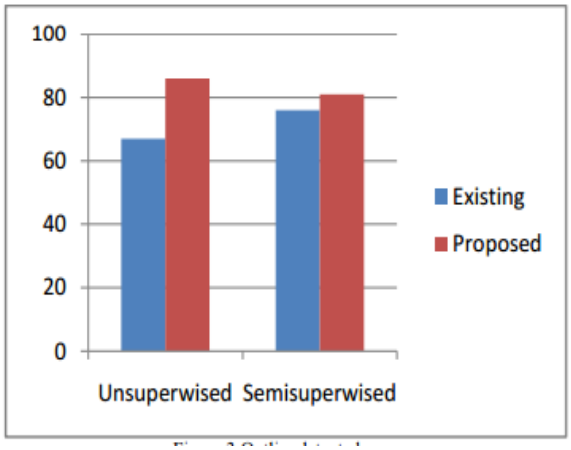

Fig. 7 Outlier detected

Outlier-Detection Methods and the hubness phenomenon, extending the previous examinations of (anti) hubness to large values of k, and exploring the relationship between hubness and data sparsity Based on the analysis, we formulated the IQR, Greedy, AntiHub method for semi-supervised and unsupervised outlier detection, discussed its properties and proposed a derived method which improves in terms of speed and accuracy, reducing the false positive and false negative rate and improve the efficiency of density based outlier detection.

8. Conclusions

Outlier detection is very important and has applications in wide variety of fields. So it becomes important to learn how to detect outliers. The main objective of this paper is to review various outlier detection techniques and to study how the techniques are categorized. So we can conclude that, methods used for outlier detection are application specific. The training algorithm and testing algorithm are used for training and testing the class. Reducing the search close to the class boundaries saves computation time in identifying such nuggets. Results from the evaluation on the real-time WDBC data sets revealed that the proposed approach achieves better performance than the existing classification algorithm. Proposed a derived method which improves in terms of speed and accuracy, reducing the false positive and false negative rate and improve the efficiency of density-based outlier detection. The future implementation is in machine learning techniques such as supervised and semi-supervised methods.

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9. Future Work

Future work on deleting data records from database is needed. More specifically, it would be interesting to design an algorithm with exponential decay of weights, where the most recent data records will have the highest influence on the local density estimation. In addition, an extension of the proposed methodology to create incremental versions of other emerging outlier detection algorithms Connectivity Outlier Factor (COF) is also worth considering. Additional real-life data sets will be used to evaluate the proposed algorithm and ROC curves will be applied to quantify the algorithm performance.

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Detection and Removal of Wormhole Attacks in Mobile Ad-Hoc Networks

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Abstract

In real time environment, the nodes in a mobile ad-hoc network (MANET) moves actively. There will be many attacks in network layer which lead to the performance degradation of the wireless network. Among them wormhole attack causes serious problems which will affect the owl MANET system. Wormhole attack can be defined as a created tunnel from more than one malicious node. Here, we proposed a new approach for preventing the wormhole attack by utilizing the threshold algorithm (NWATP-TA). Our proposed algorithm notices these sorts of attack effectively in MANET systems. Experimental analysis shows that the robustness of the proposed approach over the conventional wormhole attack prevention schemes in terms of throughput, end-to-end delay and energy consumption. We also compared our results with the Trusted AODV protocol.

Keywords: *Mobile ad-hoc networks, wormhole attack, AODV routing protocol, trusted AODV routing protocol,*

1. Introduction

A mobile ad-hoc network (MANET) is wireless network that means it's not recurred infrastructure. In MANET nodes are move energetically nature. The dynamic natures of MANET make it more vulnerable. In network layer many attacks possible but we focus only wormhole attack. When more than one malicious node creates tunnel is called wormhole attack. In ad-hoc network, routing is a vital challenge because of node's high mobility. Trust-based routing is being defined in our proposed approach, which calculates the value of trust based on the hyperbolic function of tangent that computes the trust value of their adjacent nodes promiscuously. In MANET, there is no fixed infrastructure therefore the mobile nodes communicate over multi-hop wireless links. These are often cited as infrastructure-less network model because the mobile hosts in the network establish route between themselves. Caching has been proved to be a very important method for improving data recovery and performance in mobile communication area. Caching, data or information process delay is minimized since queries or requests are served from the local cache there by clearing the need for data transmission. There are several attacks in an unexpected network. referable to their open nature, mobile ad hoc networks system nonresistant to most of the attacks such as gray hole, denial of service, wormhole, black hole, Sybil etc. Among these attacks, wormhole attack detection is a challenging and difficult task since this attack detection doesn't need any skill violation by the user. In a network location, one venomous node register traffic and then that traffic will be tunneled to a various venomous node that is found far in other location which is

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known to be distribution of routing. It's very crucial and important to detect such attacks in MANET systems. Various routing protocols in [1-5] presented in the literature, which provides the transmission of data from the source to destination with a best effort. These protocols work proactively or reactively and find a minimum hop path from source to destination. Route discovery and route maintenance procedures incorporate node mobility and are kept simple to impose minimal routing overhead on the network. Nodes in an ad hoc network are equipped with batteries and are usually mobile with varying node speeds. Inefficient utilization of battery energy via increased load (i.e. data transmission) on nodes may disrupt communication as nodes may die sooner due to energy depletion. Also, traditional routing protocols quickly discover a single route towards destination and source forwards data via this route. In case of abrupt link failures due to mobility or errors in wireless transmission on the discovered path a new route discovery is initiated leading to increased delays. The above-mentioned issues can be facilitated by disclosing the multiple directions to the destination, which can be stored at the source node or at the in between nodes and can be utilized immediately in case of any failure happens in the nodes link.

2. Related Work

In [6], proposed a CTPKM with no central trust entity with the goal of maximize presentation, at the same time as justifying security liability. Each node provides a trust threshold to determine whether or not to trust another node. Each node's choice creation using the known trust threshold affects presentation and security of CTPKM. Author take three different parameters competence, integrity, and social contact on the basis of this parameter set the trust level. In [7] author proposed a method based on route redundancy, route aggregation and round-trip time There are three phases on which proposed algorithm works in first phase, create a multipath to authenticate RREQ, second phase is used to aggregate which help to know the all possible paths of the source and destination. In last phase there is calculation of average time of all routes based on the number of hopes. In [8] author proposed a technique called PAWAODV (Power-Aware AODV) these techniques help to enhance the performance of device which has limited power resources and with help PAW-AODV devices can perform better as compare the normal AODV, Hop-Count limit is also a factor which helps to choose the efficient path.

2.1. Trusted AODV routing method

Trusted AODV is a trusted routing protocol based on trust model for mobile Ad-hoc network. Trusted AODV has many relevant features like Nodes perform trusted routing behaviors mainly according to the trust relations between them. A node that performs malicious behaviors will finally be detected and denied to the entire network. System routine is improved at every routing hop. Here the AODV routing protocol is embedded along with the trust function. The communication between the nodes in the mobile Ad-hoc network depends on the cooperation and the trust level with its neighbors. Based on the trust on neighbor and appropriate threshold values the nodes be capable of be categorize in to the subsequent. The conditions of node level:

Unreliable: it's having trust value between 0 to 0.5.

Reliable: it's having trust value between 0.4 to 0.7.

Most Reliable: it's having trust value between 0.7 to 1.

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3. Proposed System

In this paper, we propose a new method named as Wormhole attack prevention-threshold algorithm and it is described as Wormhole nodes and are announced to all other nodes. All nodes remove wormhole node id from its neighbor table and routing table. If any forwarding node receives the wormhole announcement node, it will send RERR message to source. It will reinitiate route discovery process and find the new path to the destination without wormhole node.

3.1. Algorithm

Step1: whenever a source node needs a route to destination the protocol starts route discovery. During route discovery, source node broadcasts RREQ packets through neighboring nodes. RREQ packet contains destination address and sequence number along with source address. Sequence number provides the freshness of the route.

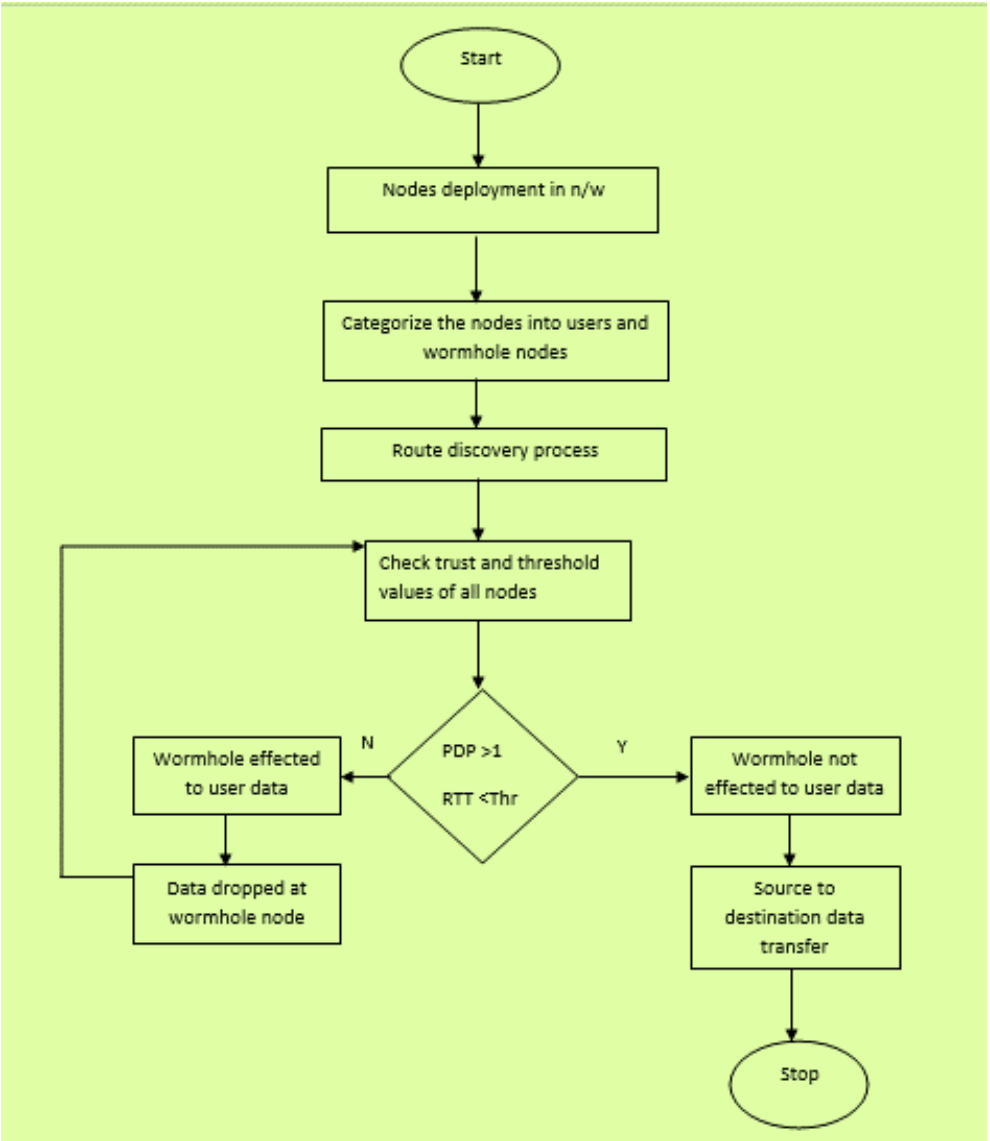

Figure 1. Flowchart of proposed algorithm

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Step2: once an RREQ packet is received by an intermediate node and verifies destination address. If the destination address not matches with the RREQ packet, then forwards it to its next hop. This process is repeated until it reaches the destination.

Step3: route path nodes are saved in routing table.

Step4: when source node starts sending packets, it sends to next node and that node sends to next until it reaches destination. The traversed path nodes are checked with the path nodes in routing table.

Step5: if the traversed path nodes are not in the routing table, wormhole is detected, and it is out band wormhole.

Step6: while sending packets to next neighbor node, PDR is calculated for each node. the ratio of sent packets to received packets is calculated for each node.

Step7: Hello packets also sending to each node along with packets until it reaches destination. Roundtrip time is calculated for each consecutive node. if the roundtrip time is less than threshold, that link is high speed link and the two nodes are malicious and detected as wormhole. And, if the PDR is less than 1, that node is wormhole node. the wormhole detected is active wormhole as it affects the packets.

Step8: If PDR less than 1 and RTT is not less than threshold means the loss may be due to traffic.

Step9: If PDR not less than 1, check for RTT less than threshold or not. If it is less passive wormhole is detected as the packets are not affected. If it is not less than the threshold, there is no wormhole.

Step10: Wormhole nodes are announced to all other nodes. All nodes remove wormhole node id from its neighbor table and routing table. If any forwarding node receives the wormhole announcement node, it will send RREP message to source. It will reinitiate route discovery process and find the new path to the destination without wormhole node.

4. Simulation Results

This section describes the simulation analysis of our proposed approach with comparison to the existing wormhole attack nodes prevention such as trusted AODV and normal AODV routing algorithms. We performed our test results in network simulator 2 (NS2) under the specifications provided in simulation table 1. The figure 2 shows that the analysis of throughput in which the simulation time has considered as X-axis and in Y-axis we took throughput values. We can observe that the performance of our proposed algorithm enhances the value of throughput when we compare with the Trusted AODV routing algorithm and normal AODV method. Figure 3 and 4 shows that the performance analysis of end-2-end delay and energy consumption, which provides that the superiority of our proposed wormhole attack nodes prevention algorithm.

Table 1. Simulation parameters

Parameter	Value
Application traffic	CBR
Transmission rate	10 packets/sec

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Radio range	250m
Packet size	512 bytes
Channel data rate	10Mbps
Maximum speed	30m/s
Simulation time	10secs
Number of nodes	25
Area	1000x500
Wormhole nodes	4
Routing protocol	AODV
Threshold	Dynamic threshold

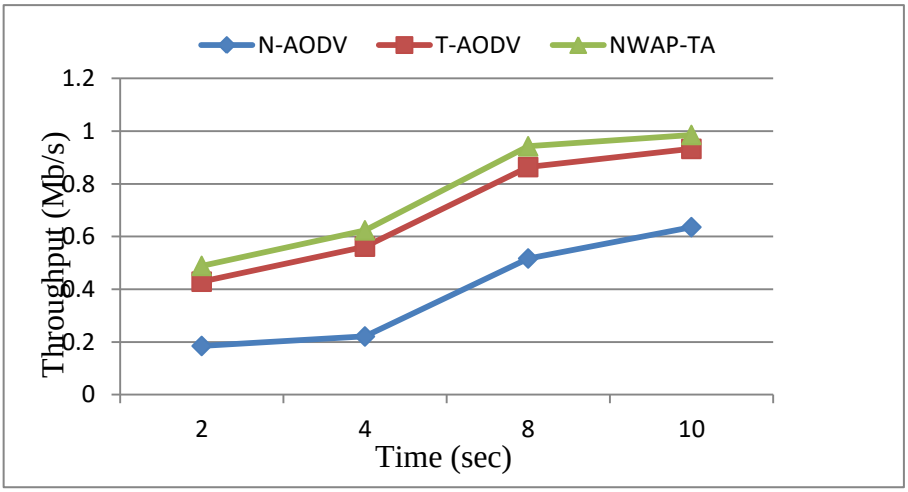

Figure 2. Comparative analysis of throughput with proposed and conventional routing algorithms for wormhole prevention

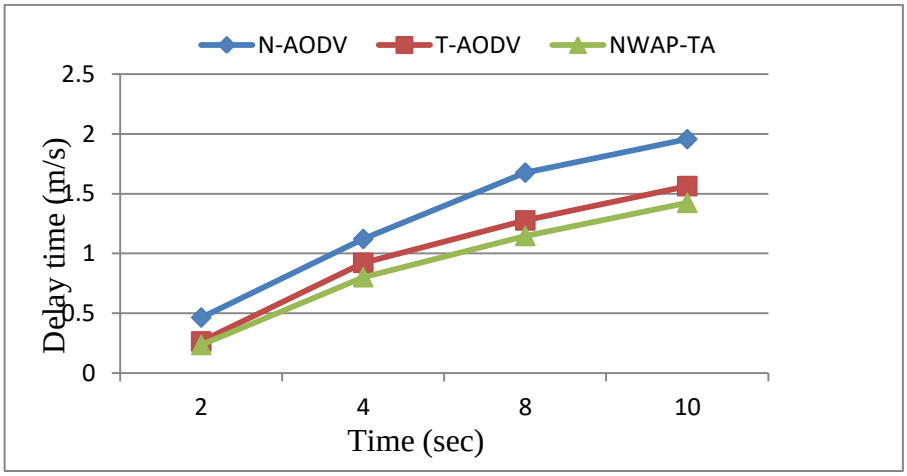

Figure 3. performance analysis of end-2-end delay

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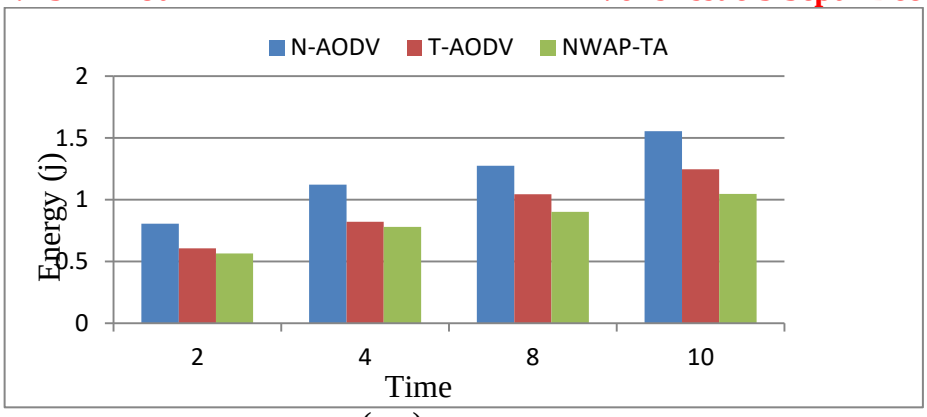

Figure 4. Comparative analysis of energy consumption with proposed and conventional routing algorithms

5. Conclusion

In this paper, we focused on detection and removal of wormhole attack during data transmission. The proposed algorithm provides more security to ad hoc networks and also prevent from such kind of attacks. It helps to increases the packet delivery ratio and reduces the control overhead by improving the performance of the routing protocol. Here we are discovery following conclusion on NS-2simulation. Like End to end delay of new fresh algorithm is better compare to TAODV. In future, we also plan to improve the table entries at destination node to get the detection of wormhole nodes faster. And also improve the security of wireless ad hoc networks. By deploying such efficient methods to prevent DoS attacks and hybrid attacks with the help of Wormhole attack prevention threshold algorithm.

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Detection of Malicious Apps in Online Social Network: Application of Facebook

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Abstract

The owners also resort and fraudulent model to deployment the ranking of the apps in the popularity list. There is limited understanding in the evolvement though the prevention of fraud has been widely is finding. We implement Firefox users to the number of installed applications on their Facebook profiles. We present the temporal analysis of the Facebook applications' stating and removal dataset take user requirements. Online social networks (OSNs) are new vectors for cybercrime and hackers are finding new ways. We present results in the perspective of over 12K users to install. Our purpose system is creating a Facebook application and user goal is to develop a FRAppE Face book's Rigorous Application. Online Social Networks (OSN) takes third party apps to changes the user experience on the platforms. Such modifications are interesting communicating number of online friends and new models such as playing games. We take facebook provides to developers an API that facilities app applied into Facebook user experience. Present Ackers to started taking advantage of the resource of this third-party apps platform and deploying small applications and small apps will give a profitable business for hackers given the recognition of OSNs. It is safe and secure data is added in our wall. Thus, the Offensive words and posts are blocked with the help of dictionary using filters and it is not publicly posted to user wall.

Index Terms: *Profiling Apps, Online Social Networks, - Measurement, Security, Verification, Facebook, evidence aggregation, ranking fraud, secret key.*

1. Introduction

One of the most popular application to comes with own advantages and disadvantages is Facebook. Today we can see that there are 500k apps is available on Facebook within that 40M apps [2] is stating everyday by the Facebook users. Such changes is consist of interesting even enjoyable way associated with communicating number of online good friends in addition to different things to do like since getting referrals even enjoying tunes. One example is Myspace supplies developers the API [3] in which facilitates software integration in to the Myspace user-experience. In [4] the data detection system for mobile apps has been studied and it is provided a holistic view. The leading sessions and the leading events of the app were studied using the mining leading session's algorithm. In [5], it proposed Facebook's Rigorous Application Evaluator (FRAppE). It failed to recommend to the website the hackers. Online social networks (OSN) are third party apps to enhance the user experience on the platforms. In our previous study [6] we presented preliminary statistics on this dataset We finding that within the first week after the add-on's stating use the user's number of applications decreased by 12.1% on average. The application removal rate continued to grow up to 27.7% by an average of 63 days after the

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initial use. This model is maximizes classify posts thus reducing the cost of resources required to support a given population of users.

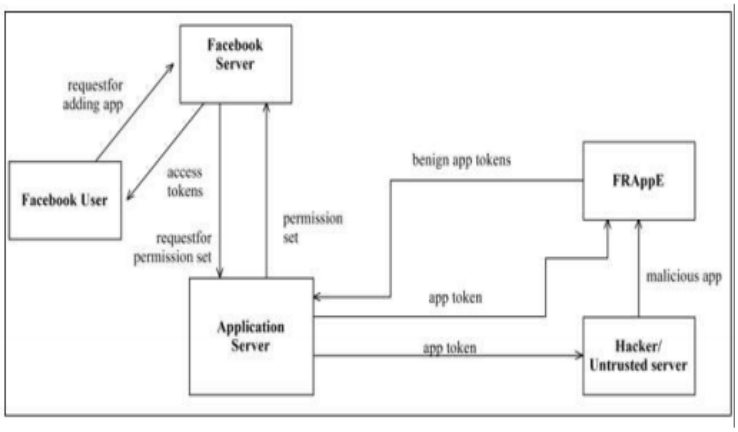

Fig. 1 MySpace Supplies Developers Model

2. Related Work

Detecting and characterizing social spam campaigns. Gao. [7] Analyzed posts on the walls of 3.5 million Facebook users take 10% of links posted on Facebook walls in spam. They also presented techniques to identify compromised accounts and spam campaigns. Towards online spam filtering in social networks Rahman, [8] Develop efficient model for online spam filtering on Social networking applications such as Facebook, Twitter, and Instagram. Towards online spam filtering in social networks, Gao [8] is efficient and security Socware Detection in Online Social Networks. Rahman [9] develop efficient model for online spam filtering on Online Social Networking sites such as Facebook Detection is the most standard way to deal with security and privacy problems. MyPageKeeper is based on a Support Vector Machine (SVM) classifier that uses a main feature specific keyword occurrence in a post made by an application. Web sense Defensio [10]. They found that about 9% of the studied posts were spam or small. In 2012, Rahman, [11] Improved his previously modify work. Rahman, developed the FRAppE: A tool is identify small applications by using the application data as features. New examples include the number of permissions required the domain reputation of redirect URI, and others. FRAppE can detect malicious applications with 99.5% accuracy and a low false negative rate 4.1%. Popular websites area unit under fire all the time from phishes, fraudsters and spammers the aim to steal user data and expose users to unwanted spam. They're well funded, with full-time practiced labor, control over compromised and stating accounts, and access to global bonnets. Security our users may be a difficult adversarial learning drawback with extreme scale and cargo needs. Over the past many years we engineered and deployed a coherent security and protrusive real-time system to shield our users and the social graph.

3. Proposed Solution

The proposed system using the FRApp tool and detect the block the small applications in the Face book. The user is trying to post the offensive words to the user's Face book wall those words or posts are detected using the dictionary and it gets filtered.

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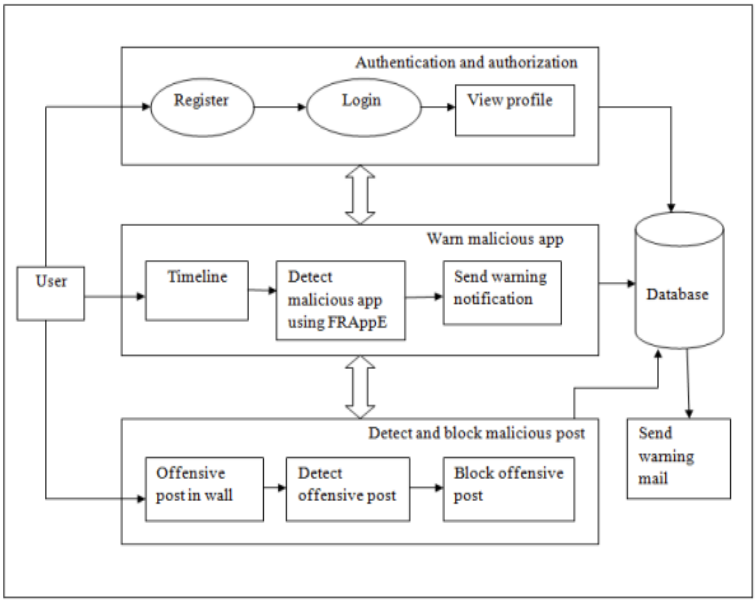

Fig. 2 System Architecture for Proposed System

We found any installation of the malicious app user wall gives total notification that the app found is small whether to install it or not. Offensive words or posts which are related and detected and blocked using the FRAppE tool. These words are posts will not display in the public wall. Instead of that such post will be migrated to the blocked post list a tool stands for Face book's Rigorous Application Evaluator which is helpful in modify the entire system. In Authentication and Authorization module the user in register the data and login into the pages to view their profile to see all the contacts the user.

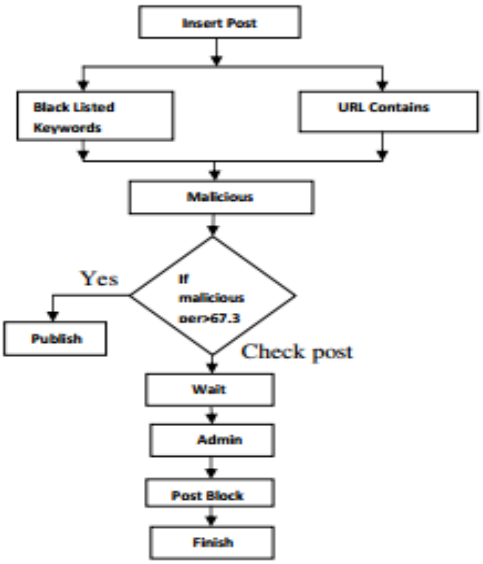

Fig. 3 Proposed Methodology

A. Detecting Spam on OSNs

We analyzed posts on the walls of small Social networking app users 10% of links posted on Social networking app walls in spam. We develop efficient models for online spam filtering on OSNs such as Social networking app is used only by the OSN provider; develop a third-party application for spam detection on Social networking app. Others

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present model find the spam URLs on Social networking app and contrast to all of these efforts rather than classifying individual URLs or posts as spam we aim on identifying small applications is main source of spam on Social networking app.

4. Implementing Mypagekeeper

We provide some details on MyPageKeeper's implementation.

A. Facebook application

First, we implement the MyPageKeeper Facebook application using FBML [12]. We implement our application server using Apache (web server), Django (web framework), and Postgres (database). Once a user installs the MyPageKeeper app in her profile, Facebook generates a secret access token and forwards the token to our application server, which we then save in a database. This token is used by the crawler to crawl the walls and news feeds of subscribed users using the Facebook open-graph API

B. Crawler instances and frequency

We run a set of crawlers in Amazon EC2 instances to periodically crawl the walls and news feeds of MyPageKeeper's users. The set of users are partitioned across the crawlers. In our current instantiation, we run one crawler process for every 1,000 users. Thus, as more users subscribe to MyPageKeeper, we can easily scale the task of crawling their walls and news feeds by instantiating more EC2 instances for the task. Our Python-based crawlers use the open graph API, incorporating users' secret access tokens, to crawl posts from Facebook. Once the data is received in JSON format, the crawlers parse the data and save it in a local Postgres database.

C. Checker instances

Checker modules are used to classify every post as socware or benign. Every two hours, the central scheduler forks an appropriate number of checker modules determined by the number of new URLs crawled since the last round of checking. Thus, the identification of socware is also scalable since each checker module runs on a subset of the pool of URLs. Each checker evaluates the URLs it receives as input—using a combination of whitelists, blacklists, and a classifier— and saves the results in a database

5. Social Malware Ecosystem

We discover the harmful apps , after that we check the several ways how the social malware support each other. From our observation we find the interesting thing that malicious apps do not operate in segregation they share the same name and their work must collaboratively in encouraging each other.

- The emergent‘s of AppNets We observed that more than 6,330 malicious apps in our dataset that emerge in collaborative promotion. In that 2.5% are promoters,58.8% are promotes, and the remaining 16.2%play both roles.
- Piggybacking The app piggybacking is a approach in which hackers are using this. The facebook‘s API and their post are harmful post by using popular apps. There are several ways that hackers are benefited by this. The hackers make the user to share the harmful post by offering rewards. They crawl the API from Facebook by hacking the users account; they again post the harmful app in the user‘s wall. By the app in the

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request to post the harmful post. The Facebook could not recognize this because the app ID is already included in the appID.

6. Session Tracking Algorithm

This session tracking concept [13] is used in the proposed system to identify the users that are trying to misuse the particular App. There are three typical solutions to this problem: cookies, URL rewriting, and hidden form fields. You can use cookies to store an ID for a downloading session; with each subsequent connection, you can look up the current session ID and then use that ID to extract information about that session from a lookup table on the server machine. URL rewriting is a moderately good solution for session tracking and even has the advantage that it works when browsers don't support cookies or when the user has disabled them. The users that are using the App and downloading it are provided with a session each and they are continuously been tracked by the admin with the help of a session tracking algorithm. A cookie is assigned to each user as a session starts and it is been tracked as the user is continuously using the App. When a number of users are using the system by downloading and uploading the Apps, even when a particular user is found to be misusing the Apps among all other users, he is blocked with the help of a session tracking algorithm and all the user details are sent to the Admin immediately and the user is blocked from accessing the apps. The user is notified of the block and is permitted to access other apps. The number of times or the hits a particular user is using the App is being recorded with which the overall misusing of the App is calculated.

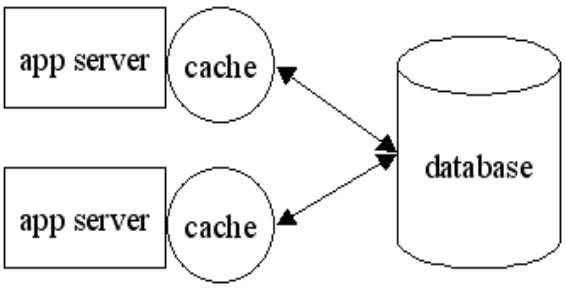

Fig. 4 Session Tracking Flow

7. EXPECTED RESULTS

The study presented in this paper is a work in progress with many available future directions. By gathering additional information about what kind of applications users tend to restrict, we can develop an algorithm for application removal recommendations. Moreover, when the same applications are restricted by many users, we can conclude with high likelihood that these applications are fake applications and recommend to Facebook and our users to remove these applications from the social network and their accounts.

Another possible future direction is discovering the point in time when the Add-on Users' application numbers start increasing again, and at that point, to give the user a special warning regarding his or her number of applications.

- FacebookNets form large and densely connected groups
- Posting direct links to other Facebooks
- Indirect Facebook promotion
- Facebooks with the same name often are part of the same FacebookNet.
- Amazon hosts a third of these indirection websites.

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- Robustness of features
- Recommendations to Facebook
- Detecting spam accounts
- Facebook permission exploitation.
- Facebook rating efforts

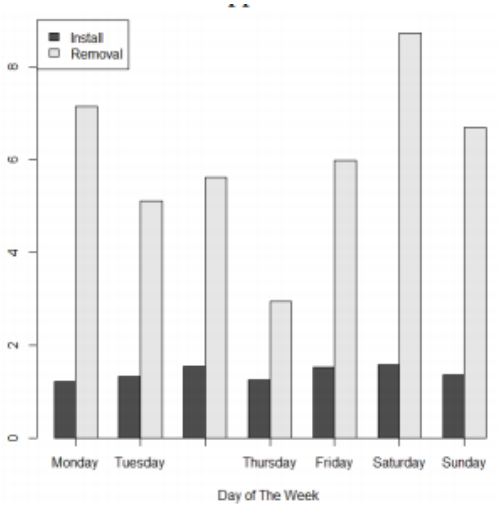

Fig. 5 Average application install and removal per day of the week

8. Conclusions

In this study, we presented our initial methods and results in studying online social network applications with an aim of improving user's safety and awareness. According to our results, it is possible to predict the number of applications a casual user has with high accuracy. we presented the design and implementation of MyPageKeeper a Facebook application that can accurately and efficiently identify socware at scale. Using data from over 12K Facebook users, we found that the reach of socware is widespread and that a significant fraction of socware is hosted on Facebook itself. Applications present a convenient means for hackers to spread malicious content on Social networks. However, little is understood about the characteristics of malicious apps and how they operate. And finally, we explore the ecosystem of malicious Facebook apps and identify mechanism that these apps use to propagate. We will continue to investigate on hacker's platform dig deep into their ecosystem to reduce the malicious app on Facebook.

9. Future Enhancement

We undergone the concept is all about posting and detecting applications on the Wall and the project has been designed keeping in mind the future scopes. A lot of tools can be used to shape many things in the future; thus this project will give rise to many future modifications focusing in all t he directions. The near future scope of this project is to block the images with offensive form of text and messages from the user wall Leveraging our observations, we developed FRAppE, an accurate classifier for detecting malicious Face-book applications. Most interestingly, we highlighted the emergence of AppNets large groups of tightly connected applications that promote each other. The application which are malicious their review, ranking and reporting will be done.

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Distributed File Replication Algorithm for Content based File Sharing System using Dynamic Peer-to-Peer Networks

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Abstract

The main aim of the research work is to develop the data replication algorithm based on data security, data processing and load balancing in order to take the minimum energy consumption and high data availability rate in the network. Mobile Ad hoc Networks (MANET) take collection of wireless mobile system dynamically forming new network without the use of any backend infrastructure or centralized administration. Based on Peer-to-Peer (P2P) network file destitute is mainly implementing in MANET. Several data replication protocol is proposed to minimize results degradation. These selfish nodes could data is reduce total data in the network. We introduce a new concept of Distributed File Replication algorithm which considers file dynamics network such as file addition and deletion in dynamic manner. Content-based file sharing scheme using dynamic network is proposed user interest is determined by the proposed scheme before searching and sharing the files in the peer-to-peer network. The locations in the network are utilized as per the contents of the files to be shared. It provides security to decentralized p2p network by the implementation of key server and Intrusion Detection System (IDS) with new P2PHBA algorithm is used for the prediction modify path in the network by the scout is implementation to the efficient file sharing. The present replication protocol drawbacks, they are node storage and the allocation of resources in the replications. Future wireless communications are heading many all-Internet Protocol (all-IP) design and will rely on the Session Initiation Protocol (SIP) to manage services such as voice over IP (VoIP).

Index Terms: *Content-based file sharing; interest extraction, interest-oriented file sharing; peer-to-peer network, Mobile Ad hoc Network (MANET), file Replication, Query Delay.*

1. Introduction

In a mobile ad hoc network (MANET), mobile hosts can communicate directly with one another using direct pair wireless links. Because it requires no fixed infrastructure and most of the time no explicit administration a MANET can extremely useful to support communication in challenging situations, such as in rural, remote disaster-struck areas. P2P computing refers to technology that enables two or more peers to collaborate spontaneously in a network of equals (peers) by using appropriate information and communication systems without the necessity for central coordination.[1] Content inserted into the network is stored and forwarded by cooperating nodes. Metadata and queries are also inserted to represent essential attributes of content and to retrieve appropriate content from the network. Routing

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and caching perform in-network matching between metadata and queries. Content and metadata/queries must be protected by a decentralized security framework to enable access control of content. Optimization of the content management strategy under constraints can be seen like many other problems in networking as a utility maximization problem. Generally, optimizations at each layer require situation- and resource-aware cross-layer adaptation that is cognizant of features, limitations, and dynamicity at each layer to maintain content accessibility with reasonable trade s between availability and bandwidth. [2].

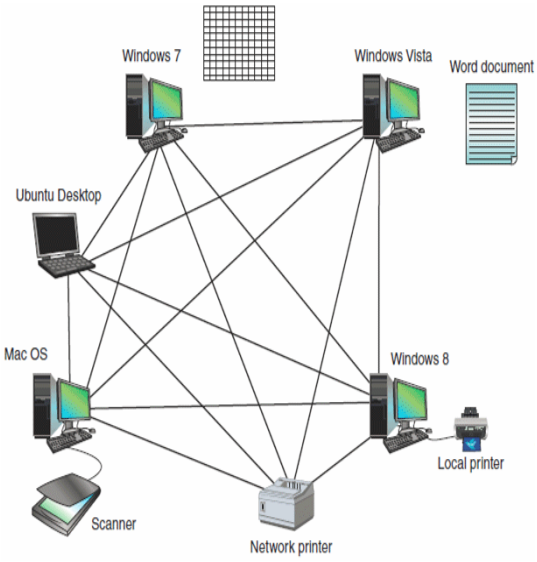

Fig. 1. MANET Peer-to-Peer Networks

For instance, the degree of redundancy for caching of content in a cluster of nodes should take into account the cluster density and stability (lower layer), and at the same time the type and importance of the content (higher layer). MANET (Mobile ad hoc network) is dynamic networks populated by mobile stations. Stations in MANETs are usually laptops or mobile phones. These devices feature Bluetooth or Wi-Fi network interfaces and communicate in a decentralized manner. Mobile ad hoc networks are composed of a set of communicating devices able to spontaneously interconnect without any pre-existing infrastructure for it. Devices in specific range can communicate in a point-to-point fashion. More and more people are interested in mobile ad hoc networks.

Peer-to-peer (P2P) networks and Virtual Private Networks (VPNs) are two typical overlay networks in constructing large scale distributed applications over large networks. Peer-to-peer networks run on top of the Internet. Peer-to-peer networks are distributed systems where the software running on each node provides equivalent functions. A definition of P2P networking is a set of technologies that enable the direct exchange of services or data between computers. Implicit in this definition are the fundamental principles that peers are equals. P2P systems emphasize sharing among these equals. A pure peer-to-peer system runs without any centralized control or hierarchical organization. A hybrid system uses some centralized or hierarchical resources. Peers can represent clients, servers, routers, or even networks [3].

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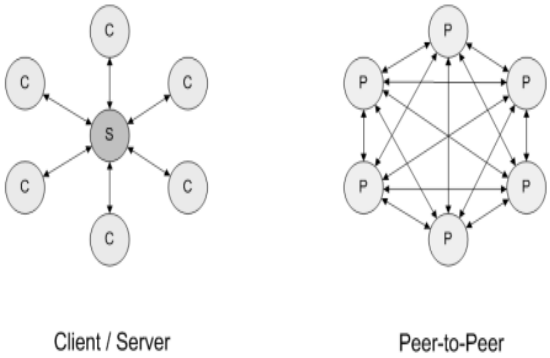

Fig. 2. Client/Server Model versus P2P Model

2. Related Work

With the everyday increasing importance of privacy, security, and wise use of computational resources, the corresponding technologies are increasingly being faced with the problem of file type detection. True identification of computer file types is a difficult task especially when dealing with suspicious goals. Computers are dealing with the huge number of file formats that are transmitting between the insider and outsider networks. Without the true file type detection, the security will not be achievable. File type detection has the most usage and importance in the proper functionality of operating systems, firewalls, intrusion detection systems, anti-viruses, filters, Steganalysis, computer forensics, and applications dealing with the file type classification [4].

Although there are many applications dealing with file type detection, they have very limited methods for determining the true type of files. The newest method of file type detection is based on the file contents. McDaniel and Heydari published the first paper on content-based file type detection [5, 6]. In mobile environment, data is distributed across the network majorly in the form of pushing (data dissemination) and pulling (data hosting) techniques. Few of the possible techniques based on push/pull mechanism have been surveyed in [7]. This includes data dissemination over limited bandwidth channels, location-dependent data querying and advanced interfaces for mobile computers. Moreover, these approaches have few issues to be addressed such as how to store information on database, how to effectively and optimally design database for mobile network, low bandwidth in network; and frequent network partitioning caused by mobility and energy constrained of peers.

The works in [8-10] show the several approaches to address these research issues in mobile networks. Content-based routing and caching solutions for disruption tolerant networking (DTN) require resource provisioning to determine storing or forwarding of a particular piece of content to maximize its availability. Quantifying the benefit and cost of such operations can be formulated as a utility maximization problem Our compositional optimization improves content-based utility by treating individual layers as modules, which makes it easier for further generalization to incorporate various local optimizers, such as deferent routing or caching schemes. Cross-layer optimization under constraints has been studied in networking previously. The work proposes Conquer, a broker-based economic incentive model for

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mobile peer-to-peer networks. Although the work considers free riders to host data in mobile peer-to-peer networks, it assumes that all peers are trusted and they do not cheat. some strategies for handling selfish behavior have been proposed in the research field of distributed databases. However, these works cannot be directly applied to a MANET, since they did not consider the constraints such as the bandwidth limitation for the detection of selfish nodes and system failures due to frequent node disconnections of a MANET.

3. System Design

Architectural diagram deals with cluster of mobile nodes. In this architecture each cluster contains cluster head. Each cluster head of each cluster is communicated with centralized node. Cluster head is also elected by centralized node. Each member in the cluster is identical in some features. Each member in the cluster requests the cluster head for files and data. Cluster head includes all information about cluster members. Cluster head one group must communicate to cluster head of another cluster in order to get information of cluster member of that particular cluster.



Fig. 3. MANET Architecture

4. Proposed Solution

The content-based file sharing in peer-to-peer networks using threshold. File sharing client allows a number of people to use the same file or files by some combination of being able to read or view it, write to or modify it, copy it, or print it. Typically, a file sharing system has one or more administrators. File sharing clients may all have the same or may have different levels of access privilege. we propose a new distributed file replication protocol to minimize the average querying delay.

Priority Based Dynamic Replication (PBDR) technique is used adding and deleting the replica files based on the priority. The file has been succeeded in the priority competition then adding the replica files, otherwise deletes the replicas. The proposed algorithm well considers the caching overhead and adapts the cache node selection strategy to maximize the caching benefit on different MAC layers. Results show that the asymmetric approach outperforms the symmetric approach in traditional 802.11 based ad hoc networks due to removal of most of the processing overhead. This file sharing client generated request to share file. In request

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analysis, the request is analyzed to see whether it is authorized or not. If it is authorized then process will be continued otherwise it is stop there. The sample files are collected from different sources to ensure that the sample files of a file type are not generated by one source.

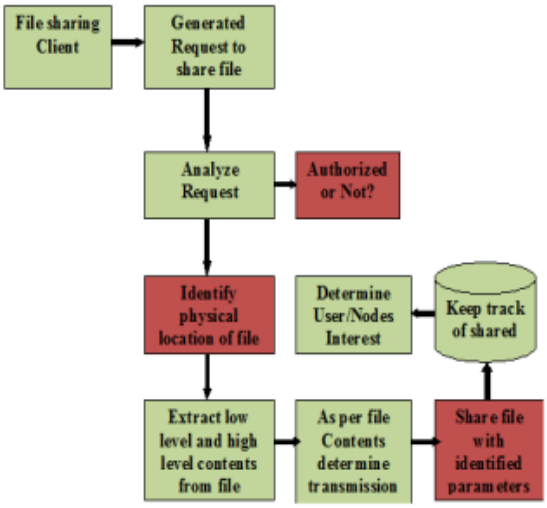

Fig. 4. Content-Based File Sharing using Threshold

A. Replica Allocation

The SCF-tree based replica allocation techniques are inspired by human friendship management in the real world, where each person makes his/her own friends forming a web and manages friendship by himself/herself. He/she does not have to discuss these with others to maintain the friendship. The decision is solely at his/her discretion. After building the SCF-tree, a node allocates replica at every relocation period.

Algorithm:

1. Initialize :
    a. Initialize node memory(in pkt)
    b. Initialize the update timer
2. Send request for allocate replica
3. If node selfish
    a. Give wrong reply or no response
4. If not
    a. Send correct reply
5. If reply is received by originator
    a. Process the reply
    b. And make the route
6. If timer is triggered

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a. Send the query for checking

7. If node is correspond node then sends the query reply

8. Originator checks the query reply

a. And forms the SCF tree

b. And allocates priority and replica according to the tree

B. The P2PSIP Protocol

P2PSIP implements traditional proxy and registrar SIP functions in a distributed way. Resource information is distributed among all the peers in the overlay, and requests are also handled by the overlay infrastructure. The main advantages of P2PSIP are cost reduction and the elimination of single failure points. Using P2PSIP, any DHT-based P2P network can locate resources in a decentralized way. The clients only use resources from the overlay. They do not participate in its maintenance. The information stored in the P2PSIP overlay consists of registers of the peer nodes and the resources available at these nodes. Kademlia's distributed resource tables (DRTs) are similar to DHTs employed for peer registration A P2PSIP deployment has an overlay name, and the participants can be peers SIP clients. The peers are identified by a peer-ID, and they collectively serve as a directory service for locating resources using the defined DHT structure. The same procedures as those described based on unique resource-IDs and a XOR metric, are employed. In order to keep registers up-to-date. Protocol dSIP [11] uses SIP messages to implement P2PSIP, while preserving the semantics of conventional SIP messages as much as possible. Although there are newer P2PSIP implementations, dSIP has several advantages:

- Simplicity of implementation (still text-based)
- Minimization of the number of protocols required for a P2P UA.
- Easy integration into existing UAs and reuse of available SIP stack implementations.
- Widespread support.

The message to add, remove and query bindings in DHT and resource tables is SIP REGISTER [12]. dSIP supports:

- Peer and resource registration.
- Session establishment.
- DHT maintenance (dSIP is modular, so it allows multiple DHTs).

dSIP peers are active members of the overlay and provide operations to enable self-organization (SIP server-like functions) in addition to the basic functionality of any SIP endpoint. The dSIP overlay serves as a directory service for locating resources.

C. Vehicular Network (VANET)

VANET is one type of mobile ad hoc network where each vehicle act as a router either V2V i.e., Vehicle to Vehicle communication, Vehicle to Infrastructure communication take place. This simply means, Network on wheels. To perform agent migration and mobility

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among nodes (handover) in an infrastructure less vehicular ad hoc network (VANET) the concept of opportunistic communication is evaluated and by considering this, [13] looks at location awareness to support agent mobility. One of the interesting applications of this idea is "virtual sensor network" composed of software agents that done the task in form of sensing services with the help of available resources provided by physical nodes like computer platforms, communication devices or physical sensor devices. Exchanging events in vehicular ad hoc network (VANET) helps drivers to receive information about relevant places or to avoid undesirable situations. The work in [14] presents data management as a solution for event exchange in vehicular networks and comparison of two different approaches. From that the first approach is helpful to estimate the relevance of events by calculating of geographic vectors; and second approach exploits digital road maps. For the testing of proposals in a real environment, a prototype is described here. The usefulness of utilizing the information stored in digital road maps for data management and sharing in vehicular networks as well as the first approach is useful in cars where maps are not available has been proved by an exhaustive simulation-based experimental evaluation[15].

D. Dynamic Source Routing Protocol

DSR is a reactive routing protocol with no periodic update messages like table-driven routing protocols to manage a MANET. It is specifically designed for use in multi-hop wireless ad hoc networks where the protocol allows the network to be completely self-configuring self-organizing where there is no need for an existing network infrastructure or administration. Only at the time routing a path is required by a node (On-Demand Routing) the process to find a path is get executed to restrict the excessive use of bandwidth. In DSR the source node (sender, initiator) first determines the communication path to reach the destination node (Source-Routing) and then deposits the intermediate node addresses in the packets. Compared with other reactive routing protocols like SSA or ABR DSR will be beacon less that is there is a no need of hello-messages by the nodes to notify their neighbors about their presence. DSR was developed for MANETs with a moderate speed at small diameter of 5 to 10 hops. DSR uses the Link-State-Algorithms that is each node can be able to save the best way to a destination. Whatever may be changes were made in the network topology will be broadcasted to the whole network by flooding. DSR contains 2 phases Route Discovery (find a path), Route Maintenance (maintain a path).

5. Performance

The output of each technique in the simulation test on NS-2 the hit rates and average delays of the four protocols. We used the following metrics in the experiments:

Hit Rate: It is the number of requests successfully handled by either original files or replica files.

Average delay: This is the average time of all requests that finish execution. The delay that calculate using the throughput and the performance of the requests.

A. Hit Rate

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The hit rates of the four methods with the simulations results. The hit rates continue SAF>DAFN> DCG >PBDR. The PBDR achieve higher hit rate than other methods. since PBDR realizes distributed way, it presents slightly differ from performance compared to others. PBDR considers the intermediate connection properties of disconnected MANETs and replications. DCG only considers temporarily connected group for file replication.

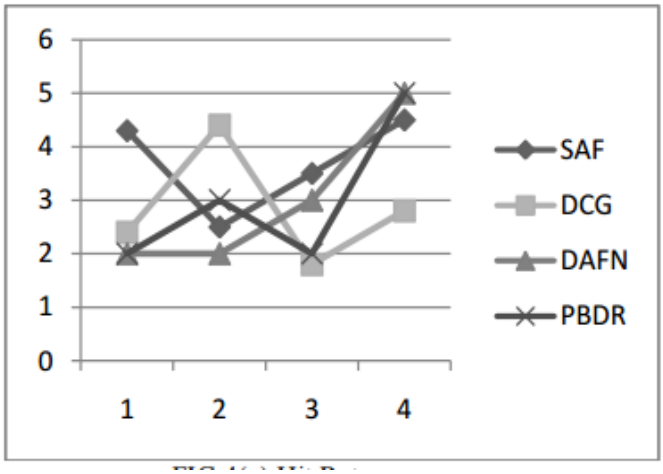

Fig. 5. Hit Rate

B. Average Delay

Demonstrate the average delays of the four methods with simulation results. The average delays show PBDR<SAF<DAFN which is in reverse order of the relationship between the four methods on hit rate as shown in Fig5 . This is because the average delay is related to the overall file availability in descending order. The PBDR have high file availability .SAF distributes every file to different Nodes while DCG only shares data among simultaneously identify neighbor nodes, and DAFN has a low file availability since all files receive equal amount of memory resources for replicas. The PBDR has the minimum average delay in the simulation results.

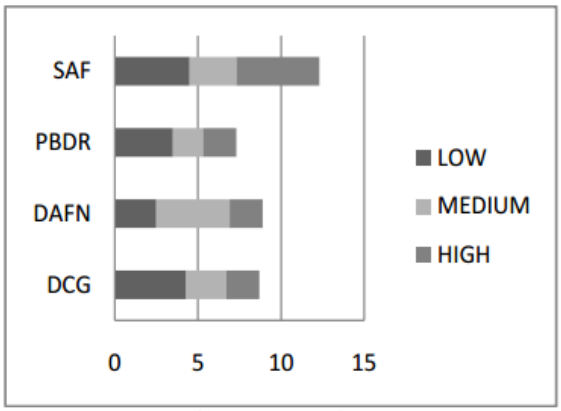

Fig. 6. Average Delay

6. Conclusion

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We also plan to improve the current leveling technique by considering the frequency of disconnections and/or the weighted ratio of total number of items and average of shared memory space we will discuss the important research issues in more detail related to mobile databases. This survey presents various mobile applications, including facility of data sharing and data storing for easy and handy access to the static and dynamic information in the mobile databases. It also discussed the various communication strategies in mobile ad hoc networks. The proposed mechanism can be used in any network environment having limited number of resources and maximum number of transmissions. This cluster form of monitoring will also decrease the overhead which may be happened while cluster head has maintaining the routes. IDS will identify the nodes as trusted and untrusted based on some threshold values and also inform about entrusted to all nodes in the network to transfer data in a secured manner. For the dynamic routing purpose nodes outside the network coverage need to get authenticated by IDS. We are currently working on the impact of data updates and different moving patterns on our scheme. In future the proposed scheme can be extended for identifying the requirements of the network for best effort network services

7. Future Work

Future work consists in enhancing protocol with quality of service mechanisms and providing measurement studies of the protocol performance. Considering the problem of overlay topology design, future work could also focus on studying the overlay topology creation and adaptation in case of unknown traffic demands. A hybrid network with a mix of selfish and cooperative nodes is an additional interesting scenario. Heterogeneous values of the overlay cost coefficient could be proposed for each node in the network, and its effect on the overlay topology creation could be studied. Otherwise, there can be an interesting joint between overlay networks and Pocket Switched Networks which could be studied in depth to make solid proposals.

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Fuzzy-based Efficacious Routing Protocol for Large-scale Mobile Networks

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Abstract

An efficient detection and recovery algorithm to identify clone node efficiently to recover the Wireless Sensor Networks by replacing only few sensor nodes along with often used alternative routes. Wireless sensor networks are exposed to different types of security threats is reduce the performance of the total network. Defensive mechanisms like key management protocols, authentication protocols and secure routing is providing security to WSN. We first analyze the desirable properties of a distributed model. After that we show the solutions for the problem and later for detection of node replication attacks. We propose a self-healing RED protocol Randomized, Efficient, and Distributed protocol. We propose a technique to improve routing protocols by considering both energy and failure constraints and managing the proposed protocol, the routing protocols dynamically modify to node's failure. We propose a fuzzy based efficient routing protocol (FBERP) for large scale mobile networks that aims to minimize the packet loss rate. Every node in the network is characterized by its communication parameters. We develop a fuzzy logic controller that combines these parameters, Packet Loss Rate, Communication Rate, Energy and Delay Parameters.

Index Terms*: Distributed Solutions, Physical Capture Attacks, Wireless Sensor Networks, Security, Intrusion Detection System, Fuzzy Logic, Route Recovery, Route Discovery.*

1. Introduction

A wireless sensor network consists of spatially tribute autonomous sensors to monitor physical conditions in wireless sensor networks is deployed in harsh environments to fulfill both military and civil applications [1]. A Wireless Sensor Network (WSN) is a highly distributed network of resource constrained and wireless devices are called sensor nodes. Each sensor node modifies some physical phenomenon inside the area of deployment [2]. The collected measurement is sent to a base station. The communication range of sensor nodes is limited to tens of meters and directly communicates with the base station [3]. The Wireless sensor network is a collection of sensors is spread over large geographic area. Since sensors is widely spread and large in number the occurrences of faults in the network.

Hence to detect the fault node and to replace the fault node an efficient algorithm is proposed [4]. Fuzzy logic implements human experiences and preferences via membership functions and fuzzy rules. A membership function is a mathematical formation of representing a fuzzy set [5]. A fuzzy number is a quantity total value is imprecise rather than exact as is the case with "ordinary" numbers [6].

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2. Related Work

Failures are unavoidable in Wireless Sensor Networks due to the lack of updating and unattended deployment. There are many methods related to energy, memory and computational ability of a sensor node. The occurrences of faults are mostly due the presence of faulty sensor nodes [7]. To identify a fault node and to replace it many techniques is proposed [8]. Most of the sensor network applications used reliable data delivery to sink instead of point-to-point reliability. It is vital to provide fault tolerant techniques for distributed sensor network applications [9]. The metrics find Link Expiration Time (LET), Received Signal Strength (RSS), Available Bandwidth (ABW) and Residual Energy (RE) and based on these metrics' node is classified as weak, normal or strong using fuzzy set[10]. Proposed distributed routing protocol TORA is provides functions, Creation of routes, Maintenance of routes and Erasing of routes. The protocol uses different packets for these functions [11]. The same results show that the proposed RED protocol meets the desirable properties. We find the feasibility of the RED protocol. The set of simulations result shows the RED protocol is implemented in sensor network is analyzed [12]. And, as a self-healing model it used continuously iterated over the same network without significantly affecting the detection protocol and network performance itself. We consider the influence of an attacker intervening on message routing both for RED and LSM [13].



Figure 1. Mobile network

3. Threat Model

It replicates one or more clones into multiple copies by compromising a certain fixed number of nodes. In general, it is possible to cope with threat to assume that nodes are tamper-proof. We will assume that the nodes do not have tamperproof components consistently with a large part of the tamper-proof hardware is expensive and energy demanding [14]. To prevent clones from being detected by the detection protocol used in the mobile network is the adversary goal. The sensors choosing from the total network is compromised by adversary. Intuitively an adversary that needs some time to move from one point to another of the network area is described by the localized adversary, while the ubiquitous adversary security nodes regardless of their position during the same time interval [15].

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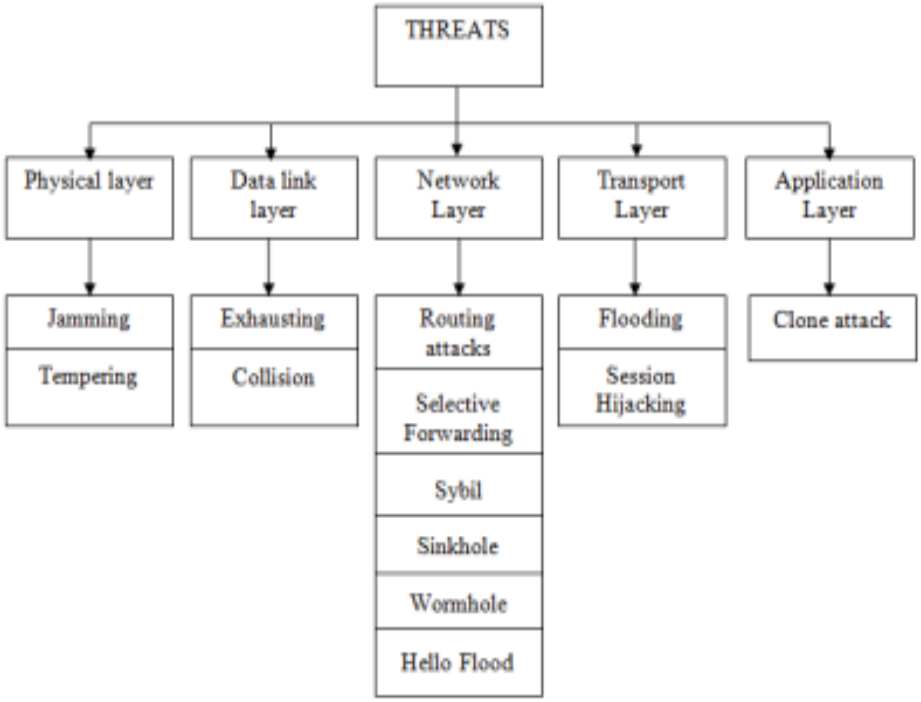

Figure 2. Layer based classification of threat

4. Proposed System

Our mobile network model takes set of low-power radio frequency (RF) transceivers which move relative to each other across an irregular terrain subject to RF propagation impairments. The combination of low power and propagation environment produces a network characterized by stochastic link failures. We propose a novel scheme Link Scanner (LS) for updating wireless links at real time [16] We propose a self-healing RED protocol. Randomized, Efficient. Distributed protocol and it meets the requirements. Finally, it shows that our protocol is highly efficient in memory, communication and computation. The mobile robots check the group of sensor functions and exchange secret keys and verify their identities. Upon new inclusion, a node is collecting enough authorizations from its neighbors and privilege is accepted by the sink [17] . The presence of unauthorized node is detected by Bootstrapping algorithm. Bootstrapping the sensor network refers to the discovery of deployed sensors and finding direct communication links between each gateway and sensors that are reachable to it. We propose a fuzzy based efficient routing protocol (FBERP) for large scale mobile networks that aims to minimize the packet loss rate. Each node in the network is characterized by its communication functions develop based on fuzzy logic [18].

4.1. Grade Diffusion Algorithm

The Grade Diffusion algorithm not only creates the routing for each sensor node is also identifies a set of neighbor nodes to reduce the transmission loading. Each sensor node is select a sensor node from the set of neighbor nodes relay. The number of sensor nodes is functioning exceeds the threshold [19]. Genetic algorithm is used for replacement [20]. There are 5 steps in the genetic algorithm: Initialization, Evaluation, Selection, Crossover, and Mutation

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Initialization: Here chromosomes is generated. Each Chromosome is an expected solution. The number of chromosomes depends on number of sensors is replaced.

Evaluation: The Number of routing path available some nonfunctioning sensors is replaced evaluated based on fitness value. This fitness value is calculated with number of sensor nodes grade values, number of reusable routing paths.

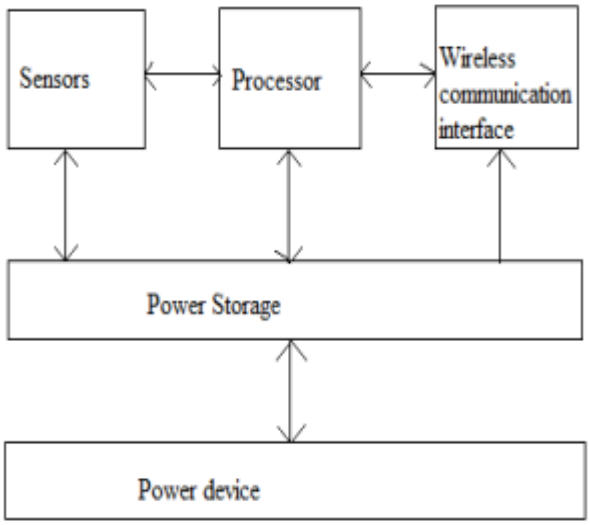

Figure 3. Block Diagram of Mobile Network

Selection: Here chromosomes with lowest fitness values are eliminated.

Cross over: Two individual chromosomes is selected and compared and a part of it is replaced with the other to produce new offspring.

Mutation: Here a single gene is replaced after comparison.

4.2. Fuzzy Based Efficient Routing Protocol

We propose new fuzzy based efficient routing protocol (FBERP) for large scale mobile networks that aims to minimize the packet loss rate. Every node in the network is characterized communication parameters [21]. We develop a fuzzy logic controller that combines these functional Packet Loss Rate, Communication Rate, Energy and Delay Parameters. The value obtained, indicates the priority of a node with maximum throughput is selected and it is used in route formation. Our simulation of proposed protocol outperforms the standard AOMDV routing protocol as the packet loss rate is minimized in our proposed work. In future work can be done to lower down the packet delay and any other communication parameters may be used to further improve the protocol [22].

4.3. Algorithm

Step 1: N nodes is distributed in network.

Step 2: Initially all nodes conserve same energy.

Step 3: Each packet sensed by a node is assigned a unique number id & broadcast it to all nodes in the network.

Step 4: Each node that receives the id checks if it is already stored in its memory.

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Step 5: If yes, the data will be discarded.

Step 6: Else, select the higher residual energy node with the shortest distance path.

Step 7: Else if node with same residual energy and distance then packets is transmitted with higher timestamp value.

Step 8: Maintain the location information of node and continue the same process till destination found.

Step 8: If packets collision occurs then reduce the contention window by giving the priority to node with higher residual energy.

Step 9: check whether the data reach to the destination

Step 10: If yes, broadcast the packet id to all nodes

5. Results

Network density is significantly changing the network topology. A dense network should suffer more channel collision and packet lost due to hidden terminal, thus may impact the probe flooding process and cover the real link results. We used NS2 to simulate our proposed protocol. In our simulation the packet interval is set to be 0.0008sec. We use IEEE 802.11 for wireless LANs as the MAC layer protocol. It has the functionality to notify the network layer in link breakage. In our simulation, 25 mobile nodes move in a 500×500 m region for 10 seconds simulation time. We assume each node moves independently with the same average speed. In our simulation, the simulated traffic is TCP (ftp).Our simulation settings and parameters are summarized.

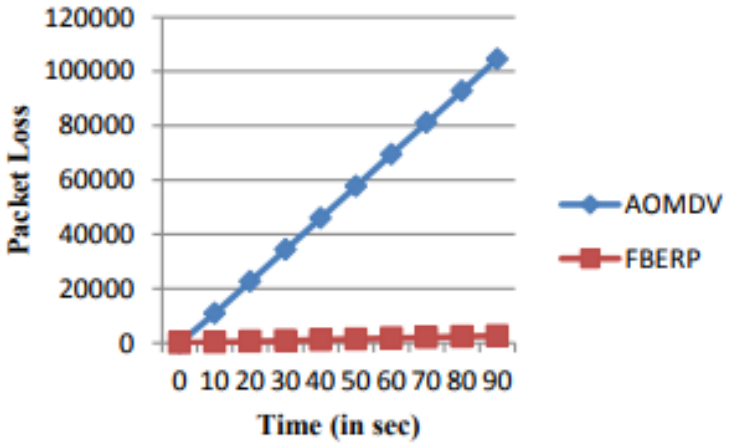

Figure 4. Packet delay

6. Conclusion

The detection of node replication attacks We first analyzed the desirable properties of a distributed mechanism. The Efficient fault detection and recovery algorithm is identifying a fault node when some of the sensor nodes shut down, either because they no longer have battery energy or they have reached their operational threshold but also when an unauthorized sensor got included in the network. We develop a fuzzy logic controller that combines functions, Packet Loss Rate, Communication Rate, Energy and Delay Parameters. The value obtained, indicates the priority of a node; a node with maximum

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throughput is selected and it is used in route formation. Also try to further reduction of load in the network by increasing the lifetime of the network.

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Hybrid Cloud Model for Data Integrity and Replication

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Abstract

The cloud computing is popular for the virtually storing data because it provides the big storage space and provides the portability and mobility functions. Even if data de duplication is main advantages in security and privacy concern occur as user's confidential data are liable to both attacks insider and outsider. A convergent encryption method imposes data security while making de duplication possible. Traditional de duplication systems based on convergent encryption even though offer confidentiality but do not maintain the duplicate check on basis of differential rights. The cloud storage service (CSS) reuses total storage traction and maintenance. Hybrid cloud model is new deduplication constructions supporting authorized duplicate check. The proposed security models contain the illustration of security analysis model. as a proof of data contains the implementation framework of proposed authorized duplicate check scheme and conduct experiments using these prototypes the many de duplication methods are implemented in Hybrid Cloud system. Our proposed model is implemented for text file, pdf file, book, and image and video, it also verifies the confidentiality of private cloud.

Index Terms: *Deduplication, authorized duplicate check, hybrid cloud, confidentiality, Secure auditing, Reliability, Cloud computing, Third Party Auditor.*

1. Introduction

Cloud computing provides biggest virtualized recourse to user as services across the total internet while hiding the platform and implementing details. Cloud data service is the management of evergreen increasing mass of data [1]. To make data management security in cloud computing, deduplication is conventional technique. Data compression technique is used for eliminating the duplicate copies of among data in cloud storage to reduce the data duplication [2]. Integrity is simply defined as consistency. Integrity is one of the security factors which influence the cloud performance. Data integrity defines rules for writing data in a reliable manner to keep persistent data storages. There are number of models is recommended [3] and [4] to preserve integrity of data. Integrity is most important security for cloud data storages because it ensures about completeness of data also provide detail data that available data is correct easily accessible to authorized users only data is consistent and of high quality. Data security is most model in present organizations not fully take up this technology. The users do not use the data is being residing after uploading to cloud and even is handling his data. We consider those challenges that the users must deal when they use cloud computing [5].

2. Related Work

The main goal of this work is to acquire data integrity as well as the secure data deduplication. In existing system, there was only the one server is used but in proposed

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system Cloud uses the multiple servers in order to load balance as well better uploading downloading speed [6]. Probabilistic queries and periodic verification as well as an optimization method of parameters of cloud audit services are implemented to provide secure access. The third-party auditor (TPA) [7] verifies the integrity of the dynamic data stored in the cloud. The TPA reduces the involvement of the client through the auditing of whether his data stored in the cloud storage. The data is stored temporarily while being authorization process. Store and forward transactions processed after completing the authorization. POR [9] protocol is designed to protect a static archived file in cloud storage. Critical information stored as storage-as-service in encrypted format. It is more flexible and cost-effective storage environments. PORs lead to several possible researches in the future. The classic merles hash tree constructed for block tag authentication to achieve secure cloud storage and data dynamics. Should clients conventionally encrypt their files their savings are lost. Message locked encryption resolves this all the tension [10]. It is inherently subject to the brute force attack is recover files falling into some known set. It enables the client for storing encrypted data with an existing service that have the service perform de duplication on their behalf and yet achieves strong confidentiality guarantees [9]. Showing that encryption for the de-duplicated storage can achieve the performance and the space savings close to that of using all the storage service with plaintext data.

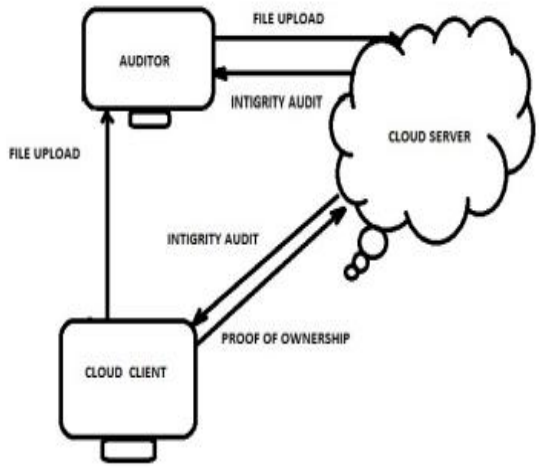

Fig.1 Secure Cloud Architecture

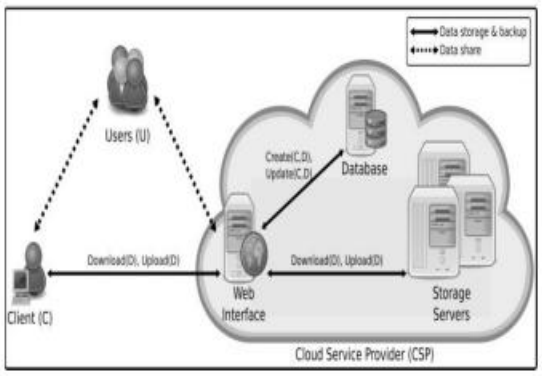

Fig. 2 Architecture of cloud data storage

3. System Model

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To develop authorized data de-duplication for privacy the data security differential privileges of users in the duplicate check and conduct test bed experiments to evaluate the overhead of the prototype. De-duplication is one of most important data compression model for eliminating duplicate copies of repeating data [14].

Cloud User: A cloud user is one who needs to outsource data on public storage which acts as a public cloud in cloud computing [11].

Public Storage: Public Storage is a storage disk which permit to store the users data which contains authorization and not permit to upload the duplicate data [12].

Private Cloud: A private cloud acts as a proxy to allow both data owner and user to strongly perform duplicate check along with disparity permissions.

Auditor: Auditor is a TPA work as proficiency and capabilities where cloud users to faith assess the cloud storage service reliability on behalf of the user upon request. The user registers into the system, permissions are assigned to user according to identity given by the user at registration time means on basis of situation which access by the user [13].

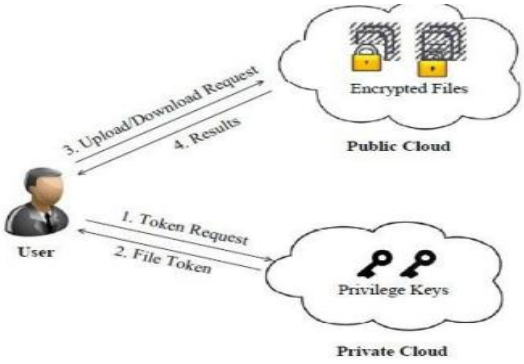

Fig. 3 Architecture of Authorized Deduplication System

4. Proposed System

User easily access the secure cloud storage model is constructed with administrator, third party auditor and cloud servers auditing model is verifying the integrity verification of cloud data storage. Administrator controls the user access of unauthorized party [15].

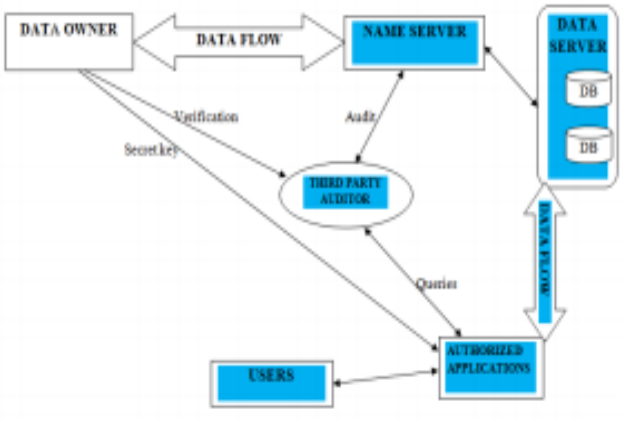

Fig. 4 System architecture of the proposed system

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Key Generation: The owner generates the public/secret key pair (pk, sk) by system manager. The secret key is not visible and then sends the public key (pk) to TPA. Data owner provides the access to authorized users and shares the public key [16].

Tag Generation: The user's/clients use the secret key (sk) to pre-process a file in cloud storage. It takes access of n blocks and generates a set of public verification parameters and index hash table. User data is stored in TPA (Third party auditor) and transmits the file with some verification tags to Cloud Service Provider

Periodic Sampling Audit: TPA (Third party auditor) challenges to audit the integrity and change outsourced data stored in TPA. Audit model detects some errors in secure storage of unauthorized modification. Administrator collects all the user details within the cloud server. Verification process is constructed with insufficient proof protocol of cloud storage [17].

Audit for Dynamic Operations: Authorized application holds the secret key (sk) and it can modify the index hash table stored in TPA. User inserts the files in cloud storage with authorized access from administrator.

A. Dynamic Data Operations

Insert operation: User inserts the file in cloud storage and file is stored in Encrypted data format. Audit process audits the file in secure methods 18]

Update operation: It is an algorithm find the applications update the block of a file. It updates the data's only trusted parties.

Delete operation: After verifying the user is authorized the TPA gives the access to delete the file in cloud storage.

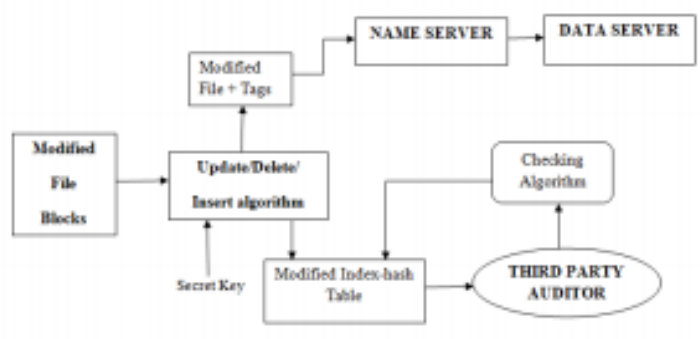

Fig. 5 Flow of dynamic data operation

Checking algorithm to tests the audit model is controlled by Administrator. The User data application takes and Update, Delete, and Insert algorithms, and then sends to TPA and CSP, respectively. It is important to security and audit process of TPA [17]. Finally, Admin gives the permission to change audit records after the confirmation message from CSP is received.

5. Algorithm

1. Take any one of the following user information. Username, password, mobile number, uploaded document name, document size.
2. Convert bit to byte conversion.
3. Byte conversion answer placed in 64*64 cells.

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4. Insertion order is not unique.
5. Reorders the element and placed in outside the cell
6. Finally add the mobile number or document size to reorder element

A. Hash Table Lookup

A hash table is a data structure that is used to implement an associative array. A hash table uses hash function that computes an index into an array of slots [20]. In a well-dimensioned hash table and average cost for lookup is independent of the number of elements. Many hash tables designs access arbitrary insertions and deletions of key-value pairs which are performed at constant average cost per operation.

B. Merkle Hash Tree

A hash tree is every non-leaf node is labeled with the hash of the labels of its children nodes. Hash trees is used to verify any security data stored. Currently the main use of hash trees is to make sure that data blocks received from other peers in a peer-to-peer network is received unaltered and undamaged [21] and even to check that the other peers do not send fake blocks.

6. Result

The authorizes deduplication model used is removed duplicate copies of data in the given cloud. Proposed system implemented by using block level duplication which compare the given blocks with database, the data will be store security format and maintain security each block contain their own token, cipher text and private key. The database size will be reduced by using this technique. The prototype of proposed system is implemented use new technology. The server machine has configuration of Intel Core Duo CPU 2.4 GHz with 4GB of RAM. Heidisql used for the database storage. When user upload file, it divides into the blocks then another same file is uploaded at that time it compare with given database

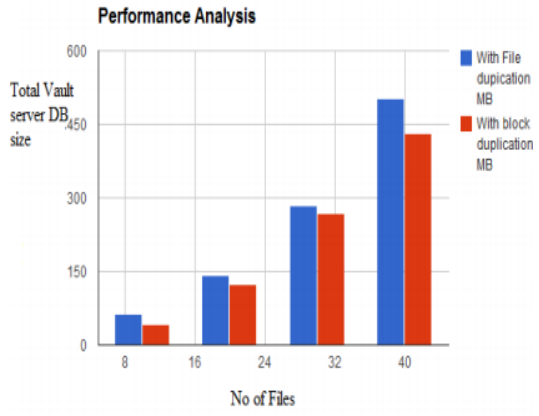

Fig. 6 Comparison between file level deduplication

7. CONCLUSION

Secure upload we can assure the user about high data security and are move data deduplication. Security analysis finding our schemes is secure in terms of insider as well as outsider attacks the proposed security model. It increased the data integrity of the cloud storage and remove the hackers to access the storage process. File insertion, File updating, File deletion is possibly used to authorized users. Cloud service users offered an audit

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service to audit the integrity and availability of Secure Storage Pool. Additional this will enable secure block level deduplication through introducing a Proof of Ownership protocol and preventing all the leakage of side information in data deduplication. In future, the methodology is proposed to resolve the security related model is used to endeavor on numerous security model that has been mentioned, in order to cater translucent services that can be trusted by all users.

8. FUTURE WORK

It introduces the proof of ownership protocol for element the leakage of side channel information. As compare to previous work computation time is decreased here. SecCloud+ uses the security mechanism for stored file. In simple words, it stores all files in encrypted format. Future work includes introduction of concept parallel computing, to support it multi-threading environment is useful it helps in improving the overall auditing performance

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Multiple Sink Placement Algorithm in Wireless Sensor Networks using PSO Approach

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Abstract

Minimizing energy consumption and maximizing network lifetime are two important challenges in battery operated Wireless Sensor Networks (WSNs). Sensor nodes sense the environment periodically and forward the collected data to a sink. In a single sink WSNs, nodes closer to the sink become overburdened for relaying excessive data. This may incur faster energy consumption by nodes and lead an energy hole around the sink. As a result, the network lifetime is shortened. Multiple sinks mitigate this problem, reduce energy consumption at nodes and prolong the network lifetime by distributing the traffic over multiple sinks. Two multiple sink placement strategies in WSNs which select the potential sink locations with an iterative manner is presented in the literature. Here, we introduce a lifetime-oriented approach (LOA) to maximize the average network lifetime and an energy-oriented approach (EOA) to minimize the average energy consumption of sensor network. Our existing algorithm proceeds iteratively and after a finite number of iterations, it produces the result which maximizes the average network lifetime (in lifetime-oriented approach) and minimizes the average energy consumption (in energy-oriented approach). In this paper, we propose a particle swarm optimization (PSO) based algorithm for placement of multiple sinks in WSNs. The performances of proposed system is evaluated and compared with previous approaches as LOA and EOA with the random sink placement (RSP) policy under various network scenarios. The experimental results show that the proposed algorithms prolong the average network lifetime and minimize the average energy consumption than LOA, EOA, and RSP.

1. Introduction

Wireless sensor networks (WSNs) consist of hundreds to thousands number of resource constraint sensors which have the capability to sense and monitor the region where they are deployed [1]. WSNs have drawn a significant attention in recent years in many applications, e.g., health care monitoring, disaster management, environment monitoring, object tracking, etc. One of the primary concerns of the sensor network is to minimize the energy usage of sensor nodes since sensors are often batteries operated. In [2], the authors introduced a dynamic routing technique for multi-hop wireless networks to minimize the energy burden at wireless node. In the cited approach, the authors focused on the wireless networks with a single sink. Here, the sink is responsible for gathering, analyzing, and forwarding the processed data to the cloud storage [9]. In [3], the authors proposed a single sink placement strategy, both in single and multi-hop WSNs to enhance the network lifetime. In a single sink WSNs, nodes nearer to the sink forward high-volume data traffic, deplete energy faster than the nodes which are away from the sink. This may lead uneven energy depletion among the nodes, and the network becomes disconnected

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soon. The unbalanced energy consumption does not only shorten the network lifetime, but also increases the network latency, number of retransmissions simultaneously. Under this paradigm, it is sensible to place multiple sinks to improve the network performance. In multiple sink WSNs, energy consumption is reduced, latency is minimized, and the lifetime of the network is prolonged [6]. However, the optimal sink placement is NP hard problem [8]. Several heuristics [4, 5] and meta heuristics [7, 8] approaches have been developed in the literature to address this problem.

2. Related work

In previous works [10], many people working on energy efficient sink placement strategies. So, they are specially two strategies taken named as Lifetime oriented approach (LOA) and Energy oriented approach (EOA) to maximize the average network lifetime and to minimize the average energy consumption of network, respectively. The algorithm has four phases, namely deployment phase, set up phase, potential sink location determination using LS and final sink location identification. In the deployment phase, nodes and sinks are deployed in the region randomly. In the setup phase, initial sink locations are chosen and grouping of nodes is done. In the third phase, local sink locations are explored so that the objective function is either maximized or minimized. In the last phase, final sink locations are identified. LOA and EOA work iteratively. At each iteration, we perform second and third phase, looking for the best solution.

3. Proposed system

In this paper, we propose a particle swarm optimization (PSO) based algorithm for placement of multiple sink in WSNs represented in figure 1. The algorithm is developed with an efficient scheme of particle encoding and novel fitness function. For the energy efficiency scheme of particle encoding and novel fitness function. For the energy efficiency of the proposed system, we consider various parameters such as Euclidian distance and hop count from the gateways to the sinks. The algorithm by varying the number of gateways and sensor nodes and the results are analyzed to show the efficiency of the proposed algorithm. PSO consists of a predefined number of particles say NP, called swarm. Each particle provides a potential solution. A particle P_i, $1<=i<=N_p$ has position $X_{i,d}$ and velocity $V_{i,d}$, $1<=d<=D$ in the dth dimension of the search space. The dimension D is same for all paricles. A fitness function is used to evaluate each particle for verifying the quality of the solution. In the initialization process of PSO, each particle is assigned with a random position and velocity to move in the search space. During each iteration, each particle finds its own best, personal best called $Pbest_i$ and the global best called Gbest. To reach the global best solution, it uses its personal and global best to update the velocity $V_{i,d}$ and position $X_{i,d}$ using the following equations

$$V_{i,d}(t+1) = \omega \times V_{i,d}(t) + c_1 \times \boldsymbol{\chi_1} \times \left(X_{Pbest_{i,d}} - X_{i,d}\right)$$

$$+c_2 \times \boldsymbol{\chi_2} \times \left(X_{Gbest_d} - X_{i,d}\right) \quad (1)$$

$$X_{i,d}(t+1) = X_{i,d}(t) + V_{i,d}(t+1) \quad (2)$$

Where $0 < \omega < 1$ is the inertia weight, $c_1, c_2, 0 \le c_1, c_2 \le 2$ are the acceleration coefficients and $\chi_1, \chi_2, 0 < \chi_1, \chi_2 < 1$ are the randomly generated values. The updating

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process is repeated until it is reached to an acceptable value of $Gbest$. After getting new updated position, the particle evaluates the fitness function and updates $Pbest_i$ as well as $Gbest$ as follows

$Pbest_i = P_i$, if $(Fitness(P_i) < Fitness(Pbest_i))$

$Pbest_i$, otherwise

$Gbest = Pbest_i$, if $(Fitness(Pbest_i) < Fitness(Gbest))$

Gbest, otherwise

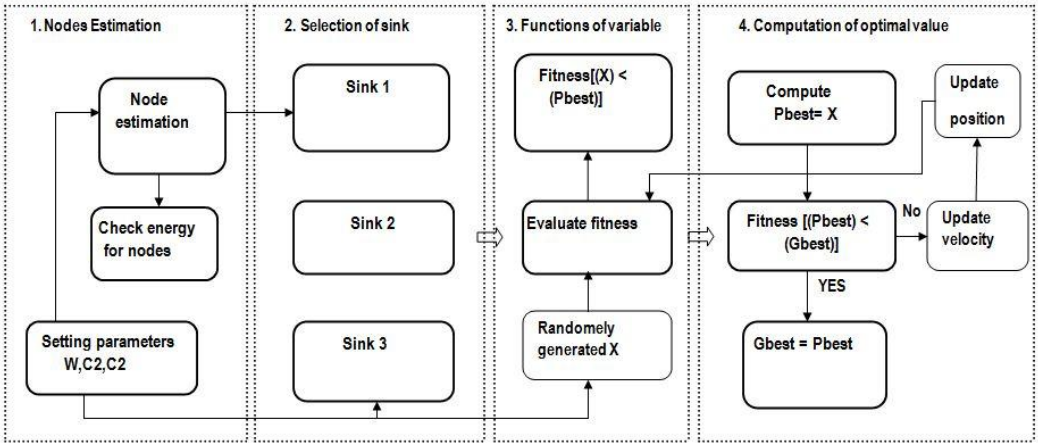

Figure 1. Update of multiple sink selection framework.

3.1. Particle representation and initialization:

In PSO, a particle represents a complete solution. For multiple-sink placement of the proposed algorithm, it represents optimal positions of the sinks with respect to the gateway nodes. Let $P_i = [X_{i,1}(t), X_{i,2}(t), X_{i,3}(t), \ldots..X_{i,D}(t)]$ be the ith particle of the population where each component $X_{i,d}(t) = (x_{id(t),} y_{id}(t))$, $1<=i<=N_p$, $1<=d<=D$, denotes the coordinates of the sink nodes. Then the ith particle can be represented as follows:

$$P_i = [(x_{i1}(t), y_{i1}(t)), (x_{i2}(t), y_{i2}(t)), (x_{i3}(t), y_{i3}(t)), \ldots\ldots, (x_{id}(t), y_{id}(t))]$$

Where N_p denotes the swarm of particles and D represents the number of sinks are supposed to be placed.

Algorithm

Input: set of gateway nodes: $G= \{g_1, g_2, g_3, \ldots, g_m\}$; predefined swarm size : N_p

Number of dimensions of a particle: D=l

Output: optimal positions of sink nodes $SN = \{SN_1\ SN_2\ SN_3 \ldots, SN_l\}$

Step 1: initialize particles P_i, i.j , $1<=i<=N_p$, $1<=j<=D=l$, number of SNs

$X_{i,j}(0) = (x_{i,j}(0), y_{i,j}(0))$ /* deployed positions of sink */

Step 2: for i=1 to N_p do

2.1 calculate fitness(P_i)

2.2 $Pbest_i = P_i$

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End for

Step 3: Gbest = {$Pbest_k$/Fitness($Pbest_k$) = min(Fitness($Pbest_i$), 1<=i<=N_p)}

Step 4: for t=1 to Terminate /*Terminate = Max.number of iterations */

For i=1 to N_p do

4.1 Update velocity and position of P_i using eqs (1),(2)

4.2 Calculate Fitness (P_i)

4.3 if Fitness(P_i) < Fitness($Pbest_i$) then

$Pbest_i = P_i$

End if

4.4 if Fitness ($Pbest_i$) < Fitness(Gbest)

Gbest = $Pbest_i$

End if

End for

End for

End for

Step 5: stop

4. Result and discussion

Our experiments are conducted using the NS- 2.34 simulator. We conduct the experiments in two steps. The initial step is to check the viability of our plan, and then deeper study is investigation is done to assess the delay and throughput in more detail. In the first step, there are 43 mobile nodes in the network, and communication starts from source to destination. Here hop-to-hop communication occurs, and we can calculate the distance based on position of an individual node. The individual communication between user to user, numbers of data flows measured. None of the individual traffic rate goes beyond a certain threshold, but the sum of them does. Here we can know the transmission rate of every node based on residual energy. In our work, we can take multiple sinks for receiving the data and using our algorithm based on that best optimal path selection for sink placement. The best placement of sink can be helpful to more data can receive the data. The connections among mobile nodes are UDP connections, and we send CBR (Constant Bit Rate) traffic in each communication channel. The CBR rate of the connections is 512Kb/s. The size of the scenario field is 1000m x 1000m. The routing protocol we use is a revised AODV routing protocol that integrates our PSO-NL, EOA, LOA methods.

Table I: Simulation parameters

PARAMETER	VALUE
Application traffic	CBR

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Transmission rate	8 packets/msec
Radio range	250m
Packet size	1000 bytes
Channel data rate	2Mbps
Maximum speed	25m/s
Simulation time	10secs
Number of nodes	43
Area	1000x1000
Routing protocol	AODV
Routing methods	EOA, LOA, PdSO-NL

Figure 2 demonstrate that end-to-end delay performance of proposed and existing approaches, and it depends on time to vary the output. The performance of the PSO-NL improves delay time which means decreasing the delay between the communication nodes as compared to ELOA and RSP approaches. Similarly, figure 3 and figure 4 discloses the performance graph of throughput and energy respectively where proposed PSO-NL approach obtained superior performance over RSP and ELOA approaches.

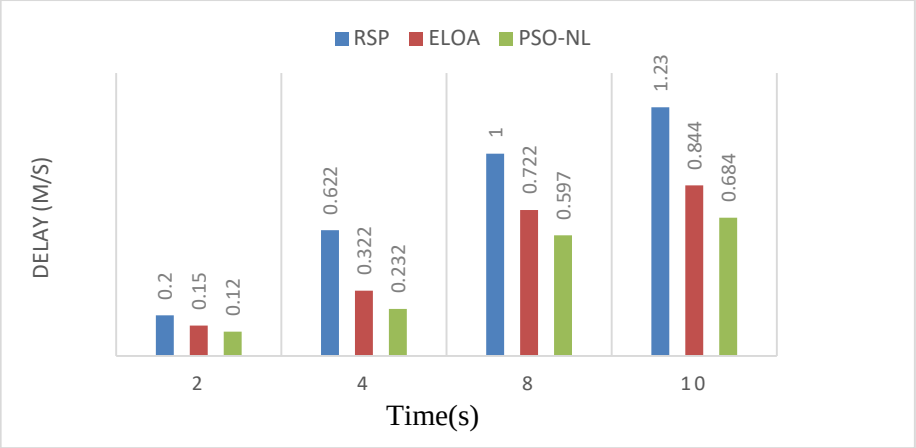

Figure 2: Routing delay

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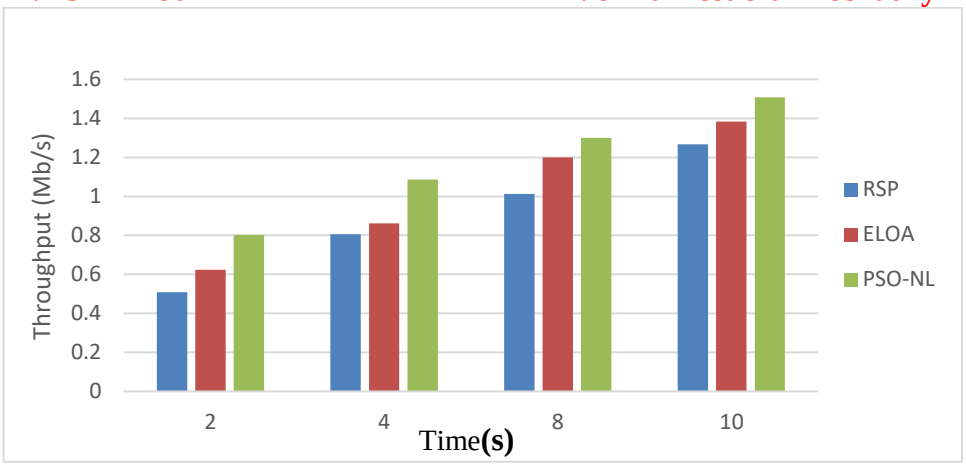

Figure 3: Network performance

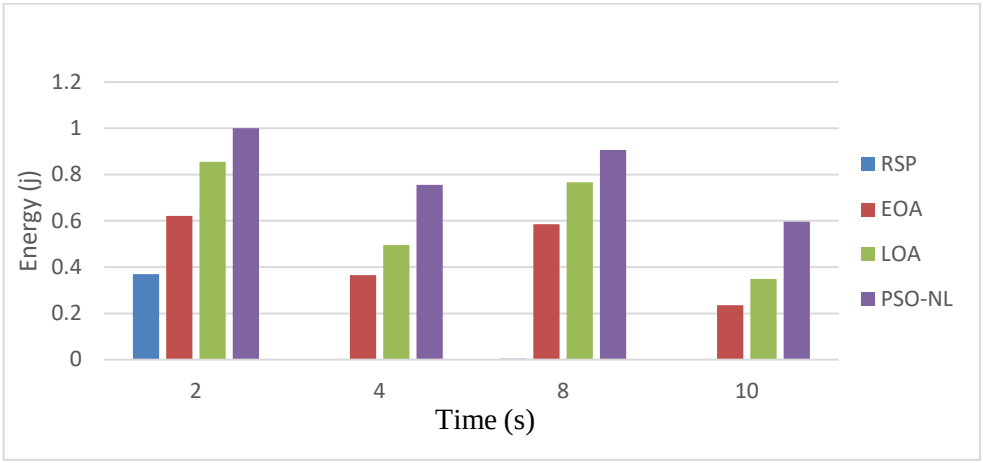

Figure 4: Energy consumption

5. Conclusion

This article proposed multiple-sink placement algorithm based on PSO using efficient particle representation and fitness function. For the energy efficiency of the proposed algorithm, we have considered the Euclidian distance and hop count. The objective of our PSO based sink placement approach is to improve the network lifetime with efficient energy levels to maintain in network. The proposed algorithms are simulated and compared with the EOA, LOA approaches and random sink placement algorithm with respect to various performance metrics. To show the improvement of PSO-NL with an existed exhaustive grid search algorithm, we have calculated network lifetime. It can be observed that the PSO-NL outperforms the existed algorithms.

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A New Public Integrity Auditing Function for An Efficient Cloud Data Storage with Message Authentication Code

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Abstract

In modern days the cloud data storage is present generations that promote the secure remote data auditing. The existing system considers the problem secure and efficient public integrity auditing for shared dynamic data storage. Cloud data assign stores data in the cloud as well as distribute data number of users. We found the collusion attack in the exiting model. An efficient public integrity auditing method with secure group user revocation based on vector commitment plus verifier total revocation group signature. We find the proposed a new public integrity auditing function to help of Message Authentication Code (MAC) generation and symmetric cryptographic algorithm. The main aim of this paper is to improve privacy and an efficient cloud data storage model to reduce the bandwidth and to improve the data security. This work modifies to number groups to access the data. We deplore scheme for group signature. The cipher text support public checking and efficient user revocation in properties like confidently, efficiency, count ability and traceability. Finally we compare our algorithm with old which shows good result in security. The experimental results are analyzed and evaluated in terms of computation time, block size, key size, number of rounds and cycles per block.

Index Terms: *Data integrity, Public auditing, User revocation component, Cloud Computing, Message Authentication Code (MAC), Message Digest (MD), Symmetric Key Cryptography, Public Integrity Auditing, Security and Data Storage.*

1. Introduction

The improvements and enhancements in cloud computing motivates enterprises and also organizations to outsource data to third party cloud service providers (CSP's) which will result in improvements in the data storage limitation of resource constrain local devices. In market already some cloud storage services are available like simple storage service (S3) online data backup services of Amazon and software like Google Drive, Drop box, Mozy, Bitcasa and Memopal built for cloud application. Cloud computing is computing in which large groups of remote servers are networked to allow centralized data storage and online access to computer services or resources. Clouds can be classified as public, private or hybrid [1]. The criticisms about it are mainly focused on its social implications. This happens when the owner of the remote servers is a person or organization other than the user, as their interests may point in different directions, for example, the user may wish that his or her information is kept private, but the owner of the remote servers may want to take advantage of it for their own business [4]. We introduce publicly verifiable scheme, it helps in various aspects. That is data integrity can be performed not only by data owners, but also by one or more third party auditor. Conversely, the dynamic schemes we mentioned only focus on the gears where there is a data owner and only the data owner could change the data. In recent times, the growth of cloud computing,

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improves that some applications uses cloud service, can use as a collaboration platform [2]. Few of the software development surroundings, one or more users in a group may need to share some of the source code, need to access, modify. At some times they may need to compile and run the shared source code at any time and place. Cloud computing is a new paradigm that is mainly used to provide an economic resource utilization over the internet [5]. It is a method of computing in which the users can increase or decrease their computing resources. Generally, the cloud contains three models as shown Fig 1.

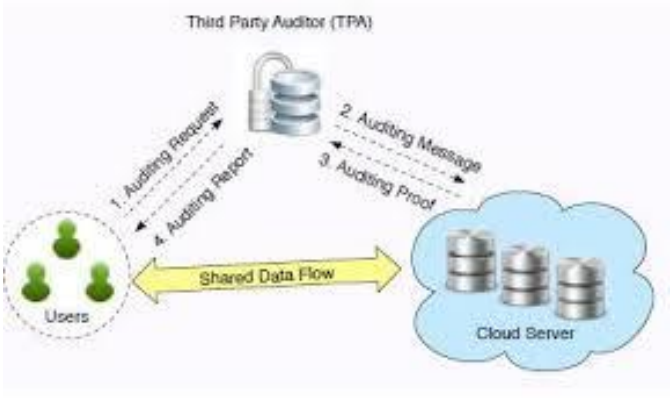

Fig1. Types of cloud security data

The major contributions are as follows:

- The secure and efficient shared data integrate auditing process is explored for cipher text database with the help of multi-user operation [3].

- Here, an efficient data auditing scheme is proposed for providing data integrity by incorporating the primitives of victor commitment, asymmetric group key agreement and group signature [7].

2. Related Work

A large number of researchers have committed significant concentration to the troubles on how to securely outsource local pile up to remote cloud server. The problem of remote data integrity and availability auditing attacks the attestation of many researchers. Sagarika Dev Roy, et.al (2014) proposed a methodology for secure outsourcing of linear Computations into the cloud environment. Outsourcing is a common procedure engaged in the business world when the customer chooses to farm out a certain task to an agent for the benefit of the firm in terms of time and cost [6]. They proposed methodology to detecting a malicious server, in an efficient result verification method. YongjunRen, (2012) proposed designated verifier provable data possession. This plays a major role in public clouds. Designated verifier provable data possession is a matter of crucial importance when the client cannot perform the remote data possession checking. By using the system security model and homomorphism authenticator they designed a new scheme [8]. The scheme removed luxurious bilinear computing process. Furthermore, in this proposal, the cloud storage server is stateless and independent of the verifier. This is an important secure property of any other schemes. In the course of security analysis and performance analysis, their scheme is secure and high efficiency [10]. The asymptotic complexity in computations were more in key generation methodologies. Gentry and Halevi [12] discussed the implementation of Fully Homomorphism Encryption (FHE).

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The complete working of any encryption methodologies required the functionality called bootstrapping. They provided the optimization in key generation that reduced the complexity with n-dimensional lattices. In a data storage outsourcing services, the permission assigned to the data owner to check whether they stored data correctly or not [9]. In previous work focused on TPA should be able to efficiently audit the cloud data storage without demanding the local copy of data and introduce no additional on-line burden to the cloud user. This paper entirely different compare with previous in the case of privacy. Privacy preserving public auditing for data storage security in cloud computing [11], by C. Wang, Q. Wang, K. Ren, and W. Lou utilize and uniquely combine the public key-based homomorphism authenticator with random masking to achieve the privacy-preserving public cloud data auditing system. In this design, propose to uniquely integrate the homomorphic authenticator with random masking technique. In this protocol, the linear combination of sampled blocks in the server's response is masked with randomness generated by a pseudo random function (PRF). By using random masking, [13] The TPA no longer has all the necessary information to build up a correct group of linear equations and therefore cannot derive the user's data content, and no matter how many linear combinations of the same set of file blocks can be collected. A public verifier, such as a third-party auditor providing expert data auditing services or a data user outside the group intending to utilize shared data, is able to publicly verify the integrity of shared data stored in the cloud server. When a public verifier wishes to check the integrity of shared data, it first sends an auditing challenge to the cloud server. After receiving the auditing challenge, the cloud server responds to the public verifier with an auditing proof of the possession of shared data. Then, this public verifier checks the correctness of the entire data by verifying the correctness of the auditing proof. Essentially, the process of public auditing is a challenge and- response protocol between a public verifier and the cloud server [15].

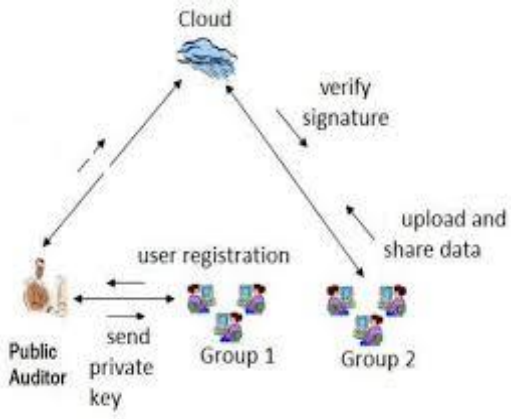

Fig2. System Flow

3. Proposed Work

Data outsourcing hoist security and privacy worry. We need to trust third-party providers for proper implementation of confidentiality, integrity checking, and access control mechanisms. The conventional encryptions have need of particular users to encrypt their data, with the own keys of the user. Therefore, the same data copies of different users will lead to dissimilar cipher texts. It creates integrity checking process is an impossible task. [5] The present system use standard encryption scheme for identifying duplicate blocks,

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the blocks are stored in cloud. In Cloud Storage, standard encryption of identical files generates same key and same cipher text. As a result, Data de duplication is impossible in encrypted data. When user lost the key, there was impossible to restore the original content of the file. Message digest algorithm provides a viable option to enforce data confidentiality while realizing duplication. It encrypts or decrypts a data copy with the help of a convergent key. By computing cryptographic hash value of the content of the data copy we can obtain the key. After key generation process and data encryption process, users can hang on to the keys. Then the user sends the cipher text to the cloud environment. Ever since encryption is deterministic, the same data copies will generate similar convergent key and the identical cipher text. This permits the cloud to perform de duplication over the cipher texts. Cipher texts are able to decrypt by the corresponding users' with their convergent keys. Convergent encryption practical is to efficiently and reliably manage a huge number of convergent keys. [9] The unique Data block will be selected and those blocks are placed in the cloud service provider's space. We are using crypto graphic algorithm for integrity checking. Message authentication code is the scheme of producing Message digest for input file. The integrity checking should be done by Third party auditor by checking this message digest code. Before Uploading file; data owner must send the hash key to the third party auditor. Third Party Auditor receives the key and verify with cloud service provider to check whether this file is already uploaded or not. In this module, user revokes the content by getting secret key of data owner. Data owner must share the secret key for group users. User downloads the file from the cloud service provider using hash key [14].

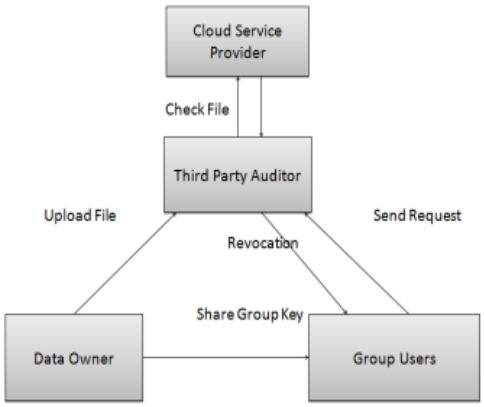

Fig3. Architecture of a proposed system

The proposed cloud storage model the problem of designing public integrity auditing based shared dynamic data with group user revocation is analyzed. The main contributions of this paper are listed as follows: [6]

- An efficient and secure public integrity auditing scheme is proposed for cipher-text base with the help of multi-user operation.
- The primitives of victor commitment, group signature and asymmetric group key agreement are integrated.
- The new features like, traceability and countability are provided at the time of auditing.

It is identified that the upload file is duplicated. Otherwise, it will divided into various blocks, after that the availability of the blocks is also verified. If the block is not exists, it

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will be given to the Cloud Service Provider (CSP). Hence, the file is downloaded from the server and to access that file, the hash key and data blocks are need to be decrypted. [15] In this work, the two different algorithms such as, Message Digest Code. Message Authentication Code (MAC) algorithm is used for code generation. Then, the symmetric key cryptography algorithm is used for encryption and decryption processes.

Algorithm – MAC Algorithm

Input: Block of file B = (B1, B2, B3 … BN}

Step 1: Generate the hash key;

Step 2: Encrypt the data block with the help of hash key;

Step 3: Generate the tag and hash key from the content of the file;

Output: Obtain the decrypted file with the help of hash key;

1. H(M) = K (Key Generation)
   Where,
   M= Input file
   H(M)=Hash value of file
   K= Hash Key
2. E(K, M)=C (Encryption)
   Where.
   M-File,
   K-Hash Key,
   E-Encryption
   C-Cipher Text
3. Tag(M)=T (Tag Generation)
   Where,
   M-File
   T-Tag from File M

4. Cipher Text Database

In cloud storage outsourcing environment, the outsourced data is usually encrypted database, which is usually implicitly assumed in the exiting academic research. Actually, our scheme could support the auditing of database of both plaintext and cipher text database [5]. It is not straightforward to extend a scheme to support encrypted database. In order to achieve the confidentiality of the data record mx, the client can use his/her secret key to encrypt each mx using a encryption scheme. When there is only one user in the group, the user only needs to choose a random secret key and encrypt the data using a secure symmetric encryption scheme. When the scheme needs to support multi- user data modification, while at the same time keeping the shared data encrypted, a shared secret key among group users will result in single point failure problem [3]. It means that any group user leak the shared secret key will break the confidentiality guarantee of the data. To overcome the above problem, we need to adopt a scheme, which could support group users data modification. Exponentiation (BDHE) assumption in the standard model according to the ASGKA protocol, we consider the case of encrypted database (x, cx), where x is an index and cx is the corresponding cipher value. We provide the detailed changes upon our scheme to support encrypted database [16].

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1) In the Setup phase, the scheme has to run the key agreement of ASGKA for the group users. Then the database DB = (i,mi) is encrypted by the group key gpk of data owner. Finally, the stored database is a cipher text database DB = (i, ci).

2) In the second step of the Update phase, a group user firstly decrypts the record ci using the ASGKA secret key gsk[∗] to get plaintext database DB = (i,mi). Then, update the data to m′i, and later encrypt the data with the public key gpk of ASGKA scheme to get the new encrypted database DB = (i, c′ i)

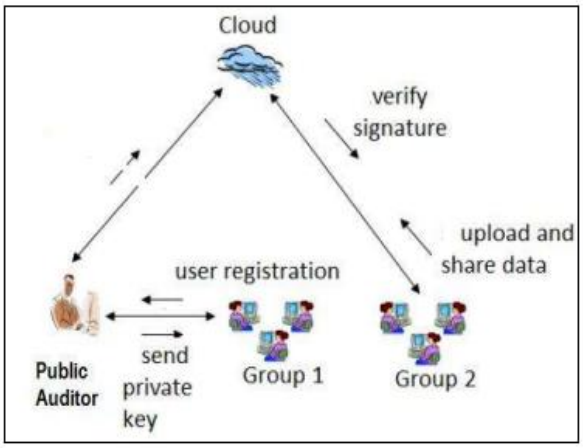

Fig 4. Cipher Text Model

The system is based on proxy re-signature concepts. Blaze et al first proposed the concept of proxy re-signature in [12]. Proxy signature is a digital signature scheme where original user delegates his signing capability to a proxy signer, and then the proxy signer performs message signing on behalf of the original signer [9]. In simple word it allows semi-trusted proxy to work as a converter of signatures between two users belonging to same group

5. Result

We have provided a scheme of auditing the integrity of the shared and dynamic cloud data along with group user revocation. The auditing of the data integrity is secure and reliable. In this paper, the concept of authorized data duplication was proposed to achieve the data security by including differential privileges of users in the duplicate check. The data and associated key primitives consume the space in cloud architecture refers block size. An algorithm effectiveness decided by the low space consumption. Fig 5 shows the variation of block size for both the proposed and existing AES method. The block size for AES is 128 bits and for proposed symmetric cipher block is 65 bits. The optimal steps reduction in proposed work offers 49. 21% reduction in block size. This section demonstrates the implementation results and experimental performance analysis is carried out on the basis of revocation time and overall auditing time by implementing our proposed mechanism. Graphically presented analysis is most feasible analysis of our mechanism with the existing public auditor.

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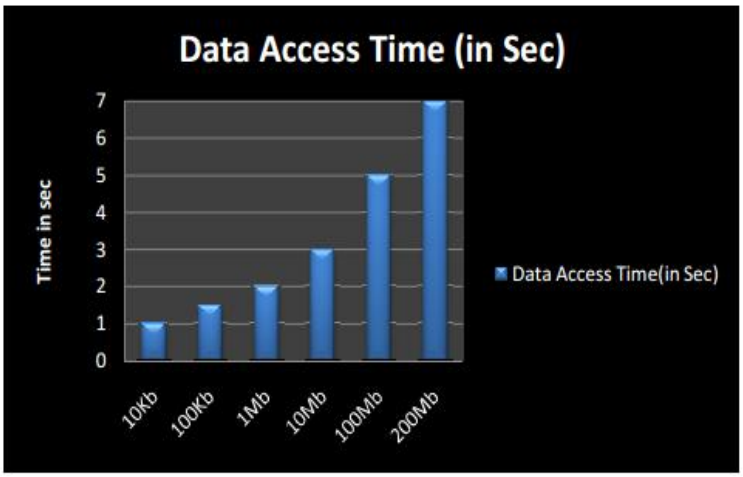

6. Conclusion

A new public integrity auditing scheme for cloud data storage for this purpose algorithms such as, Message Authentication Code (MAC) generation and symmetric key cryptographic techniques are used in this work. This paper proposed system to realize efficient and secure data integrity auditing for dynamic data. The proposed model consists of the public data auditing. This technique will provide better data confidentiality compare to other methodologies. The main objective of this paper is to reduce the bandwidth and to improve the content integrity in cloud data storage. Our novel design allows efficient user revocation operations to the cloud. Because of keys generated for the data not a user. In addition, scheme allows aggregation of integrity auditing operations for multiple tasks (files) through our batch integrity auditing technique. When compared to other algorithm key size is very small, it is not able to hack easily. It is used for efficient revocation without updating private keys of remaining users. Cloud public verifier plays an important role when dealing with security aspects of cloud. In this paper, we have proposed a new public auditing mechanism for cloud for efficient user revocation while maintaining shared data integrity which allows cloud to re-sign blocks signed by revoked user. In future, concentrate on key management, how to revoke the private keys from the group members

7. Future Work

Designing an efficient public auditing mechanism with the capabilities of preserving identity privacy and supporting traceability is still open. Future work includes improving performance of the overall system using distributed cloud. Even though there is greater performance and efficiency in this mechanism, there is a problem of traceability in this system which is been considered to be continued in future work. Since this mechanism is based on aggregate signatures which are group signatures with compressed storage, the identity of the signer is protected. Proxy re-signature can be carried out on two or more cloud servers which reduces risk of increased in data or users. It also helps in improving security factors

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Spying of Malicious Applications in OSN: A New and Efficient Framework

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Abstract

The owners also resort and fraudulent model to deployment the ranking of the apps in the popularity list. There is limited understanding in the evolvement though the prevention of fraud has been widely is finding. We implement Firefox users to the number of installed applications on their Facebook profiles. We present the temporal analysis of the Facebook applications' stating and removal dataset take user requirements. Online social networks (OSNs) are new vectors for cybercrime and hackers are finding new ways. We present results in the perspective of over 12K users to install. Our purpose system is creating a Facebook application and user goal is to develop a FRAppE Face book's Rigorous Application. Online Social Networks (OSN) takes third party apps to changes the user experience on the platforms. Such modifications are interesting communicating number of online friends and new models such as playing games. We take facebook provides to developers an API that facilities app applied into Facebook user experience. Present Ackers to started taking advantage of the resource of this third-party apps platform and deploying small applications and small apps will give a profitable business for hackers given the recognition of OSNs. It is safe and secure data is added in our wall. Thus, the Offensive words and posts are blocked with the help of dictionary using filters and it is not publicly posted to user wall.

Index Terms: *Profiling Apps, Online Social Networks, - Measurement, Security, Verification, Facebook, evidence aggregation, ranking fraud, secret key.*

1. Introduction

One of the most popular application to comes with own advantages and disadvantages is Facebook. Today we can see that there are 500k apps is available on Facebook within that 40M apps [2] is stating everyday by the Facebook users. Such changes are consisting of interesting even enjoyable way associated with communicating number of online good friends in addition to different things to do like since getting referrals even enjoying tunes. One example is Myspace supplies developers the API [3] in which facilitates software integration into the Myspace user-experience. In [4] the data detection system for mobile apps has been studied and it is provided a holistic view. The leading sessions and the leading events of the app were studied using the mining leading session's algorithm. In [5], it proposed Facebook's Rigorous Application Evaluator (FRAppE). It failed to recommend to the website the hackers. Online social networks (OSN) are third party apps to enhance the user experience on the platforms. In our previous study [6] we presented preliminary statistics on this dataset We are finding that within the first week after the

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add-on's stating use the user's number of applications decreased by 12.1% on average. The application removal rate continued to grow up to 27.7% by an average of 63 days after the initial use. This model is maximizing classify posts thus reducing the cost of resources required to support a given population of users.

2. Related Work

Detecting and characterizing social spam campaigns. Gao. [7] Analyzed posts on the walls of 3.5 million Facebook users take 10% of links posted on Facebook walls in spam. They also presented techniques to identify compromised accounts and spam campaigns. Towards online spam filtering in social networks Rahman, [8] Develop efficient model for online spam filtering on Social networking applications such as Facebook, Twitter, and Instagram. Towards online spam filtering in social networks, Gao [8] is efficient and security Socware Detection in Online Social Networks. Rahman [9] develop efficient model for online spam filtering on Online Social Networking sites such as Facebook Detection is the most standard way to deal with security and privacy problems. MyPageKeeper is based on a Support Vector Machine (SVM) classifier that uses a main feature specific keyword occurrence in a post made by an application. Web sense Defensio [10]. They found that about 9% of the studied posts were spam or small. In 2012, Rahman, [11] Improved his previously modify work and developed the FRAppE: A tool is identify small applications by using the application data as features. New examples include the number of permissions required the domain reputation of redirect URI, and others. FRAppE can detect malicious applications with 99.5% accuracy and a low false negative rate 4.1%. Popular websites area unit under fire all the time from phishes, fraudsters and spammers the aim to steal user data and expose users to unwanted spam. They are well funded, with full-time practiced labor, control over compromised and stating accounts, and access to global bonnets. Security our users may be a difficult adversarial learning drawback with extreme scale and cargo needs. Over the past many years, we engineered and deployed a coherent security and protrusive real-time system to shield our users and the social graph.

3. Proposed Solution

The proposed system using the FRApp tool and detect the block the small applications in the Face book. The user is trying to post the offensive words to the user's Face book wall those words or posts are detected using the dictionary and it gets filtered. We found any installation of the malicious app user wall gives total notification that the app found is small whether to install it or not. Offensive words or posts which are related and detected and blocked using the FRAppE tool. These words are posts will not display in the public wall. Instead of that such post will be migrated to the blocked post list a tool stands for Face book's Rigorous Application Evaluator which is helpful in modify the entire system. In Authentication and Authorization module the user in register the data and login into the pages to view their profile to see all the contacts the user

3.1. Detecting Spam on OSNs

We analyzed posts on the walls of small Social networking app users 10% of links posted on Social networking app walls in spam. We develop efficient models for online spam

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filtering on OSNs such as Social networking app is used only by the OSN provider; develop a third-party application for spam detection on Social networking app. Others present model find the spam URLs on Social networking app and contrast to all of these efforts rather than classifying individual URLs or posts as spam we aim on identifying small applications is main source of spam on Social networking app.

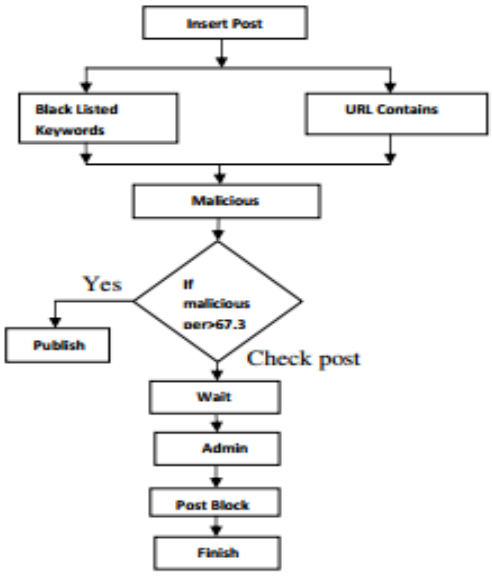

Fig. 3 Proposed Methodology

3.2. Implementing MyPageKeeper

We provide some details on MyPageKeeper's implementation.

Facebook application: First, we implement the MyPageKeeper Facebook application using FBML [12]. We implement our application server using Apache (web server), Django (web framework), and Postgres (database). Once a user installs the MyPageKeeper app in her profile, Facebook generates a secret access token and forwards the token to our application server, which we then save in a database. This token is used by the crawler to crawl the walls and news feeds of subscribed users using the Facebook open-graph API.

Crawler instances and frequency: We run a set of crawlers in Amazon EC2 instances to periodically crawl the walls and news feeds of MyPageKeeper's users. The set of users are partitioned across the crawlers. In our current instantiation, we run one crawler process for every 1,000 users. Thus, as more users subscribe to MyPageKeeper, we can easily scale the task of crawling their walls and news feeds by instantiating more EC2 instances for the task. Our Python-based crawlers use the open graph API, incorporating users' secret access tokens, to crawl posts from Facebook. Once the data is received in JSON format, the crawlers parse the data and save it in a local Postgres database.

Checker instances: Checker modules are used to classify every post as socware or benign. Every two hours, the central scheduler forks an appropriate number of checker modules determined by the number of new URLs crawled since the last round of checking. Thus, the identification of socware is also scalable since each checker module runs on a subset of the pool of URLs. Each checker evaluates the URLs it receives as

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input—using a combination of whitelists, blacklists, and a classifier— and saves the results in a database

4. Expected Results

The study presented in this paper is a work in progress with many available future directions. By gathering additional information about what kind of applications users tend to restrict, we can develop an algorithm for application removal recommendations. Moreover, when the same applications are restricted by many users, we can conclude with high likelihood that these applications are fake applications and recommend to Facebook and our users to remove these applications from the social network and their accounts. Another possible future direction is discovering the point in time when the Add-on Users' application numbers start increasing again, and at that point, to give the user a special warning regarding his or her number of applications.

5. Conclusions

In this study, we presented our initial methods and results in studying online social network applications with an aim of improving user's safety and awareness. According to our results, it is possible to predict the number of applications a casual user has with high accuracy. we presented the design and implementation of MyPageKeeper a Facebook application that can accurately and efficiently identify socware at scale. Using data from over 12K Facebook users, we found that the reach of socware is widespread and that a significant fraction of socware is hosted on Facebook itself. Applications present a convenient means for hackers to spread malicious content on Social networks. However, little is understood about the characteristics of malicious apps and how they operate. And finally, we explore the ecosystem of malicious Facebook apps and identify mechanism that these apps use to propagate. We will continue to investigate on hacker's platform dig deep into their ecosystem to reduce the malicious app on Facebook.

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Two-Cloud Secure Database for Numeric-Related SQL Range Queries with Privacy Preserving

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Abstract

In the present scenario businesses and people are outsourcing database to accomplish helpful administrations and minimal effort applications. These are buried in the cloud server, which is outside the ability to control of the data proprietor. The SQL Queries require a few secure database schemes for its undeniable working, yet this at long last prompts privacy spillage to the cloud server. For numerical range inquiry (>,< , and so forth.) these neglect to give adequate security insurance. A portion of the difficulties faced are privacy leakage of statistical attributes, access patterns and so on. Likewise, increased number of queries will release more information to the cloud server. Thus, regarding these issues numerous works have been done by various researchers. We have studied some of these research works and analyzed the best possible ways to come to the desired level of privacy preservation in the case of cloud computing. Some of the works studied are the fuzzy logic, range queries, CryptDB order preserving encryption and multi-cloud architecture.

Keywords *— cloud computing, database, privacy preserving, range query*

1. Introduction

In the present circumstances as it can be seen cloud has taken the control over the IT business with its innumerable advantages. It holds the possibility to change an extensive segment of the IT business, making software considerably more appealing as an service. Cloud computing [1] is alluded to as SaaS (Software as a Service) since it renders the applications as administrations over the Web and the hardware and systems software in the data centres that offer those administrations. The hardware of data centre and software is called a cloud Today the clouds can be open/public and in addition private. Private clouds are associated to the inner datacenters of a business or other association, not made accessible to the overall public. Cloud computing in this manner can be compressed as a blend of saas and utility computing, booting out the data centre (little + medium estimated). Security is the chief concern of the cloud computing. Cloud clients confront security dangers both from outside and inside the cloud. Shielding the information from the server itself is the pro of the main issues related with it. The server will by definition control the "bottom layer" of the product stack, which adequately goes around most known security methods. As said the cloud server is accepted as semi-trusted (honest-but-curious). CryptDB [5], a framework that gives confidentiality to applications that utilize database administration frameworks (DBMSes). CryptDB permits to perform queries over

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encrypted data, likewise the SQL's very much characterized set of operators, and queries over encrypted data. CryptDB tends to the hazard of an inquisitive database administrator (DBA) who endeavors to learn private information (e.g., health books, financial articulations, individual data) by keeping an eye on the DBMS server by keeping the DBA from learning private information. It uses a few instruments to accomplish this security functionality. One of the devices being the Order preserving encryption (OPE) [11, 12] is generally utilized as a part of databases to process SQL Questions over encrypted information. It permits to perform order operations on ciphertext like the plaintext for e.g. data server can fabricate index perform range queries [10] and sort the encrypted information like the plaintext. Regardless of going to the security reason well, despite everything it uncovers the order of the ciphertext. Therefore, the objective of security protection of the outsourced information to a cloud server is refined by partitioning the sensitive knowledge into two parts and store them in two non-colluding clouds.

Moreover, a secure database service architecture is acknowledged by utilizing two non-colluding clouds in which the information learning and query rationale is divided into two clouds. Henceforth, perceiving just a single cloud can't help uncovering private data. Other than a progression of intersection protocols to give numeric-related SQL range queries [1] with privacy preservation is additionally executed and it won't uncover order related data to any of the two non-colluding clouds.

2. System Architecture

Our proposed secure database system includes a database administrator, and two non-colluding clouds. In this model, the database administrator can be implemented on a client's side from the perspective of cloud service. The two clouds (refer to Cloud A and Cloud B), as the server's side, provide the storage and the computation service. It briefly depicts the architecture of our outsourced secure database system in our scheme. The two clouds work together to respond each query request from the client/authorized users (availability). For privacy concerns, these two clouds are assumed to be non-colluding with each other, and they will follow the intersection protocols to preserve privacy of data and queries (privacy). In our scheme, the knowledge of stored database and queries is partitioned into two parts, respectively stored in one cloud. The mechanism guarantees that knowing either of these two parts cannot obtain any useful privacy information.

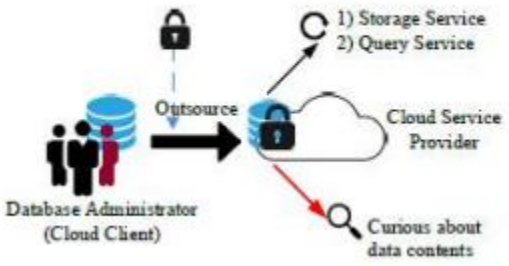

Figure 1. Outsource Database and Services

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As shown in to conduct a secure database, data are encrypted and outsourced to be stored in one cloud (Cloud A), and the private keys are stored in the other one (Cloud B). For each query, the corresponding knowledge includes the data contents and the relative processing logic. We utilize a prototype of knowledge partition, dividing application logic into two parts, which is bristly proposed by Bohli et al. In [16]. The application logic, as a secret knowledge, is partitioned into two parts, each of which is only known to one cloud. This prototype. Intuitively, this two-cloud architecture increases some complexity to some extent, and we will analyze and point out that this overhead is acceptable.

3. Related Work

This Paper analyzes recent research related to single or multiple cloud security and addresses possible solutions. Research on using multi-cloud providers to maintain security has been found to receive less attention from the research community than using individual clouds. This work aims to promote the use of multiple clouds thanks to its ability to reduce security risks affecting the user of cloud computing. We present new preprocessing techniques that allow obtaining interactive query times in large text collections (100 GB of text, served by a single machine). Consider two similarity measures, one in which the query terms coincide with similar terms in the collection (for example Algorithm of algorithm matches or vice versa) and one in which the query terms coincide with terms with a similar prefix in the collection (for example, Alori corresponds to the algorithm). The latter is important when we want to show the results instantly after each keystroke (search while writing). All the algorithms have been completely integrated into the complete search engine.

In this Paper, we define and solve the search for keywords classified as effective but protected on data encrypted in the cloud. We use order preserving symmetric encryption to protect data in the cloud. Although many research techniques are available, they do not offer efficient search results. For example, the search results generated 40 records and in those 30 records are relevant and the remaining 10 records generate irrelevant data. This paper focuses mainly on research methods that will improve the effectiveness of research. We use search methods based on keywords and concepts to retrieve relevant search criteria. This method will restore documents based on broader conceptual entities, which will improve the efficiency of the search.

4. Modules

1. Potential Threats and Privacy Requirements This section describes the potential threats and the privacy requirements when the database is outsourced to public cloud. The stored data contents and the query processes. Although there are many data encryption schemes, some fail to provide sufficient privacy preservation after statistical analysis: Repeated and large-amount query processes not only leak the access patterns, but also disclose the stored encrypted data progressively.

2. Data contents Module: Besides the static properties can disclose the private information of data contents, such properties themselves are already sensitive and private for the client. Order Preserving Encryption(OPE), which is widely used in constructing the secure database, with support of range queries, directly exposes the statistical

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information in the encryption field. Furthermore, the leakage of statistic properties is part of the nature of outsourced cloud database service: the cloud can learn the statistical properties (like order) by repeated query requests. As an example, It describes such an attack: After two simple queries over one same column, the order relationship of some data in certain column can be determined. There are also some other direct and indirect scenarios to leak statistical properties. In this way, even though the order property is not exposed to the semi-trusted cloud at the beginning, the cloud can gradually find out the order information after many query requests.

3. Query pattern Module. The query pattern also contains privacy information, as they can reveal the client's purpose of the query. Even worse, such pattern can leak some statistical properties, as discussed above. Based on the above discussion, we assert that an outsourced secure database providing numeric-related queries should prevent the following private information from being obtained by the honest-but-curious clouds

4. Privacy of Item Values Modules: An ideal scheme is required to make nothing of the statistical properties be leaked to the curious clouds. However, the privacy leakage of statistical properties in a practical Outsourced database system is inevitable, as returning subset of data rather than universe requires knowledge for filtering. For instance, if the client wants to retrieve a from the outsourced database, a cloud server without any knowledge of the order can only return all items of the database to the client, which is not usable.

5. Conclusion

In this paper, we presented a two-cloud architecture with an intersection for outsourced database service, which ensures the privacy preservation of data contents and SQL range query pattern. At the same time, with the support of range queries, it not only protects the confidentiality of static data, but also addresses potential privacy leakage in statistical properties or after large number of query processes. Security analysis shows that our scheme can meet the privacy preservation requirements. Furthermore, performance evaluation result shows that our proposed architecture are efficient. To achieve the assurances of cloud data integrity and availability and enforce the quality of dependable cloud storage service for users, we propose an effective and flexible distributed scheme with explicit dynamic data support, including block update, delete, and append. We rely on erasure-correcting code in the file distribution preparation to provide redundancy parity vectors and guarantee the data dependability.

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1	Dr Kannan S	An energy efficient wireless body area network design in health monitoring scenarios, chapter 10	2019	978-111-94-3896-0	Yes	Wiley Publishers

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18

An Energy-Efficient Wireless Body Area Network Design in Health Monitoring Scenarios

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18.1 Wireless Body Area Network

18.1.1 Overview

In concern with medical environment, a wireless body area network (WBAN) is a group of energy-constrained, persistent or nonpersistent, and lightweight wireless sensor nodes that are used to monitor the patient's health condition and the medical environment. As per the description given in IEEE 802.15.6 standard, medical environment is one of the crucial applications of WBAN (Jovanov et al. 2000). The applications of WBAN in medical and healthcare environment can be classified into three categories: wearable, implant and remote-controlled WBANs. The wearable WBAN is used in scenarios like monitoring the sleeping disorder, monitoring sport training, etc. Medical field functions like diabetic monitoring, cardio function monitoring, etc. can be fulfilled by wearable WBANs and these types of sensor devices are either implanted in a patient's body or transmitted in the bloodstream (Malan et al. 2004; Otto et al. 2005; Hanson et al. 2009). The remote-controlled WBANs are used for exchange of the patient medical information from one place to another for assisting back-end medical network. This will enable the speedy exchange of medical data on a particular patient from one to another to give speedy treatment.

The sensor nodes in the WBAN can be classified into three types based on their nature of work in the network, namely, coordinator, end nodes, and relay nodes. The communication between the two or more sensor nodes and the communication with other outside networks are coordinated and monitored by the coordinator nodes. Upon monitoring and controlling the sensor nodes,

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the coordinator receives or collects medical information from them. Later the collected information is transferred to medical care center or central server for further processing. In general the coordinator could be a personal digital assistant and they may transmit necessary information and notifications to users directly. Due to various limitations like small size, short transmission range, and less battery power, the end nodes are limited to collecting and transferring the sensing data to the nearby coordinator or the relay nodes. The end nodes and relay nodes are normally small-sized sensor devices that consist of sensing unit, power unit, communication, storage, and processing units. Sometimes the relay nodes can act as coordinator node when the actual coordinator is far away from the end nodes. In few cases, the WBAN may have special node called actuator. These nodes are meant for performing some small specific task when they are receiving the signals from the on-patient end nodes (Gyselinckx et al. 2007; Golmie et al. 2005).

18.1.2 Architectures of Wireless Body Area Network

In general, the healthcare monitoring system based on WBANs has been broadly composed of the following three-tier communication:

- Tier 1: Intra-WBAN communication
- Tier 2: Inter-WBAN communication
- Tier 3: Beyond-WBAN communication

Figure 18.1 gives an illustration on the working process of these three components.

18.1.2.1 Tier 1: Intra-WBAN Communication

In the intra-WBAN communication level, the communication between the sensor nodes and the coordinator nodes is considered. This level also includes the communication among the sensor end nodes. Here, the data transmission is limited to 2 m around the human body. Basically the star topology is utilized in the WBAN environment due to the limited size of the network. This also leads to crucial design of WBAN design. However, due to limited transmission range and irregular human body movement, the WBAN has great challenges to attain reliable communication. In WBAN, though the multi-hop communication causes higher transmission delays, at the same time it consumes lower power for transmissions (Cavalcanti et al. 2007).

18.1.2.2 Tier 2: Inter-WBAN Communication

This layer aims to connect the WBAN to broader network to improve or enhance the availability of the WBAN by connecting with the Internet and mobile networks. The entry point to the any mobile network is an access point (AP). Hence, WBAN's coordinator nodes establish a direct connection to these

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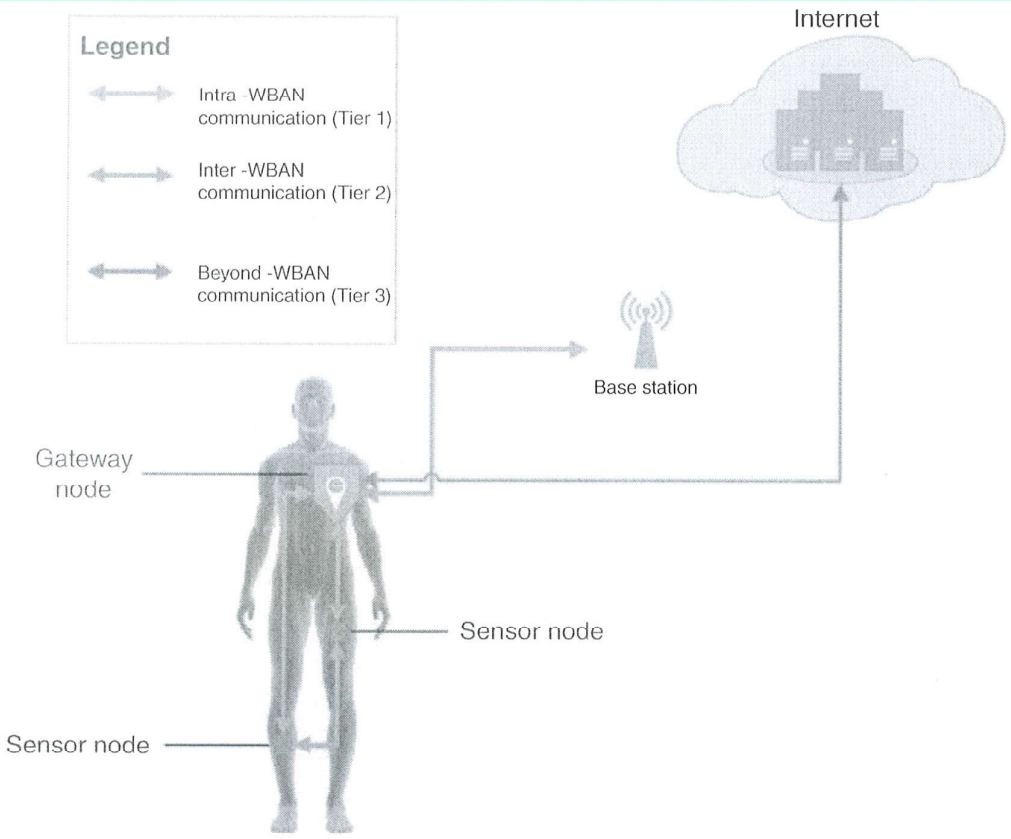

Figure 18.1 WBAN-based healthcare monitoring architecture.

APs, which will enable inter-WBAN communication in a limited space, for example, some conference room in a hospital (Figure 18.2).

18.1.2.3 Tier 3: Beyond-WBAN Communication

The major advantage of the WBAN system is to enable the doctors to perform remote diagnosis and give the formal instructions for treating the patient by the doctors in site. This could be achieved by establishing the communication medium between the AP and the outside work with the help of Internet resources. This kind of environment for the doctors as well as the patient for accessing the treatment database remotely allows the patients to get the automatic notifications about the series of treatments and follow-up of the given treatment (Figure 18.3).

18.1.3 Challenges Faced in System Design

In WBAN, reliability is most concern among anything since the treatments are given based on the values received by the communication. The following

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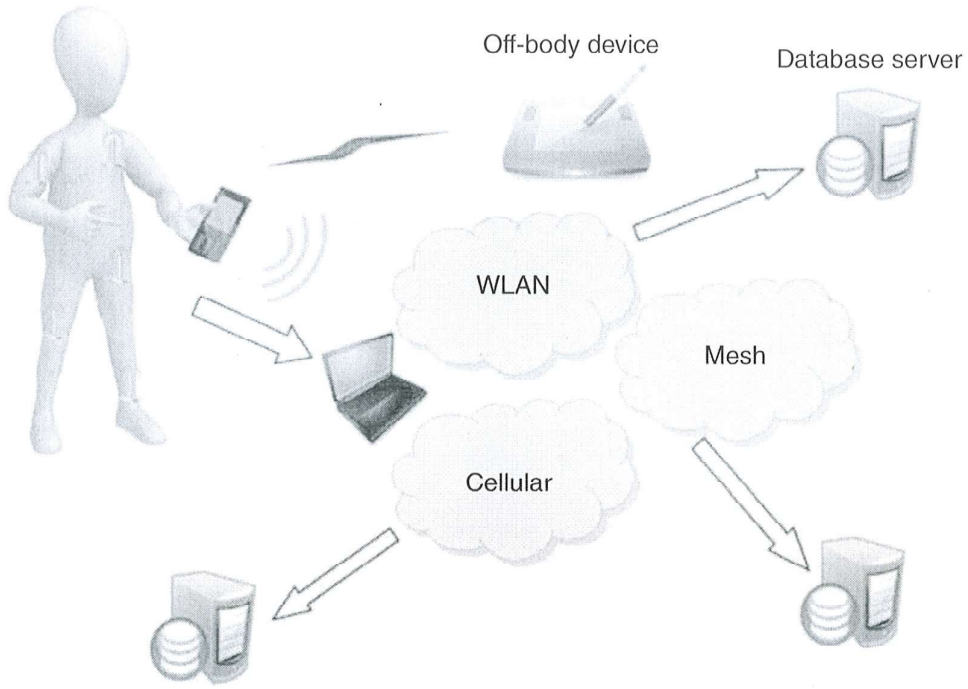

Figure 18.2 Inter-WBAN communication: infrastructure-based architecture.

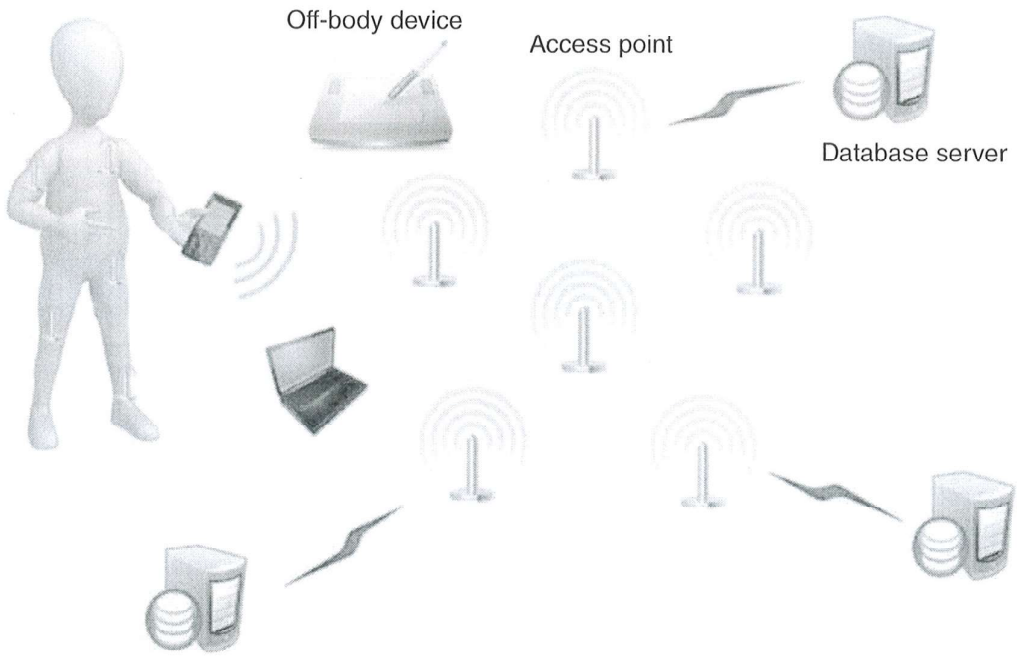

Figure 18.3 Inter-WBAN communication: ad hoc-based architecture.

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are some of the most concerned challenges that need to be addressed in the WBANs (Ullah et al. 2008; Lo and Yang 2005; Ye et al. 2004).

18.1.3.1 Energy Constraint

Unlike wireless sensor networks, the WBANs are needed to be more energy-efficient. This is because the WBAN sensor nodes are likely to be implanted on or inside the human body. Large-sized sensors on or inside the human body will strongly persuade patient's day to day life activities and, hence, should not be larger in size than the WSN nodes.

On the other hand, by aiming the reduction in the size, it should not reduce the lifetime of the sensor devices. Because the nodes heavily depend on the energy of the batteries, these tiny sensors are expected to work for long durations, since replacement or charging is not an easy one. Hence, the transmission will be an effective one and might result in less consumption of energy.

18.1.3.2 Interference in Communication

All on-body and in-body sensor nodes in the human body could be controlled by the centralized coordinator node. This strategy will be the effective one unless there is a movement of the sensor node. For example, consider a case where there are number of patient coming together by wearing number of sensor nodes on them. In this case, the strategy designed for maintaining the coordination among the sensor nodes to their respective coordinator node may fail. This will lead to collision on data transmission to the coordinators. Hence, it is mandatory to have a good network design such that to have effective interference mitigation system to handle the topology changes in a very fast manner.

18.1.3.3 Security

The WBAN handles the personal and private data of the individual patient, that should not be known to anyone. Hence, the primary objective of WBAN system is to maintain such a private data with the highest security. The valuable patient's data stored and handled in the data center cannot be accessed by the public and it should be made available to the doctors irrespective of denial of service (DoS) attacks. Any attack to the data center of WBAN will lead to severe damage and worst results. However, it is very difficult to implement an encryption key mechanism in body area network since it has more limitations on battery, processing capability, storage, and transmission power.

18.1.4 Research Problems

Considering the various challenges in WBANs, this chapter aims to achieve reliable and energy-constrained communication among the sensor nodes and

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among the coordinator nodes. This chapter also considers some important aspects of network design such as scheduling scheme, fixing the transmission power to the nodes, usage of relay nodes, and number of sensor nodes for any coordinator.

The static scheduling schemes do the scheduling without considering the variation in the wireless channel on the MAC layer. Generally this kind of scheduling produces poor performances due to not avoiding bad channels completely and not demoralizing all good channels. In this chapter, we focus the effectiveness of opportunistic scheduling in less overhead WBAN environment, in which the current status of the wireless channel is considered to adjust the scheduling of the transmission and super-frame length. Also an outage rate is significantly reduced by effective scheduling in the data transmission, and it is illustrated in the following simulation study.

18.2 Proposed Opportunistic Scheduling

18.2.1 Introduction

This simulation study addresses the problem currently faced by the WBAN with fixed scheduling, which failed to react to the channel fluctuations: an opportunistic scheduling approach is proposed and executed. This scheduling utilizes a two-state Markov model and beacon-based time division multiple access (TDMA). Here, the two-state Markov models are used to count the state transition samples, which will be useful when estimating the probability distribution and channel dynamics in which the fixed scheduling failed. We use ρ as a factor to discounting by considering the highly dynamic characteristics of network for coordinating the coordinator nodes. From the studies in the literature, it is shown that the Markov model delivers much better estimations on state values since this method produces more perfect transition probability values for modeling the wireless channel (Patel et al. 2012).

We also propose and prove that the heuristic scheduling method is performing comparatively good and optimal under some insignificant assumptions. Based on the literature study and observation, we further extend the proposed method to dynamic adjustment in length of the super frame according to the status of the channel.

The designed system follows the principle based on super-frame length. Within the super-frame range, the dynamic scheduling does not have much control on it when the length of the frame is small. On the other hand, the current condition of the channel is unreliable or the frame length could not be large.

The simulation results show that the proposed dynamic heuristic scheduling with super-frame adjustment methods results in better performance than

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the fixed scheduling and any other opportunistic scheduling approaches considered in the study. In particular, the dynamic scheduling avoids at least 8% of outage when compared with static or fixed scheduling. Also the dynamic heuristic frame length adjustment scheme gains 25% more of the overall system's throughput when compared with the flipping method and 30% than the random method.

18.2.2 System Model and Problem Formulation

18.2.2.1 System Model

This proposed system model adopts star topology with one-hop routing. It is due to the scenario that is considered here in health monitoring environment, where the communication of signals between the sensor nodes and the coordinator node is more frequent. Hence, one-hop communication between the sensor nodes and the coordinator node may result in better throughput. It is recommended to use beacon-enabled TDMA mode of process by IEEE 201.15.4 for WBANs, since the coordinator nodes are mobile devices. At the beginning of every super frame, the beacon frame is broadcasted to all the coordinator nodes in the network for resource allocation and synchronization among the coordinator nodes. Because of this super frame, synchronized process in every node will be activated in the allocated time slots and can go for transmission (Darkins et al. 2008; Akkaya et al. 2005).

Each time slot is defined by two channel states and they are named as good and bad state; also they are represented by 1 and 0, respectively. Based on the literature studies, the Gilbert model is chosen since it is very effective on dynamic behavior of on-body sensor network environment and also the probing of the wireless channel is not feasible. The current status of the coordinator node is monitored only during the node's transmission of signals to the coordinator. On the other hand, during the idle time slots, the system uses the state belief information instead of current channel status to calculate the current status or condition of the channel. For the node i, the state transition matrix at super-frame time slot $P^i(K)$ is represented as follows:

$$P^i(K) == \begin{pmatrix} P^i_{00}(k) & p^i_{01}(k) \\ P^i_{10}(k) & p^i_{11}(k) \end{pmatrix} \tag{18.1}$$

At this state of transition for the ith node, the initial state belief is represented as

$$\begin{bmatrix} P^i_0(k) \\ P^i_1(k) \end{bmatrix} \tag{18.2}$$

Hence, the state belief of the ith node at super-frame time slot n can be premeditated as

$$\begin{bmatrix} P^i_0(n) \\ P^i_1(n) \end{bmatrix}^T = \begin{bmatrix} P^i_0(0) \\ P^i_1(0) \end{bmatrix}^T \prod_{k=1}^{n} \begin{pmatrix} P^i_{00}(k) & P^i_{01}(k) \\ P^i_{10}(k) & P^i_{11}(k) \end{pmatrix} \tag{18.3}$$

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where

$P_0^i(0)$ – Probability value of channel to be a bad channel.

$P_1^i(0)$ – Probability value to have good channel during the transition.

18.2.2.2 Problem Formulation

By considering the objective as maximizing the successful attempts in a number of packet transmissions from the sensor nodes to the coordinator for attaining higher throughput in the systems, assume that the quality belief of the channel is represented by $h_i^r(\tau)$, which represents the probability values for the ith sensor node to have a good channel at time slot τ in round r. Thus the problem is expressed as follows:

$$\text{Maximize} \sum_{1\le i\le M, 1\le \tau\le T, 1\le r<\alpha} h_i^r(\tau) L_i^r(\tau) \tag{18.4}$$

$$\text{Subject to } \sum_{1\le i\le M} L_i^r(\tau) \le 1$$
$$\sum_{1\le \tau\le T} L_i^r(\tau) \le x_i$$

where

$L_i^r(\tau)$: Scheduling of the node i at slot τ in round r.

x_i: Number of packets to be transmitted by the node i in one round.

M : Number of nodes.

T : Number of slots in a round.

As mentioned previously, the calculation of $h_i^r(\tau)$ is done in each round in an independent manner. These independent local solutions in the attempt of increasing the network throughput by maximizing the successful transmissions at individual rounds will make up the optimal global solution.

18.2.3 Heuristic Scheduling

Based on the study, a greedy method that has low complexity than the other methods is considered to guarantee the tolerable complexity during the scheduling. To accomplish this during the scheduling, the sensor nodes are formed as two different groups. On the one hand, one group will contain the set of sensor nodes whose transmission was successful during the last round. However, on the other hand, the other group combine the set of sensor nodes whose transmission failed or was unsuccessful during the last round (Otto et al. 2006). When a sensor node goes for forwarding more than one packet, then the node's last transmission of packet in that specific round is considered to find which group the node belongs. However, the successful node's transmission must be scheduled before the failed node's transmission. Due to this advantage, a node with the good channel will have the advantage to access the channel before it becomes worse; at the same time the nodes with the bad channel may have sufficient time to recover from the failed state to success state to have good channel.

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In addition, by using the success rates of the transmission and transition matrix estimation values during the last round, we can calculate state belief in any random time slot of the considered current round. By the same way, the future time slot for the future round also can be estimated. Based on the literature study, almost all the WBAN has the coherence time of 400 ms and it is longer than the length of the super-frame, which is considered in this system design. Hence, the estimated channel belief will be reliable.

The calculation of P_1^i to approximate h_i^r is in the objective function, where the last communication in the previous round is the early state belief of P_1^i. It is proved that P_1^i progress as an exponential function. Here, we skip the round number r and use ϵi to symbolize the probability value of transiting to good channel from bad channel $P_{01}^i(r)$ and δi is considered to represent the probability value of transiting to bad channel from good channel $P_{10}^i(r)$. This is taken by the basis of dynamic channel properties during the scheduling.

The calculation of channel state belief to have good channel at given time t can be represented in the following formula;

$$P_1^i(t) = \begin{cases} \left[1 + \dfrac{\delta_i}{\varepsilon_i}(1-\varepsilon_i-\delta_i)^t\right]\dfrac{\varepsilon_i}{\varepsilon_i+\delta_i}, & \text{Successful node} \\ [1+(1-\varepsilon_i-\delta_i)^t]\dfrac{\varepsilon_i}{\varepsilon_i+\delta_i}, & \text{Failed node} \end{cases} \tag{18.5}$$

where t is the number of time slots away from the initial state, which is the result of the previous transmission.

Here we considered that fluctuation range of the current channel belief could be the heuristic function. In specific, to all successive sensor nodes, we are determining the difference of channel belief of each node between the start and end of the round for all successful node's transmission. Let us assume N_i is a cumulative number of time slots that happened between previous transmission of ith node and commencement of the next round. Also assume every successful transmission is assigned with N_{Good} number of time slots.

Hence, the utility function for successive nodes is calculated as per the given formula (18.6):

$$U_i = P_1^i(N_i) - P_1^i(N_i + N_{\text{good}}) \tag{18.6}$$

Figure 18.4 shows the design of scheduling the node at front that has the larger utility function. Let us assume five sensor nodes, in that one among five nodes failed while transmitting the packet.

Similarly, the failed node's utility function is calculated as per the given formula (18.7):

$$U_i = P_1^i(N_i + T - N_{\text{bad}}) - P_1^i(N_i + T) \tag{18.7}$$

where N_{bad} represents the failed node's time slot and T is the total number of time slots in a single round.

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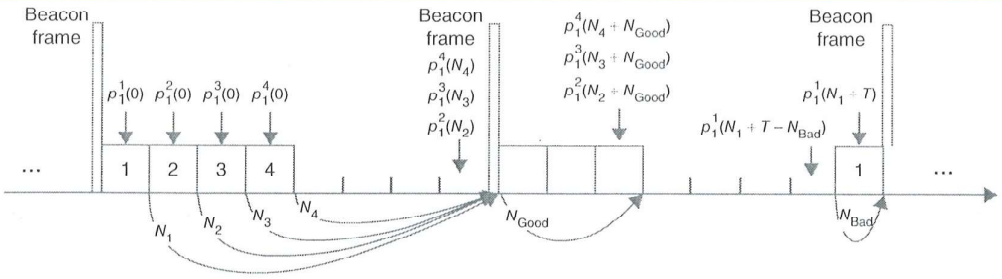

Figure 18.4 Illustration of utility function calculation.

Algorithm 1: Heuristic scheduling

Initialize: $r = 1$, $W^i_{s1,s2}(r) = \theta$, random schedule for 1st round.
While r $\geq$ 1 *do*
Transmission as per the schedule;
for $i = 1,2;$ .....,M do
if S_1 is observed at one slot and S_2 at the next then

$$W^i_{s1,s2}(\mathrm{r}) = W^i_{s1,s2}(\mathrm{r}) + 1;$$

end if
End for
for $i = 1,2,....,\mathrm{M}$ do

$$P^i_{s1,s2}(r) = \frac{W^i_{s1,s2}(r)}{\sum_s W^i_{s1,s2}(r)}$$

End for
To schedule successive nodes at front and failed nodes at last;
Calculate Utility function U_i and sort each group in decreasing order;
$r = r+1;$
End while

This utility function works in such a way that the scheduling process must be fast enough to schedule the node, which has the successive transmission in the previous round, which depreciates fast. Also the scheduling must be completed as early as possible so that the successive node can complete the transmission before the transmission channel becomes bad. Similarly, when a channel state improves from bad state to good state for a node, previous transmission failed. Then this node should be scheduled as soon as possible in its own group. The below pseudo code shows this approach in Algorithm 1.

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The complexity of the proposed dynamic scheduling approach is represented as $O(M \times N_p + M \log M)$ by assuming that at every round of packet transmission, each sensor node transmits an average of N_p packets. However, this complexity is insignificant for the coordinator nodes whose load is low and has limited number of sensor nodes. In practical, the mere requirement of sharing the same $\varepsilon + \delta$ value by all sensor nodes is true and the proposed dynamic heuristic approach achieved this.

18.2.4 Dynamic Super-Frame Length Adjustment

Based on the literature study, the effectiveness of time slot scheduling within some assured round is relatively limited due to an improper length of the super frame. The reason behind this is that the channel property does not change too much in certain rounds where the length of the super frame is short. In this scenario the process of time slot scheduling will become unimportant. On the other hand, the state belief of a channel converges to steady state and hardly has any details for scheduling when the system has lengthy super frame. Moreover, the length of the super frame changes dynamically when the objective gesture changes (Venkatasubramanian et al. 2005).

Hence, we propose a dynamic Super-Frame length adjustment approach based on temporal difference (TD) error. By this approach, the performance of the proposed dynamic system improves further.

18.2.4.1 Problem Formulation

In the processes of determining the length of the super frame, the coordinator node will act as an agent and it is responsible to make decisions based on "states" and "rewards." The terms states, rewards, and action are defined as follows:

1) *State:* Packet delivery rate (PDR) at the last round.
2) *Action:* Determining length of the super frame T and choosing a packet by its number to deliver in x_ith round.
3) Reward: Reward (rw) = (1 − PDR) + PDR at state.

During the dynamic computation and adjustment of the super frame while data is being transmitted, to maintain the constant rate of data, the length will be calculated by multiple of minutes length T_0. And the total number of packets to be transmitted x_i will be dynamically calculated and adjusted proportionally to T. We use the function $Q(s, a)$, which represents value of performing action a in state s. In every state the approach chooses the action with the highest Q value. The following equation shows the dynamic calculation of action value function:

$$Q(s,a) = \sum_{s'} P(s'|s,a)[rw(s,a,s') + \gamma^{\max}_{a'} Q(s',a')] \tag{18.8}$$

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Algorithm 2: Dynamic super frame length adjustment

Initialize Q(s,a) at random, default length of super frame: T_0, default packet no.: x_{i0} in single super frame, r = 1;
while r $\geq$ 1, do
Step 1 : decide action as per Q(s,a) values being ε-greedy. T=a X T_0, x_i=a X x_{i0};
Step 2 : do heuristic forecast and send out with length T and packet no x_i;
Step 3 : scrutinize transmission result and calculate *rw* and the new state s';
Step 4 : revise $Q(s, a)$ belief using
$Q(s,a) \leftarrow Q(s,a) + \alpha[rw + \gamma^{\max}_{a'} Q(s',a') - Q(s,a)]$
Step 5 : s $\leftarrow$ s', $r - r + 1$.
end while

Here we use Q learning method to calculate the Q value in action value function. This is because of considering the difficulties on obtaining the value of transition probability.

$$Q(s,a) \leftarrow Q(s,a) + \alpha[rw + \gamma^{\max}_{a'} Q(s',a') - Q(s,a)] \tag{18.9}$$

Algorithm 2 gives the pseudo code for this above approach.

18.3 Performance Analysis Environment and Metrics

The experiment is conducted by using five sensor nodes and one coordinator node on human body. The time slot is fixed as 5 ms. The number of packets transmitted by every sensor node is assumed as identical (Vijendra 2011). The channel samples are used as datasets. For any subject, five channels are allocated as gain channels. This experiment collects the data from the five sensor nodes that are placed in different locations on the body of an adult object. When the gain at the channel is less than the fixed outage threshold value, outage is starting to occur and results in failed transmission. The final value of the result is arrived by averaging the considered all eight datasets. In the comparison study two other scheduling schemes are also considered to assess the performance of the proposed dynamic scheduling. The first one is random scheduling method, in which the sensor nodes are grouped into successive group and failed group. The second method is flipping method. Here, the performance of the fixed scheduling method is considered as baseline to evaluate the performance of the proposed dynamic scheme. The experiment and the simulations are performed on MATLAB environment.



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18.3.1 Heuristic Scheduling with Fixed Super-Frame Length

This section presents the performance of heuristic scheduling over fixed and flipping approaches. Figure 18.5 shows the impact of the number of delivered packets for each sensor nodes in each round of transmission. In this evaluation all the nodes are allowed to have 80 rounds of transmission of packets in order to have a wide range of results with respect to packet delivery ratio. So this simulation will take 400 ms long, which is close to on-body channel's coherence value. The results show that the design of placing the successive nodes at the front and the failed nodes at the last in every individual round gains better packet delivery ratio when compared with fixed scheduling at the outage value of 80 dB. This also shows that the heuristic scheduling approach results with better value than the flipping method.

Figure 18.6 shows the performance of different length of super frames with respect to outage rate reduction. When the length is 20 slots, each sensor node is allowed to transmit two packets. Further, the number of packets to be transmitted increases proportionally, and the length is maintained as constant rate. The figure reveals that the proposed scheduling scheme performs better than the other two considered approaches. The curve presented in the figure has the consistency throughout the simulation. It depicts that a medium length of the super frame has a good balance between the accuracy level of estimated channel state and scheduling outcomes.

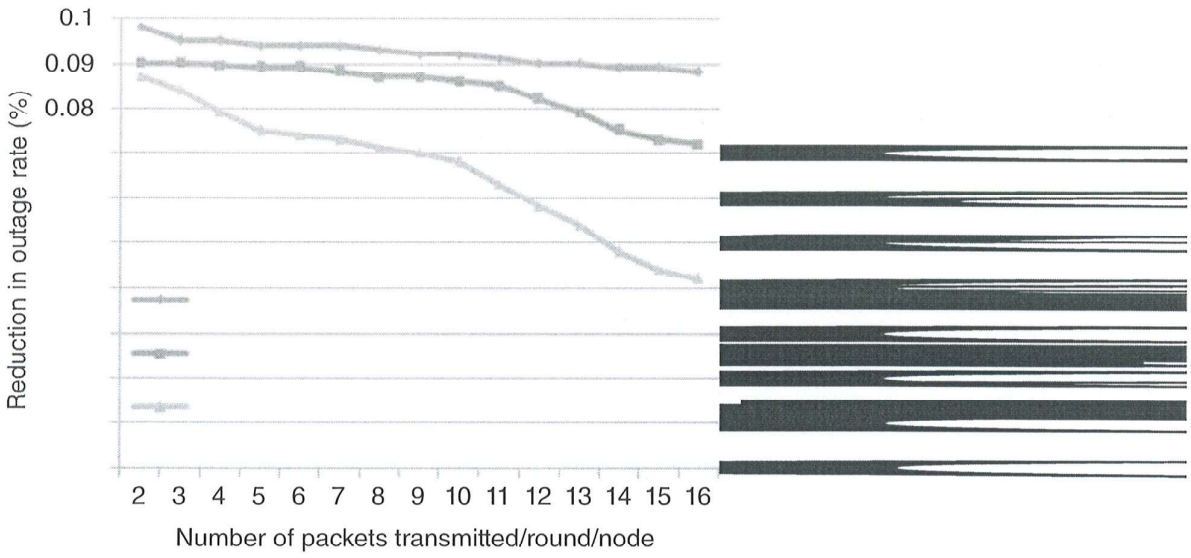

Figure 18.5 Effects of the number of packets in static length of the frame.

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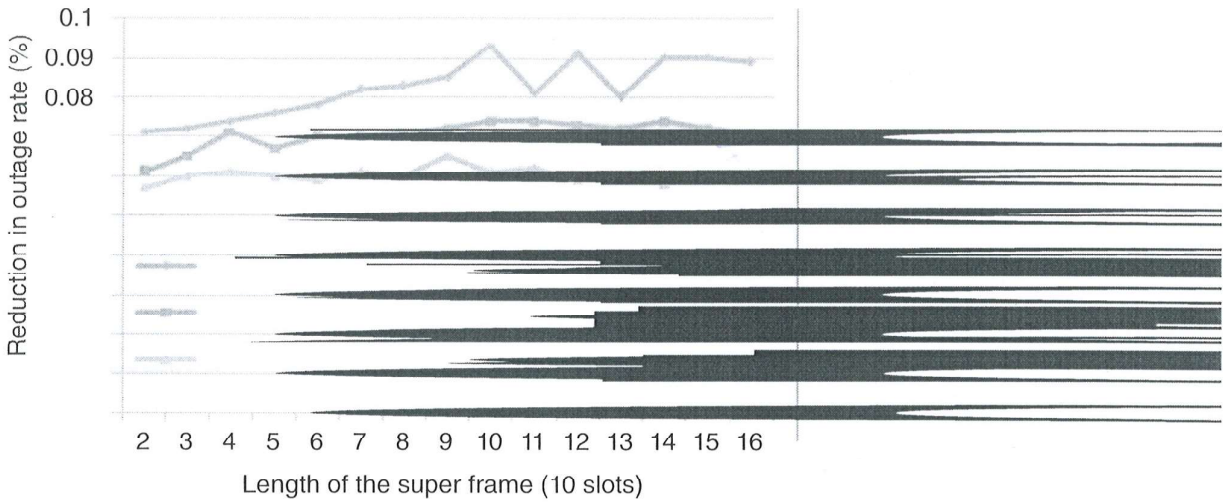

Figure 18.6 Effects of the length of the super frame.

18.3.2 Heuristic Scheduling with Dynamic Super-Frame Length

In this section, we discuss the performance and its comparison of dynamic adjustment of length of the super-frame approach with the proposed heuristic scheduling method. As per the literature study it is observed that the length of the super frame should not be growing large in unreasonable manner. This will effect in worst performance of channel belief estimation of unreliable channel. So it is necessary to restrict the growing of super frame unnecessarily. To achieve this, here we set T_0 as default initial value, which is more over equal value adopted in other models. Figure 18.7 shows the performance of proposed dynamic method. The number of packets to be transmitted per round is fixed in a range of 2–7 for the other fixed length methods. The dynamic method is fixed with the initial value of $X_{i0.}$ The figure depicts that the proposed heuristic scheduling and the variable length schemes are showing better performance than any other static methods.

18.4 Summary

The communication between the coordinator and sensor nodes in WBAN are crucial part to improve the performance of the network. The dynamic and heuristic super-frame length adjustment methods are introduced for measuring and controlling the super-frame length to improve the performance in packet transmissions between the sensor nodes and the coordinator nodes. The heuristic scheme is used to estimate the length of the super frame to regulate the packet transmission, which is based on the utility function. The dynamic adjustment method is also used to estimate the length of the super

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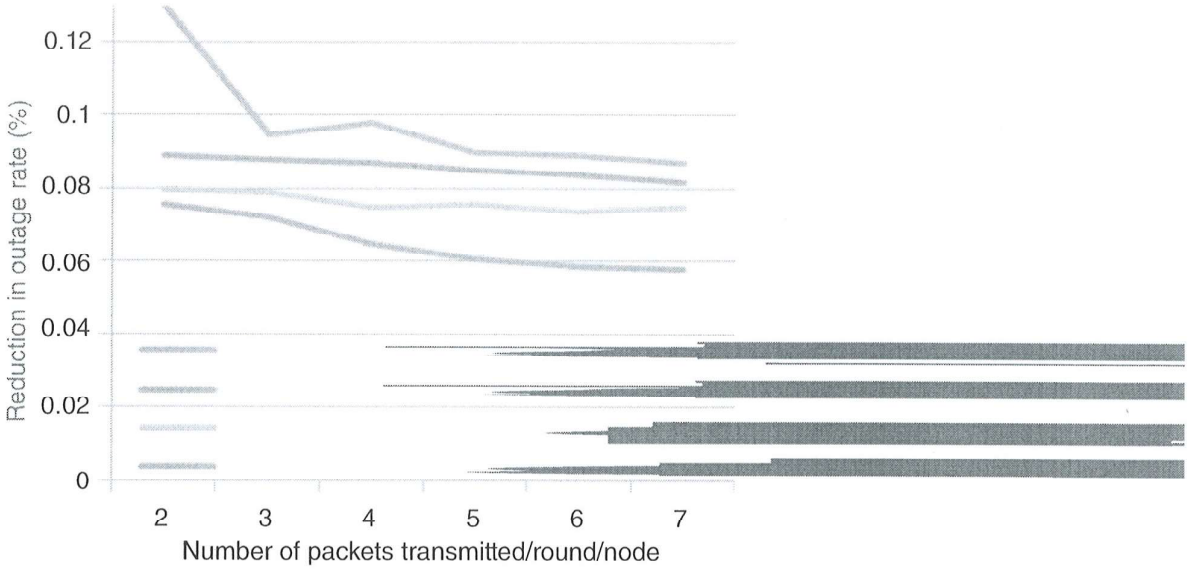

Figure 18.7 Effects of the number of packets in dynamic length.

frame and to improve the efficiency in the packet transmission rate. The performances of the above approaches are compared against two other static methods, namely, flipping and random methods. The simulation results are showing that the heuristic and dynamic frame length adjustment methods are performing better against the static methods in all the considered conditions.

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Manufacturing of Foot step power generation by using rack and pinion motion with suspension spring.

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ABSTRACT:

In this project we are generating electrical power as non-conventional method by simply walking or running on the foot step by using rack pinion methods. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step is converting mechanical energy into the electrical energy. This project using simple drive mechanism such as rack and pinion assemble and chain drive mechanism.For this project the conversion of the force energy in to electrical energy. The control mechanism carries the rack & pinion, D.C generator, battery and inverter control. We have discussed the various applications and further extension also. The D.C generator used in this project is Permanente Magnet D.C generator. The Generator is coupled to the fly wheel Shaft with the help of Spur Gear Mechanism.

Keywords: Footstep, Conventional Energy,Non-conventional Energy system.

1.INTRODUCTION

In this project the weight which acts on the foot step is used to generate electrical energy. When a person walks over the foot step, a force acts on the step. One can simply be amazed by knowing how much energy a person can have just by walking on the floor with normal speed. Whenever a person walks, manages to lose energy towards the floor by means excess weight to the floor. That energy may be used and converted into electrical energy. The Mechanical energy(weight)is converted into electrical energy using drive mechanism, in this case rack and pinion. Generated energy can be stored in batteries. Then the output of the battery is used to lighten the lamps in the room.

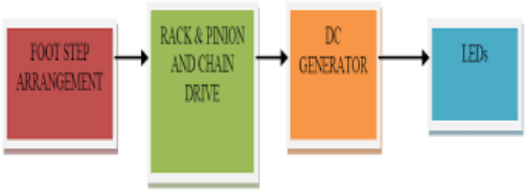
2. PROBLEM STATEMENT

Design and fabrication the model of foot step power generation. Also to fabricate the model of the same which would able to show the characteristics of the systems and working according to need.

3. OBJECTIVES

To design and develop the model of Stair case power generation. o fabricate the model which will work on the systems for required application

4. METHODOLOGY



5. LITERATURE REVIEW

[1] "PowerGeneration in Automobile Suspension System" by C.NithiyeshKumar,K.Gowtham, M.Manikandan, P.Bharathkanna, T.Manoj Kumar In this research paper author studied three methods of foot step power generation namely piezoelectric method, rack and pinion method and fuel piston method comparatively and found that the rack and pinion mechanism is more efficient with moderate cost of operation and maintenance

2] "Generation of Electrical Energy from Foot Step Using Rack and Pinion Mechanism" by Md.Azhar, ZitenderRajpurohit, Abdul Saif, NallaAbhinay, P.Sai Chandu In this research paper authors used regulated 5V power, 500mA power supply. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer. A rack and pinion is a type of linear actuator including a pair of gears which convert rotational motion into linear motion. The "pinion" engages teeth on the rack. In this paper, since the power generation using foot step get its energy requirements from Non-renewable source of energy. There is no need of power from external sources (mains) and there is less pollution in this source of energy. It is very useful to the places like all roads and as well as all kind of foot step which is used to generate the non-conventional energy like electricity.

[3] "Electrical Power Generation Using Foot Step for Urban Area Energy Applications" by Joydev Ghosh, Amit Saha, Samir Basak, Supratim Sen. In this research paper authors used 80 volts and 40 mA from one coil have been generated from a prototype model as first invention. The second invention provides 95 volts and 50 mA from one coil and this generated power can be used to light LED array and to run DC fan after rectifying the AC or can charge batteries. For high efficiency in the axel of the second gear, they fitted a strong magnet vertically, so that when the gear will rotate due to human body weight the magnet also rotate. The magnet is placed in a loop type copper coil. When the magnet start rotating according to the Faraday's law of electromagnetic induction, there will be induced emf in the coil.

[4] "Power generation through step" by Vipin Kumar Yadav1, Vivek Kumar Yadav1, Rajat Kumar1, Ajay Yadav In these research paper authors used equipments with following specification: Motor Voltage:10 volt Type: D.C. Generator, RPM:1000 rpm, Gear 1-Mild Steel,No. of teeth:59(big gear),No. of teeth:36(small gear),Type: Spur Gear, No. of gear used:2 Spring 1-Load bearing capacity:60-90 kg, Mild Steel,Total displacement:5 inch, Bearing 1- Type: Ball bearing, Bearing no.N35,Shaft 1-Diameter: 15 mm- Material: Mild steel author concluded

that with these method energy conversion is simple efficient and pollution free.

[5] “Power Generation Footstep” by Shiraz Afzal, Farrukh hafeez This paper is all about generating electricity when people walk on the Floor if we are able to design a power generating floor that can produce 100W on just 12 steps, then for 120 steps we can produce 1000 Watt and if weinstall such type of 100 floors with this system then it can produce 1MegaWattAs a fact only 11% of renewable energy contributes to our primary energy. If this project is deployed, then not only we can overcome the energy crises problem but this also contributes to create a healthy global environmental change. In this project a gear system is attached with flywheel which causes to rotate the dynamo as the tile on the deck is pressed The power that is created is saved in the batteries in addition we will be able to monitor and control the amount of electricity generated When an individual passes it push the tile on the ground surface which turn the shaft beneath the tile, turn is limited by clutch bearing which is underpinned by holders. Primary shaft is rotate approx. twice by a single tile push. The movement of the prevailing shaft turn the gearbox shaft which builds it 15 times (1:15) then its movement is smoothen by the help of fly wheel which temporary store the movement, which is convey to the DC generator (it generates 12V 40 amp at 1000 rpm).

[6] “POWER GENERATION FROM STEPS” by Ramesh Raja R, Sherin Mathew This research paper attempts to show how energy can be tapped and used at a commonly used floor steps. The usage of steps in every building is increasing day by day, since even every small building has some floors. A large amount of energy is wasted when we are stepping on the floors by the dissipation of heat and friction, every time a man steps up using stairs. There is great possibility of tapping this energy and generating power by making every staircase as a power generation unit. The generated power can be stored by batteries, and it will be used for slighting the building.

[7] "Electricity Generation from Footsteps; A Regenerative Energy Resource” by Tom Jose V*, BinoyBoban*, Sijo M T* In these research paper author manufactured a model made from stainless steel, recycled car tires and recycled aluminium, also includes a lamp embedded in the pavement that lights up every time a step is converted into energy (using only 5 percent of the generated energy). The average square of pavement produces about 2.1 watts of electricity. And according to author, any one square of pavement in a high-foot traffic area can see 50,000 steps a day. Based on this data, only five units of Pavegen pavement can be enough to keep the lights on at a bus stop all night.

6. WORKING

The complete diagram of the power generation using foot step is given below. The pushing power is converted into electrical energy by proper driving arrangement. The rack & pinion, spring arrangement is fixed at the upper plate and lower plate. The spring is used to return the plate in same position by releasing the load. The gear wheel is coupled

to the smaller motor shaft. The generator is used here, is permanent magnet D.C generator. This arrangement is fitted in FOOT STEPs; the complete arrangement is kept inside the floor level except the pushing arrangement. Basic Components: It consists of the following main parts:

1. MS plate
2. MS Pipes
3. Rack and pinion
4. DC motor
5. FRAME
6. LED lights Etc

7. ADVANTAGES

1. Power is generated simply by walking on the step.
2. Power also generated by running or exercising on the step and implementing this mechanism on treadmills.
3. No need input fuel for power generation.
4. This is a Non-conventional system.
5. Battery is used to store the generated power else we can use directly this generated power for conventional purposes.

8. DISADVANTAGES

1. High Initial Cost

9. APPLICATIONS

1. This can be implemented on railway stations, bus stops, air ports to generate electric power by human physical activity.
2. Also can be implemented in parking lots, electric escalators.
3. This mechanism can be implemented on gymming instruments like cardio machine for power generation and the power generation rate is high.
4. We can use this mechanism in automobile suspension system.
5. In rural areas etc.High Initial Cost

10. CONCLUSION

In concluding the words of our project, since the power generation using foot step gets its energy requirements from the non-renewable sources of energy. There is no need of power from the mains and there is less pollution in this source of energy. It is very useful to the places like all roads and as well as all kind of stair case which is used to generate the nonconventional energy like electricity. It is able to extend this project by using same arrangement and construct in the footsteps/speed breakers so as to increase the rate of power production rate.

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[3] “Electrical Power Generation Using Foot Step for Urban Area Energy Applications” by Joydev Ghosh, Amit Saha, Samir Basak, Supratim Sen.

[4] “Power generation through step” by Vipin Kumar Yadav1, Vivek Kumar Yadav1, Rajat Kumar1, Ajay Yadav

[5] “Power Generation Footstep” by Shiraz Afzal, Farrukh hafeez

[6] “POWER GENERATION FROM STEPS” by Ramesh Raja R, Sherin Mathew

[7] "Electricity Generation from Footsteps; A Regenerative Energy Resource”by Tom Jose V*, BinoyBoban*, Sijo M T*

Pneumatic based bike gear changing

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ABSTRACT

In this paper, a gear shifting mechanism was designed and applied to make the shifting process more expeditious and less destructible for the driver. The incipient contrivance must be reliable, has a diminutive dimensions, low construction and maintenance cost. This paper aims to gear shifting process utilizing contrivances as: a manual four speed gear box, two pneumatic double acting cylinders, , an electrical motor , limit switches, buttons, , a table (holder) and power supply. According to suggested gear shifting mechanism the control unit select optimum gear shifting ratio for an automobile without operating it manually (utilizing relays). Utilizing this method leaves to the driver the exhilaration of selecting the shifting moment.

Key Words: pneumatic cylinders, Solenoid valves, gear box, gear shifting mechanism, electric motor.

INTRODUCTION

In this project, a gear shifting mechanism is designed and applied to make the shifting process more expeditious and less destructible for the driver. The incipient contrivance must be reliable, with minute dimensions, low construction and maintenance cost. This project aims to ameliorate gear shifting process utilizing contrivances as: a manual four speed gear box, two pneumatic double acting cylinders, two pneumatic two position five ways directional control valves, , an electrical motor, a belt, two pulleys, limit switches, push buttons, bulbs, a table (holder) and power supply. According to suggested gear shifting mechanism the driver can cull the transmission gear ratio without moving his hands from the steering wheel by putting the gear shifting push buttons on the steering wheel. Utilizing this method leaves to the driver the exhilaration of culling the shifting moment. This study describes in detail in an simple way to how to convert the traditional manually gear shifting mechanism to a semi-automated gear shifting mechanism. The development has concluded withal the gearbox, which became much smoother and engenders less noise. Gear shifting mechanism must be facile to utilize and workable, these authoritative ordinances are very paramount especially for minute cars utilized by special needs people. For some drivers, the gear shifting can cause some perplexing at driving specially at critical situations. A crowded road

on a hill or a sudden detour makes an abundance of tension on the driver. One of the difficulties in this situation is to operate the right reduction ratio and engaging it at the right time. This design avails the driver to increment his fixating on the road. Withal reduces the time needed to engage the required. Reduction ratio, which increases the conveyances replication, this design may be considered as an inculcative model for gear shifting mechanism. So, we pointed to the following: 1. The opportune dimensions for the main components holder keeping in mind the integration of other part for enhancement and development. 2. A manual, 4-frontal speed gear box is utilized automobile drive is culled for this design because it is more facile to modify. 3. An electrical motor is utilized to engender mechanical power in lieu of an internal combustion engine, which is arduous to be placed there. It is additionally used to make the engagement process more facile .Motor is variable speed (0 to 9000 rpm) 4. A couple of pulleys and a belt are acclimated to transmit power from the electrical motor to the gear box. 5. To eschew binding in the input shaft caused by the radial force, we utilized a bearing fine-tuned on the holder. 6. We used two pneumatic, double acting cylinders, per pair of gear shifting. 7. Two (five ways, two positions) directional control valves are habituated to transmute the compressed air direction. Every directional valve has 230V ac solenoid that converts electrical power to magnetic puissance, which magnetizes the spool inside the valve; this action transmutes the compressed air direction.

2. OBJECTIVE

The main objective of this system is to minimize the human errors in operating the gears with the avail of automatic technology. Other objectives include optimum gear ratios, reducing wear and tear of the gears, shifting the gear efficaciously, optimum performance of the gear box, optimum force exerted by the cylinders to move the shifting levers (pedals).

3. MODEL COMPONENTS

3.1 Base Frame

The base frame is a structural element that fortifies the entire gear box system. The frame carries the drive system at its lower end which comprises of the LH and RH rear bearing housings. The drive motor is mounted on the base frame.

3.2 Drive system

Drive system comprises of the single phase AC commutator motor with following designations

• Single phase AC moto

r • Commutator motor

• Power = 1/15hp=50 watt

• Speed= 0-6000 rpm (variable)

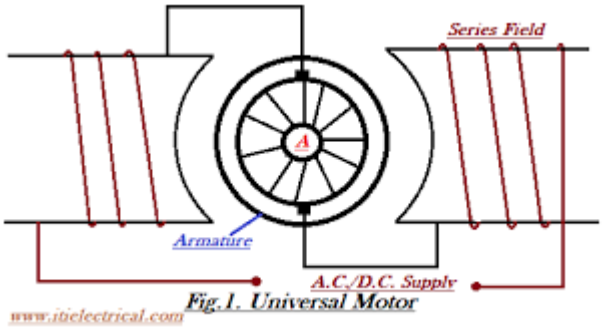


Fig -1: AC commutator Motor

3.3 Pneumatic linear actuator

The pneumatic linear actuator is an Standard cylinder SDA 20 x 15.This cylinder is an double acting cylinder that is operated by an pneumatic valve5/2 way. The valve is supplied compressed air from the compressor by denotes of an a AGB operates filter-regulator-lubricator (FRL) unit. This linear actuator is utilized in the following positions, a. 1st gear b. 2nd gear c. 3rd gear d. 4th gear

3.4 Shifter mechanism

The shifter mechanism is an assemblage of levers actuated by the linear actuator as mentioned above. This shifter is mundanely in neutral condition; it shifts the gears at commencement of cycle and releases it at cessation of cycle

. 3.5 Position control system

The position system comprises of the following components; a. 5/2 ways, Solenoid operated, center off, and detent type b. Pneumatic cylinder DPNC connectors The details of this relay system are given in the circuit diagram of the pneumatic system

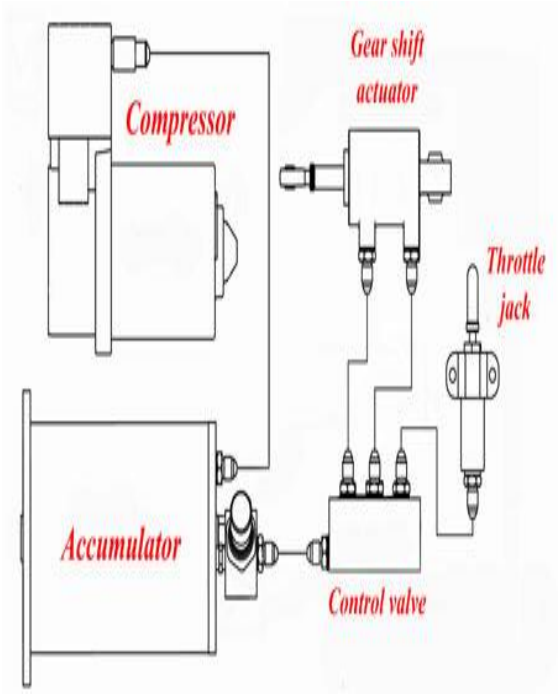
4. CONSTRUCTION DETAILS

The two solenoid valves are connected to a compressor with the avail of hoses of Ø6mm from which pressurized air is extracted. The solenoid valves are followed by two pneumatic cylinders with the avail of air hoses. The cylinders are followed by a clutch pedal. Contiguous to the clutch pedal gear box and a motor arrangement is present. The construction withal includes a proximity sensor which senses the haste of the wheel. The precise signals are sent tothe solenoid valves by the control unit through the relays. Ergo the input is speed of the wheel sensed by a sensor and the output is shifting of gearaccordingly. The puissance to the control unit is supplied from the 12V battery as well the shifting of gear monitored on an LCD. It withal consists of DC motor, ATMEGA Development board, speed regulator (expeditor), transformer etc.

5. WORKING PROCEDURE

The pneumatic circuit is as shown in fig.2,the motor is started to drive the main shaft by means of belt and pulley arrangement, initially the gear box is in neutral i.e., the output shaft is stationary condition. When the 5/2 way direction control valve -1 is operated the cylinder -1 operates the piston to move in the right hand direction thereby bringing the 3rd gear into engagement, and thus the output shaft starts to rotate thereby transmitting power from the input (motor/engine) to the output (differential). Fig -2: Electro-Pneumatic gear shifting mechanism The flow control valve in the circuit governs the pressure which is of the order of 1.5 to 2 bars, hence the governed pressure causes the gradual push provided to the piston rod which brings about gradual engagement of the gears hence, (effect of gradual clutch release for smooth engagement is not required). When the 5/2 way direction control valve -2 is operated the cylinder -2 operates towards left as the piston rod is locked for movement left , hence first the fork shifter moves towards left bringing on the neutral position and then slides further left to bring the 1st gear into engagement. Similarly the circuit works for

the 2nd and 4th gear. Note: If both the valves i.e., 5/2 way direction control valve - 1&2 are operated simultaneously, the system is arranged such that neutral position will be achieved, hence the system becomes fool proof.



6. CONCLUSION

The pneumatic gear changer was designed and checked for successful working. It was found to be running successfully under all the conditions. By the results, the suggested mechanism is realizable and workable. Using the simplest and required hardware enables to convert the old traditional gear shifting mechanism to semiautomatic one. Using of this mechanism in vehicles leads to make the driving process easier, reduces the risk of destabilizing the car, the lap/stage time, and the chance of miss shifting.

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[9] Material selection for output/counter shaft from PSG (1.10 & 1.12) + (1.17) [10] V.B. Bhandari., "Design of Machine Elements" Tata McGraw Hill Pvt Ltd. Gear design procedure for Spur Gear (chap. Spur Gear)

Rack and pinion motion-based Head light tilting system

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Abstract

A regulation system of one or more supports of the domes of the headlights in a vehicle having a chassis a rear wheel at least one front steering wheel and a roll and steering mechanism operatively connected with the chassis is described. The regulation system comprises articulated connection means between the roll and steering mechanism and the supports for controlling the domes of such headlights so that they rotate such to compensate the roll rotation of the vehicle while driving.

Keyword: -Rack & pinion, Head light, front wheel steering with Ackerman's principle.

INTRODUCTION

Car safety is the avoidance of automobile accidents or the minimization of harmful effects of accidents, in particular as pertaining to human life and health. Special safety features have been built into cars for years, some for the safety of car's occupants only, and some of the safety of others. One of the choices available is Design and fabrication of steering controlled head light system. This device relates to a headlight arrangement for vehicles, and, more particularly, to a head light arrangement operably connected to the steering mechanism of the vehicle for illuminating the proposed path of travel including support brackets operable to support head light members thereon connectable to a frame portion of the vehicle, linkage means interconnecting the brackets for conjoint movement thereof, and means interconnecting one of the brackets to the connector rod of the vehicle whereupon the brackets and headlight members are moved in relation to the direction of vehicle travel. Still, more specifically, this device relates to a headlight arrangement operably connected to the steering and front wheel assembly of an automobile operable to maintain headlight members and front wheels pointed in the same direction at all times.

Objectives

The main objective of this system is to apply automotive vehicle.

- To move the headlight along with steering on sharp turning.
- To keep the headlight beam parallel to road turning as possible as can.
- To change the place of area illuminated by headlight and direct illumination area of headlight in useful direction.
- To improve the visibility area of driver at night so that driver can judge road turning well.
- To prevent road accidents on sharp turning at night specially in hilly areas.

- To increase safety at night.

. **LITERATURE REVIEW**

The present invention relates to a vehicle front lamp light distribution control system and more particularly to a vehicle front lamp light distribution control system capable of raising visibility at the time of cornering by controlling light distribution means of the front lamp. According to1. Japanese Patent Publication No. H5-23216, 2. Japanese Patent Application Laid-Open No. H8-183385, 3. Japanese Patent Application Laid-Open No. H11-78675, and 4. Japanese Patent Application Laid-Open No. H8-192674 Laxmi et al. [1] Design &Fabrication of steering controlled headlights in automobile states, A vehicle head lamp including a fog lamp is provided with a movable reflector and by turning the movable reflector in the steering direction by an amount corresponding to a steering angle of the steering wheel, the light distribution pattern of the front lamp is changed in the direction of vehicle's turn so as to raise visibility at the time of cornering However, according to the aforementioned earlier art, the light distribution pattern of the front lamp is changed in the steering direction of the steering wheel by an amount corresponding to the steering angle when the vehicle turns on an intersection or the like, cornering destination cannot be beamed brightly enough before operating the steering wheel. Therefore, an t capable of beaming the cornering destination prior to operation of the steering wheel has been demanded. Czech Tetra and 1920s Ca dills were early implementer of such a technique, producing in the 1930s a vehicle with a central directional headlamp. The American 1948 Tucker Sera was likewise equipped with a third central headlamp connected mechanically to the steering system. The 1967 French Citroën DS and 1970 Citroën SM were equipped with an elaborate dynamic headlamp positioning system that adjusted positioning in response inputs from vehicle steering and suspension systems, though US regulations required this system to be deleted from those models when sold in the USA. Presently, studied changes are unfolding in automotive lighting technology. Automobile manufacturers - together with suppliers and representatives - currently aspire to develop the headlights of tomorrow. Freeform headlamp is one of the popular design which offers great flexibility and compactness. They suggested that the apparatus for automatically adjusting a direction of a light axis of a vehicle headlight includes a steering angle sensor detecting a steering angle of a steering wheel of a vehicle and a swivel control unit performing swivel control by which the direction of the light axis of the vehicle headlight is adjusted to the target direction in accordance with the steering angle detected by the steering angle sensor. Proposed automatic optical-axis adjusting device for automatically adjusting direction of optical axes of front lights with respect to steering angle of steering wheel An electronic control for automobile headlight utilizing a spherical sensor comprised of a metal ball surrounding by a fluid encapsulated in a spherical sensor which is connected to the spherical sensor system. The automatic optical

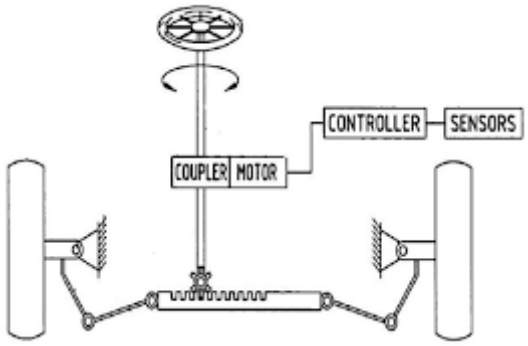
axis adjusting device for automatically adjusting direction of optical axis of from lights headlight control apparatus and method controls an irradiation direction of a headlight. This apparatus uses a navigation based swivel angle calculated based upon the shape of a road in a navigation based control period and a steering based swivel angle calculated based upon a steering angle in a steering based control period [2] The optical design, fabrication and the measurement of the freeform reflector headlamps are investigated by Shinde G. et al. [3] proposed the new standard for cornering light system allows not only the conventionally approved ONOFF control mode interlocked with the operation of the turn signal switch but also an automatic ON-OFF control according to the steering wheel angle. The active cornering light system (ACL system) on the new DELICA D: 5 have a dedicated ECU to control the operation of the lamps. On-dong line investigated by car light piloting system objective of the present invention is to provide a steering wheel controlled car light pointing system which automatically turns the lights of the motor car to coincide the projection of the lights with the steering direction of the motor car

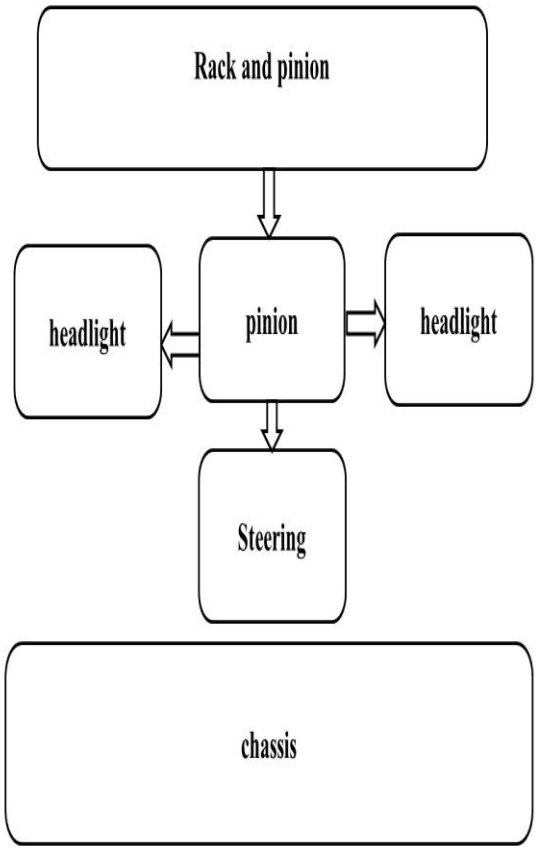
WORKING

Steering system is to achieve angular motion of the front wheels to negotiate a turn. This is done through linkage and steering gear which convert the rotary motion of the steering wheel into angular motion of the front road wheels. The parts of steering system are consisting of Steering linkage and Steering gear. Steering Linkage-it depend upon the type of vehicle, wither it is a car which has independent front suspension. Steering linkage for vehicle is defining two types like as Steering Linkage for Vehicle with Rigid Axle Front Suspension and Steering Linkage for Vehicle with Independent Front System.

1 Rack and Pinion Steering Gear:

The rotary motion of the steering wheel is transmitted to the pinion of the steering gear through universal joints. The pinion is in mesh with a rack. The circular motion of the pinion is transferred into the linear rack movement which is further relayed through the ball joints and tie rods to the stub axles for the wheel to be steered. In the figure shows the schematic and actual modal of steering gear mechanism.





CONCLUSION

In the view of forgoing disadvantages inherent in the known types of road tracking headlamps now present in the prior art, the present invention provides a new movable vehicle head light construction wherein the same can be utilized for automatically aiming the head lamps in the same direction of the travel regardless of the terrain of the road. The further object of the system is, this is susceptible of a low cost of manufacturing with regard to both cost and labor and which accordingly is then susceptible of low prices of sale to the public.So there by making such movable vehicle head lamps which are economically low to available to the public

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Railway track based power generation with rack and pinion mechanism

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Abstract:

This project using simple drive mechanism such as tension spring assemble and link mechanism. For this project the conversion of the force energy in to electrical energy. The control mechanism carries the rack and pinion, Dynamo generator, battery and inverter control. So this project is implemented to all railway track, the power generation is very high. The initial cost of this arrangement is low. Used energy at an increasing rate for his requirement.**The principle** of this project is conversion of mechanical energy in the form of force into electrical energy.

KEYWORDS: Energy, Energy Harvesting, Non-conventional Method, Rail Road

INTRODUCTION

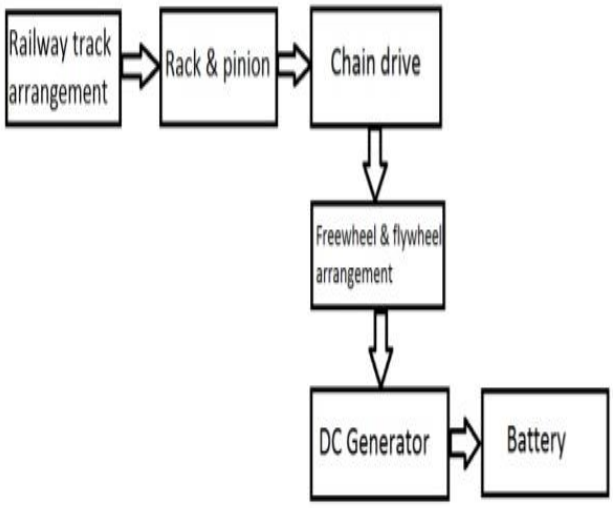
Man has needed and used energy at an increasing rate for his requirement. Man required energy primarily in the form of food. He derived this by eating plants or animals, which they hunted. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling water to turn water for sailing ships and for driving windmills, and the force of falling water to turn water wheels. Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy. World is growing at the faster rate with regards to consumption of fuel and so the scarcity of energy as the sources producing them are depletable in nature. Around the world, there were 8,06,000 cars and light trucks on the road consuming 260 billion US gallons 980000 liters of gasoline yearly. The extensive usage of energy has resulted in an energy crisis and there is a need to develop methods of optimal utilization. Which will not only ease the crisis but also preserve the environment. Commuter rail and subway are including railway transportation which play an important role in the economy and quality everyday life. Researches show that the world has already had its enough shares of its energy resources. Fossil fuels pollute the environment , Nuclear energy requires careful handling of both raw as well as waste material. The focus now is shafting more and more towards the renewable sources of energy. which are essentially nonpolluting. In the present day scenario power has become the major need for human life. Energy is an important input in all the sectors of any countries economy. The

increasing population and decreasing conventional sources for power generation. provides a need to think on non-conventional energy resources. To facilitate policymakers and transportation into making informed decisions on operating transportation systems, it is essential that railway track-side equipment (signal lights, wireless communication monitoring devices, positive train control, etc.) are well maintained and operated. When train moves over the track, the track deflects vertically due to load exerted by the train's bogies. The vertical displacement of the track under the weight of a passing train can connected regenerative devices i.e. a vibration energy harvester. The generated power can be stored into the battery and used to power track side equipments. Railroad energy harvesting is no trivial disturbance.In our project we are using these powers for irrigation system to the near by lands and fields and for lamp lights near the track.

PROPOSED SYSTEM

When a train ease up the track, the track deflects in downward direction attributable to the load exerted by the train's bogies. additionally due the deflection of track there's a deflection of timber that is place below the track and thus the flap is occupation downward direction because the flap is occupation a downward direction the spring that is connected to flap get compress in downward direction and thus rack is additionally move in downward direction and attributable to these pinion get rotates and thus larger freewheel turned as a result of each square measure mounted on same shaft. As there's a rotation of larger freewheel then the smaller freewheel is additionally turned through chain drive. The freewheel and regulator square measure mounted on same shaft thus the regulator additionally turned. The regulator is connected to the shaft of the generator therefore if the regulator can turned then there's a rotation shaft generator and power get generated which power is keep into the battery ADVANTAGES • Power generation is solely running the vehicle on this arrangement • Power additionally generated by running or exercise on the brake. • No want fuel input • This could be a Non-conventional system • Battery is employed to store the generated power

Block diagram



ADVANTAGES

• Power generation is solely running the vehicle on this arrangement

• Power additionally generated by running or exercise on the brake.

• No want fuel input

• This could be a Non-conventional system

• Battery is employed to store the generated power

DISADVANTAGES

• Slight inclination is needed within the railway track

• Mechanical moving elements is high

• Initial value of this arrangement is high.

• Care ought to be taken for batteries

APPLICATIONS

Power generation exploitation railway track system will be employed in most of the places like

All highways road speed breaker

All Railway track

• **For Irrigation system:**

The battery will be connected to the relay which will work as a switch.This switch will be activated with the current coming from an op-amp.A comparator op-amp will be used which will be work as a sensing device to sense the moisture in soil.A potentiometer will used to set the minimal voltage. Two cross wires will be placed in the soil with a nominal distance.When the soil is dry,resistance in soil will be around 10k.This will trigger the op-amp to give a output with low resistive path,i.e.fromground.This will connect the coil in relay and pump will be on. And on the contrary,when moisture will be enough,conduction will take place and relay will be switched off.

• **For Lamp lights near track:**

Another application which we are showcasing is lamp lights near track. The energy stored in battery can be used for lights near railway track. As we are searching for of a automatic solution for every problem, hence we are using LDR sensors here to avoid manual switching. The LDR wil allow electricity to flow through it when the photovoltaic cells are inactive and the resistance are low. This happens in the absence of sunlight.So during the day time, the lights connected through the sensors are switched off due to high resistance and evetually will glow in night time. One potentiometer is used for setting a reference value of resistor and a comparator IC to compare the light with the reference and allow the leds to glow.



RESULT

• As our project is Electric power generation using railway track and according to our fabricated model we are glowing LED which indicates the power is generated this is approximately equal to 5 volts. And even we are storing energy in battery by using toggle switch. Which can be utilized to any application.

• In our project we are glowing LED instantly when the train is passing over the roller and some of energy is stored in battery at the same time. And by using toggle switch we are using the pumps for irrigation system. And over all energy generated in our model is 8volts.

• These new design leads to more generation of electricity. And also it is more optimumand reliable in usage. The compact design of the structure leads to its easy and compatible mounting wherever required. Also less number of contact pairs leads to less frictional forces developed. These will lead to non-conventional energy generation which would further be used in the nearby railway infra-structure.

• A train weighing 1,000 kg going up a height of 10 cm on a rumble strip produces approximately 0.98KW power by placing one such speed-track on a busy highway, where about 100 trains pass every minute, about one kilo watt of electricity can be produced every minute.

CONCLUSION

It is ascertained that the electric power is in nice demand, we tend to as applied scientist ought to be in discovered for brand spanking new plan of power generation. As energy will ne'er be created or destroyed, we should always rework it into the shape that we will wont to provide for railroad station instrumentation light-weight, fan, beacon etc. we will implement this method at each entry and going away purpose within the railroad station This arrangement will be employed in completely different application like in foot step or speed breaker in school, faculties and main road for generation ways in which of voltage. so the facility production rate is raised and demand at explicit space will be consummated.

FUTURE SCOPE

This arrangement is slightly changed to construct in foot step and this arrangement is mounted in • colleges, cinema theatres, • searching advanced and • several different buildings

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SOLAR Grass cutting machine

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Abstract

In this project we studied a solar grass cutter. A solar Grass cutter is a machine that uses revolving blades to cut a grass at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Grass cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep land s in gardens, schools, college's part etc. We have made some changes in the existing machine to make its application easier at reduced cost. Our main aim in pollution control is attained through this. Unskilled operation can operate easily and maintain the land very fine and uniform surface look. In our project, "solar economical grass cutter" is used to cut the different grasses or different grass for the different application.

Key Words: Solar panel, battery, Motor, Pulley system, Grass cutter, pollution.

INTRODUCTION

In large size of grass field is cut manually. The farmer used hand scissors used to cut and maintain grass uniformly. It is not easy and also very difficult to maintain uniform size. Hence, we design to make a grass cutter without any power source due to reduce the power consumption. The unskilled gardener is enough to operate the grass cutter. The grass cutter easy to operate and it consists of Rotary Blade, Roller etc. The blade removes the extra growth of the land and roller gives light pressure to the top surface of Land. It gives fine cutting done fast work done on the land and uniform speed throughout the Land. The project work was very great successful one. It is used to maintain land of our college auditorium land maintenance. The operations involved in the grass production cycle include land clearing, land forming/ land levelling, tillage, and grass establishment, harvesting and post-harvest operations. Grass establishment, harvesting and post-harvest operations. Grass establishment is necessary to eliminate the effect of weeds, pests and disease infestation and to provide suitable conditions for optimum yield. More than 3000 species of weeds had been identified all over the world. The cost of weed management is enormous; however, the opportunity cost of weed management is higher. Weed control measures must be put in place to check the growth and propagation of weeds. Chemical and manual weed control methods are viable alternatives; however, whereas environmental impact of herbicides made chemical method unsustainable, drudgery limits

the size of farm of an individual in sub-Saharan Africa. Introduction of an effective mechanical weeder is expected to encourage subsistent farmers leading to increased production and hence reducing poverty. To achieve this objective, a row grass cutter was developed in the Federal University of Technology, Akure in Nigeria. The weeder was designed, fabricated and tested and found to be very efficient. The machine consists of an abrasive nail- brush mounted on a shaft, transmission system, engine, frame and wheels. The height of cut of the machine is set above the ground level, but works effectively as a weeder. The machine is simple, cost effective and useful for small to medium scale farm holders. A Crop cutter is a machine that uses revolving blades to cut a crop at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Crop cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep land s in gardens, schools, college's part etc. We have made some changes in the existing machine to make its application easier at reduced cost. Our main aim in pollution control is attained through this. Unskilled operation can operate easily and maintain the land very fine and uniform surface look. In our project, "crop cutter" is used to cut the different grasses or different crops for the different application.

2. LITERATURE REVIEW

Automated Solar Grass Cutter (February 2017) Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil, Prof. V .A. Mane According to the author a daily purpose robot which is able to cut the grass in the lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem. Automated solar grass cutter are increasingly sophisticated, are self –docking and some contain rain sensors if necessary, nearly eliminating human interaction. The system is switched to automatic mode in which the robot's infrared sensors make a compason between, cut and uncut the grass. The mower continues this process until it completes the job. The system uses 12v batteries to power the vehicle movement motors as well as the grass cutter motor. They also use a solar panel to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to an 8051 family microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection. The microcontroller moves the vehicle motors in the forward direction in case no obstacle is detected. If in case obstacle is detected by the sensor then the microcontroller stops the grass cutter motor so as to avoid any damage to the object/human/animal coming. [2] Solar Based Grass Cutting (January-June 2017) Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil According to the author, human enlargement in many countries there are studies and trials going on the solar energy and the wind energy, so they made their new concept solar power grass cutting machine. In this concept they cut the grass on the agricultural land or small plants in lawns and gardens. The design of solar powered agricultural equipment will include direct current (DC) motor, a rechargeable battery, solar panel, a stainless-steel

blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is essential. The purpose of the project here is to design and build a remote-controlled grass cutter. The device consists of linear blades and it does not affected by climatic conditions. They have used many components for preparing grass cutter like DC Motor (3) for rotating the wheels and blade, wheels (4), battery, Solar panel, IR sensor, Collapsible blade. There are two main components such as transmitter and receiver. Transmitter continuously transmits the rays if any obstacle come in front of grass cutter then the rays are reflected back towards the receiver. The receiver receives the signal in the serial form from encoder but microcontroller requires parallel data for communication so receiver sends data to decoder to convert data in the parallel form and then it is passed to microcontroller.[4] Solar bases wireless grass cutter (IJSTE - International Journal of Science Technology & Engineering, May 2016) According to the author, The idea of autonomous machine used to reduce man power with efficient work has given. Mainly this project explains application of green energy. This knowledge can be used in agricultural field as a future scope. According to the author, it gives description multipurpose grass cutter which is sensor based for special purposes like in grass trimming, hedge trimming etc. utilization of sensor and design calculation are used in proposed system. According to the author, A robot was designed that operates on an on-board, solar charged battery has been designed by the French manufacturer SN Eno. The RoboMower4 the capability of steering itself across a person's lawn. This robot called the Atawa A34, uses built-in infrared sensors to avoid obstacles. This system uses wires buried beneath the surface of the ground [4]

3. BLOCK DIAGRAM DESCRIPTION

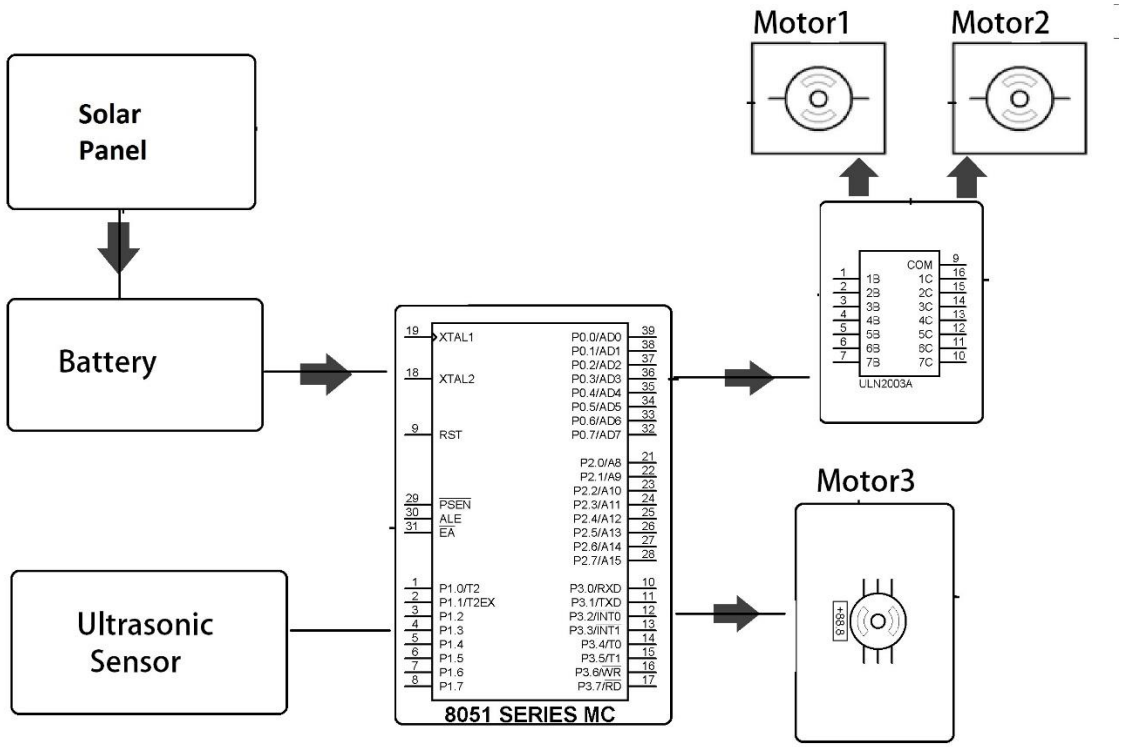

Fig-2: block diagram

3. Mechanism and working layout

The work layout shows the arrangement of3various parts of project. to the end of 3rd shaft and which is power transmit to the cutter mechanism



Fig -3: front view of grass cutter

3.1. WORKING PRINCIPLE

Coming to the working of solar powered grass cutter, it has panels mounted in a particular arrangement at an angle of 45 degree in such way that it can receive solar radiation with high intensity easily from the sun. These solar panels convert solar energy into electrical energy is stored in batteries

by using a solar panel. The main function of the solar charger is to increase the current from the panels while batteries are charging, it also disconnects the solar panel from the batteries when they are fully charged and also connects to the panels when the charging in batteries is low. The motor is connected to the batteries through connecting wires. Between these two mechanical circuit breaker switches is provided. It starts and stops the working of the motor. From this motor, the power transmits ton the mechanism and this makes the blade to slide on the fixed blade and this makes to cut the grass.

3.2. SOLAR ENERGY

Solar radiation is format among the promising new source of energy. India receives annually over 60 x 1000 MWH of solar insulation with a span of 3000 – 3200 hrs in Rajasthan, Gujarat, West of Madhya Pradesh and North of Maharashtra; and 2600 – 2800 hours in the rest of the country excepting Kerala, Assam and Kashmir. Energy from the sun can be utilized in multi various ways. It can be tapped directly from solar radiation in the form of thermal, thermodynamic and photovoltaic energy and indirectly through the production of Phyto man and other related energy sources such as wind, hydropower and ocean energy all of which are the result of solar radiation on the planet Earth. The contribution of these sources in the total consumption of energy in the world is about 15%. The scope for the application of solar energy now stands greatly enhanced through intensive research and development carried out all over world. The major areas that manifest great potential out all over world. The major areas that manifest great potential for immediate.

3.3ADVANTAGES

¬ Compact size and portable

¬ Easy to move from one place to another place

¬ Operating principle is simple.

¬ Non-skilled person also operates this machine

3.4 LIMATATIONS

¬ Large time required to remove the grass

¬ Manually operated

¬ Difficult to operate in rainy season

3.5APPLICATION

¬ For cricket ground

¬ College campus

¬ All playground

4. COST BENEFITS & ANALYSIS:

In our market, the approximate cost of an electric grass cutter is 25000/- coming to our project, we are modelling a solar powered grass cutter.

5. CONCLUSIONS

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries. We are proud that we have completed the work with the limited time successfully. The Crop Cutter is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus, we have developed an "solar economical grass cutter" which helps to know how to achieve low cost automation. By using more techniques, they can be modified and developed according to the applications.

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Solar Powered refrigeration system

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Abstract

In this paper, a review has been conducted on various types of methods which are available for utilizing solar energy for refrigeration purposes. Solar refrigeration methods such as Solar Electric Method, Solar Mechanical Method and Solar Thermal Methods have been discussed. In solar thermal methods, various methods like Desiccant Refrigeration, Absorption Refrigeration and Adsorption Refrigeration has been discussed. All the methods have been assesed economically and environmentally and their operating characteristics have been compared to establish the best possible method for solar refrigeration. Also, the various available technologies for Cooling Thermal Energy Storage (CTES) have been discussed in this paper. Methods like Chilled Water Storage (CWS) and Ice Thermal Storage (ITS) have been compared and their advantages and disadvantages have been discussed. The results of the review reveal Solar Electric Method as the most promising method for solar refrigeration over the other methods. As far as CTES systems are concerned, ITS has advantage over other methods based on storage volume capability, but it has a comparatively lower COP than other available techniques. Keywords: Solar powered refrigeration, Solar Electric Method, Solar Mechanical Method, Solar Thermal Method, CTES system, Chilled Water Storage (CWS) system, ice TES systems, etc.

Introduction

A solar-powered refrigerator is a refrigerator which runs on electricity provided by solar energy. Solar-powered refrigerator are able to keep perishable goods such as meat and dairy cool in hot climates, and are used to keep much needed vaccines at their appropriate temperature to avoid spoilage. Solar-powered refrigerators may be most commonly used in the developing world to help mitigate poverty and climate change. In developed countries, plug-in refrigerators with backup generators store vaccines safely, but in developing countries, where electricity supplies can be unreliable, alternative refrigeration technologies are required. Solar fridges were introduced in the developing world to cut down on the use of kerosene or gas-poweredabsorption refrigerated coolers which are the most common alternatives. They are used for both vaccine storage and household applications in areas without reliable electrical supply because they have poor or no grid electricity at

all. They burn a liter of kerosene per day therefore requiring a constant supply of fuel which is costly and smelly, and are responsible for the production of large amounts of carbon dioxide. They can also be difficult to adjust which can result in the freezing of medicine. The use of Kerosene as a fuel is now widely discouraged for three reasons: Recurrent cost of fuel, difficulty of maintaining accurate temperature and risk of causing fires. There are three methods by which solar energy can be utilized for refrigeration purposes. They are as follows- Solar Electric Method, Solar Mechanical Method and Solar Thermal Method.

Solar Electric Method

In Solar Electric Method, the solar energy is directly converted to DC current by an array of solar cells known as Photovoltaic (PV) panel. Photovoltaic Cells are nothing but semiconductors which allow direct conversion of solar energy to direct current. A part of this current is stored by lead acid battery while the rest is utilized in driving the compressor of the refrigerator. This DC current can be either used to run a DC motor coupled to compressor or an inverter can be used to convert this DC current to AC current for running the compressor. A solar charge controller consisting of capacitor, sensors etc. may be required to stabilize and smoothen the current.

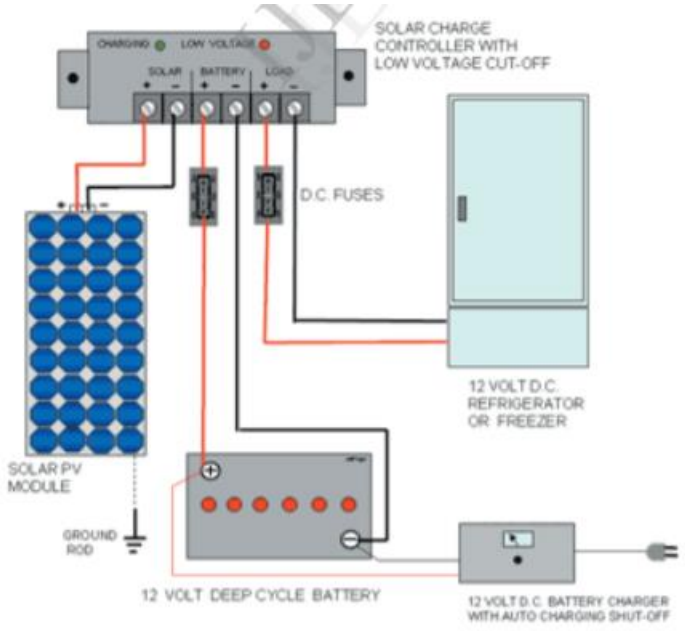


Fig. 1- A typical Solar PV system

A normal Solar PV system includes different components that should be selected according to the system type, site location and applications. The major components for solar PV system are solar charge controller, inverter, battery bank, auxiliary energy sources and loads (appliances).

• PV module – converts sunlight into DC electricity.

• Solar charge controller – regulates the voltage and current coming from the PV panels going to battery and prevents battery overcharging and prolongs the battery life.

• Inverter – converts DC output of PV panels or wind turbine into a clean AC current for AC appliances or fed back into grid line.

• Battery – stores energy for supplying to electrical appliances when there is a demand.

• Load – is electrical appliances that connected to solar PV system such as lights, radio, TV, computer, refrigerator, etc.

• Auxiliary energy sources - is diesel generator or other renewable energy sources.

Solar Mechanical Method

In Solar Mechanical Method, the mechanical power required to drive the compressor is generated by solar driven heat power cycle. Rankine cycle is the heat power cycle considered for this process. In Rankine cycle, fluid is vaporized at an elevated pressure by heat exchange with a fluid heated by solar collectors. A storage tank can be included in this process to provide some high temperature thermal storage. The vapor flows through a turbine or piston expander to produce mechanical power. The fluid exiting the expander is condensed and pumped back to the boiler pressure where it is again vaporized. The efficiency of the Rankine cycle increases with increasing temperature of the vaporized fluid entering the expander. Whereas, the efficiency of a solar collector decreases with increasing temperature of the delivered energy. High temperatures can be obtained by employing concentrating solar collectors that track the sun's position in one or two dimensions.

The disadvantages of using solar trackers are cost, weight and complexity of the system. If tracking is to be avoided, evacuated tubular, compound parabolic or advanced multi-cover flat plate collectors can be used to produce fluid temperatures ranging between 100°C – 200°C. Both intensity of solar radiation as well as difference of temperature between entering fluid and ambient govern the efficiency of solar collector. The efficiency of such a system is lower than solar electric method using non-concentrating PV modules. Solar Mechanical is advantageous only when solar trackers are used but, the use of such systems is limited to large refrigeration systems only i.e.atleast 1000 tons. (refer fig. 2)

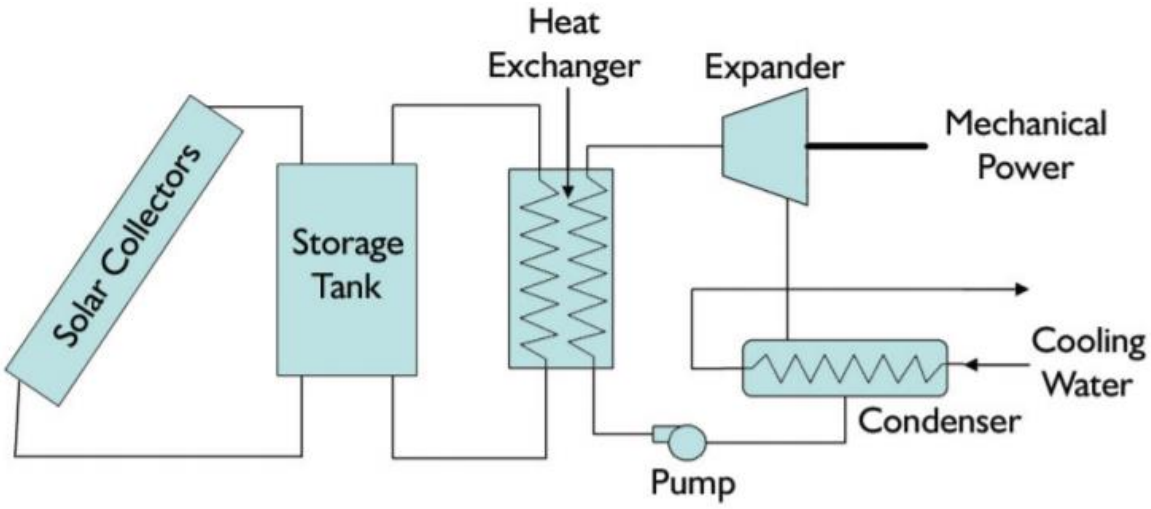


Fig.2- Solar Mechanical Method

Solar Thermal Method

The main advantage of using Solar Thermal Method is that they can utilize more of the incoming sunlight than photovoltaic systems. In a conventional PV collector, 65% of the incident solar radiation is lost as heat whereas in solar collectors over 95% of the incoming solar radiation is absorbed. But all of this is absorbed energy is not converted to useful energy due to inefficiencies and losses. Collection efficiencies for commercial solar thermal collectors are generally more than double that of crystalline photovoltaic solar collectors. A typical solar thermal refrigeration system consists of four basic components - a solar collector array, a thermal storage tank, a thermal refrigeration unit and a heat exchange system to transfer energy between components and the refrigerated space. Selection of the solar array depends upon the temperature needed for refrigeration system. Generally for temperature range 60-100C, flat plate collectors, evacuated tube collectors and concentrating collectors of low concentration can be used. Concentrating collectors are avoided for residential purposes due to high cost of solar trackers. Selection of the thermal storage tank depends upon the type of storage medium and the temperatures desired. Water is mainly selected for its low environmental impact and high specific heat.

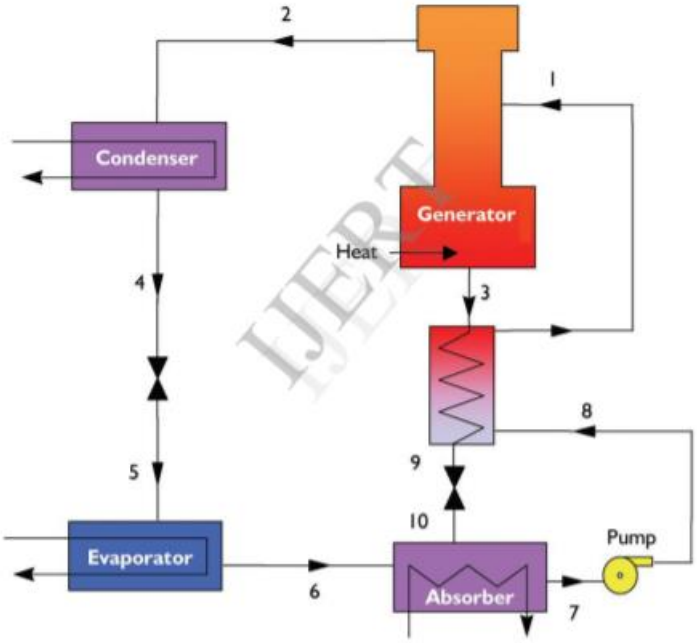
Desiccant

A desiccant system is usually an open cycle where two wheels turn in tandem – a desiccant wheel containing a material which can effectively absorb water, and a thermal wheel which heats and cools inward and outward flows. Warm, humid, outside air enters the desiccant wheel where it is dried by the desiccant material. Next, it goes to the thermal wheel which pre-cools this dry, warm air. Next, the air is cooled further by being re-humidified. When leaving, cool, conditioned air is humidified to saturation and is used to cool off the thermal wheel. After the thermal wheel, the now warm humid air

is heated further by solar heat in the regenerator. Lastly, this hot air passes through the desiccant wheel so that it can dry the desiccant material on its way out of the cycle. Pre-packaged desiccant is most commonly used to remove excessive humidity that would normally degrade or even destroy products sensitive to moisture. Some commonly used desiccants are silica gel, activated charcoal, calcium sulfate, calcium chloride, montmorillonite clay, and molecular sieves.

Absorption

An absorption refrigerator is a refrigerator that uses a heat source (e.g., solar, kerosene-fueled flame, waste heat from factories or district heating systems) to provide the energy needed to drive the cooling system. Absorption refrigerators are a popular alternative to regular compressor refrigerators where electricity is unreliable, costly, or unavailable, where noise from thecompressor is problematic, or where surplus heat is available (e.g., from turbine exhausts or industrial processes, or from solar plants). In absorption, two mainly used cycles are- LiBr (Lithium Bromide) and NH3 (Ammonia Hydrogen). The main difference between them is which substances are used as the refrigerant and absorbent. In a LiBr system, LiBr is the absorbent and water is the refrigerant. In an NH3 absorption system, water is now the absorbent and NH3 is the refrigerant. In both cases, the job of the compressor (in a conventional vapour compression system) is replaced by an absorber and a generator. Concentrated absorbent enters the absorber, which is connected to the evaporator. When refrigerant is boiled off in the evaporator (removing heat from the refrigerated space), vapour (of relatively high pressure) then moves to the LiBr/water absorber where it is absorbed. Next, the mixture moves to the generator where solar heat is supplied to boil off the refrigerant. High-pressure refrigerant vapour then travels to the condenser where heat is rejected to the surroundings to condense the refrigerant back to liquid. Liquid refrigerant goes back into the evaporator, where it can be used again to take in heat from the refrigerated space, which completes the loop.



Adsorption

In this cycle, solar heat is directed to a sealed container containing solid adsorbent saturated with refrigerant. Once this reaches the proper temperature/pressure the refrigerant desorbs and leaves this container as pressurized vapour. That is, the vapour has been compressed with thermal energy. This vapour then travels to a condenser where it turns to liquid by rejecting heat to the surroundings. Expanded, low-pressure liquid refrigerant then flows over the evaporator which pulls heat from the conditioned space to boil off the refrigerant. The refrigerant vapour can then be adsorbed again by the cool adsorbent material easily at night. Although there are similarities between absorption and adsorption refrigeration, the latter is based on the interaction between

gases and solids. The adsorption chamber of the chiller is filled with a solid material (for example zeolite, silica gel, alumina, active carbon and certain types of metal salts), which in its neutral state has adsorbed the refrigerant.

Cooling Thermal Energy Storage (CTES) System

The most important use of CTES systems is to shift the power consumption from peak to offpeak periods. For this reason these systems are also known as “off-peak cooling” systems. The performance of a TES system is described by its co-efficient of performance (COP). The COP of a system during peak and off-peak hours is defined by the chiller and compressor design. CTES systems are generally classified into three types- chilled water, ice storage and eutectic salt TES systems. Among these techniques, the Chilled Water Storage (CWS) and the Ice Thermal Storage (ITS) systems are the most promising ones in case of the normal applications. The ITS system has the

advantages of larger storage volume in comparison with two other systems. However, the COP of the ITS system is much lower than other techniques. In sensible CTES, the storage medium is usually water-based whereas in latent CTES systems, eutectic salts with phase change materials is generally preferred as storage medium. Sensible CTES systems account for most cold TES applications presently. Thermochemical TES may prove useful for cooling TES systems provided ongoing efforts to develop systems are successful. So, in short, the various advantages of using CTES system are: -

- Reduction in electricity bills by shifting the power consumption from peak to off-peak periods.

- Usually, the systems with CTES would consume less operating energy than conventional air conditioning (AC) systems due to constant and comparatively lower temperature during the nights.

- Producing off-peak electricity is cheaper as it would consume less fuel.

- Chiller efficiency is improved by shifting the electricity consumption from daytimes to nights when the ambient temperature (Ta) is considerably low.

- The significant air temperature difference across the Air Handling Unit (AHU) reduces the required air volume required for circulation. Hence, smaller AHUs, less duct working and less electrical equipment's are required.

Chilled Water Storage (CWS)

It is a famous strategy adopted in many countries to save energy by shifting power consumption from peak hours in the daytime to off-peak hours during the nighttimes by employing chilled water to store cool thermal energy. In the past, prior to the successful evolution of thermally stratified systems, many different types of CWS designs have been developed and employed. Designs of CWS were such in order to primarily avoid temperature mixing of chilled water with return water. However, they often require complex tank configurations or piping systems that are expensive and difficult to operate. The CWS systems currently in use can be classified as (a) labyrinth, (b) baffle, (c) tank series, (d) membrane tank. (refer fig.4)

Ice Thermal Storage (ITS) The most popular technique for storing cool thermal energy was the use of ice due to its high latent heat of fusion i.e.hsf = 334 kJ/kg. This method was used especially when the available space was limited. The supplied chiller in this technique must be able to produce charging temperature in the range of -60C to -30C in order to produce ice. Investigations revealed that employing the ITS system would downsize the cooling generation devices such as pipes, ducts and AHUs. This downsizing will help in lowering the primary cost of the HVAC system. The ITS storage technologies are generally categorized by their different combinations of storage media, charging or discharging mechanism. ITS systems can be commonly categorized into the following types –

- Ice Harvesters
- Ice slurry
- Encapsulated Ice
- External melt ice-on-coil storage systems
- Internal melt ice-on-coil storage systems

Ice Harvesters

This technique is a dynamic type of ITS system consisting of an open insulated storage tank and vertical plate surface positioned above the tank. A circulating pump brings the water at a temperature of 00C on the outer surface of the evaporator, which is fed internally with liquid refrigerant. Normally, thickness of the produced ice varies between 8 mm and 10 mm depending on the length of the freezing cycle. (refer fig.5)

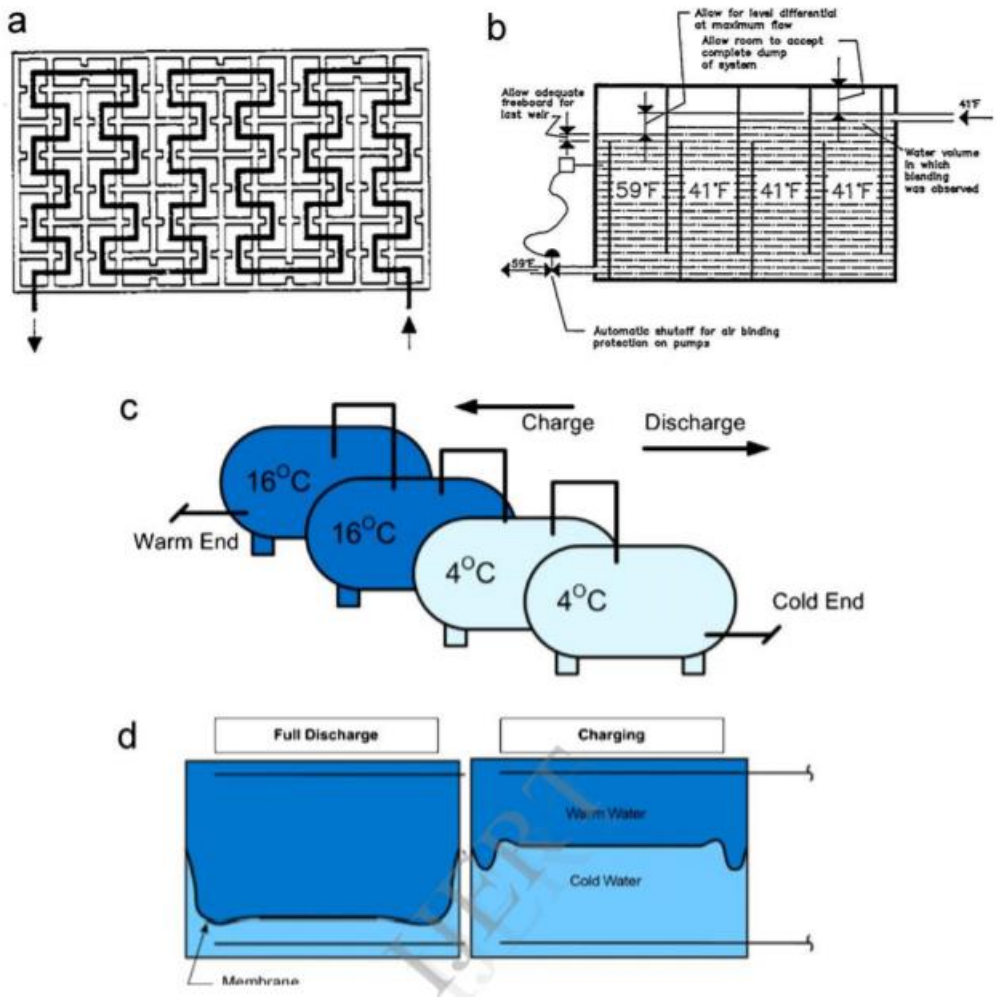


Fig.5- Schematic diagram of a typical ice harvesting ITS system

The ice would then be harvested by feeding a hot gas to the evaporator. The outer surface temperature rises to about 50C causing the ice in contact with the plates to melt and fall into the storage tank. During the discharging period, the chilled water that circulates through the storage tank further reducing the water temperature to cope with the load. Due to the system complexity, only a few manufacturers are involved with these systems, which are normally employed only in special applications.

Literature survey of work carried out by various authors

M. M. Hussain, et al. [1]: The simulation of thermal energy storage (TES) system for HVAC system has been dealt with in this paper. To store cooling capacity, TES system is integrated with conventional HVAC system. Ethylene Glycol is used as a storage medium in this system. Exergy and Energy analyses have been used to determine the thermodynamic performance of the system. Effect of various parameters such as ambient temperature, cooling load and mass of storage on the performance of the TES system has been also studied in this paper. The results of various studies and analyses conducted on TES systems revealed that the storage temperature International Journal of Engineering Research &Technology Vol. 2 Issue 2, February- 2013 ISSN: 2278-0181 www.ijert.org 10 IJERT decreases linearly with time when there is no load and follows the load profile during daytime and decreases linearly with time at the end. Also, it was found out that the storage temperature decreases slightly with increase in ambient temperature when there is no load. COP of the system was found out to decrease sharply with small increase in storage temperature. It was also discovered that for all mass flow rates of discharging fluid, the energy efficiency of the system was found out to be nearly 80%. But, the exergy efficiency of the system decreased with increase in mass flow rate of the discharging fluid and increased with increase in reference temperature.

FakehaSehar, et al. [2]: In this paper, the impact of ice storage systems on the chiller energy consumption for large and medium-sized office buildings in diverse climate zones has been investigated. The various studies indicated that the systems with ice thermal storage (ITS) have higher chiller energy consumptions than the conventional non-storage systems because of the day and night operation of the chiller. By discharging ice storage during the peak hours, the ITS were able to achieve peak energy savings by reducing or even by completely eliminating the chiller operation during the daytime. It was also noticed that climatic zones with summers having high temperatures and relative humidity (RH) increase not only the building cooling load but also the chiller energy consumption by decreasing the cooling intensity of the condenser water, for example- Miami and Las Vegas. But, climate zones with less extreme summers have lower chiller energy consumption due to lower building cooling loads and more cooling of condenser water, for example- Seattle.

Mehmet Azmi Aktacir, [3]: In this study, a PV-powered multi-purpose refrigerator system has been erected to investigate experimentally its daily and seasonal operating performances based on semi-

arid climatic conditions of Sanliurfa province in Turkey. It is one of the sunniest rural regions in the world and hence the need for refrigeration is critical. The overall results revealed that PV-refrigerator system can be reliably used in places where the local grid was unreliable and the refrigeration need is critical. On observation, the following results were observed- Low temperature of 10.6°C was reached in the refrigerator, the highest energy amount produced by PV panels was recorded between 11:00 am and 14:00 pm, amount energy consumed by the refrigerator was determined to be 347.7 Wh/day, the amount of energy stored in the battery bank was 78.2 Wh/day while the amount of electric energy produced by photovoltaic panel was 425.9 Wh/day.

Sanford A. Klein and Douglas T. Reindl, [4]: In this paper, it was stated that the energy use associated with refrigeration system operation and the environmental impacts associated with its generation and distribution often outweigh the choice of environmental friendly refrigerants. In this article, three approaches to use solar energy for refrigeration at temperatures below 0C were reviewed and their operating characteristics were compared. The COP of all the three refrigeration cycles- Solar Electric, Solar Mechanical and Absorption cycles were compared and found to be low due to various barriers like firstly, the solar refrigeration systems are complicated, costly and bulky because of the necessity to locally produce the power required for operation and secondly, the energy source for these systems i.e. solar energy is variable which requires energy storage system that further adds to the system size and cost. The PV system was International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 2, February- 2013 ISSN: 2278-0181 www.ijert.org 11 IJERT most viable of all other systems especially for small capacity portable systems whereas the absorption systems were more feasible for large stationary refrigeration systems.

S.M. Hasnain, et al. [5]: In this paper, the incorporation of ice thermal storage with conventional air conditioning systems in Saudi office was studied. This incorporation reduced the peak electric demand, cooling plant capacity and new electric connection charges of an office building. For this study, two different scenarios were studied. The partial ice storage technique adopted for this study reduced the peak electrical load for Scenario-I and Scenario-II, by 15 and 23%, respectively. It was estimated that an ice storage system would reduce the peak cooling load between 35 and 40% in this type of Saudi buildings. The savings that resulted by downsizing the cooling plant overcame the cost of storage and the additional interface equipment. Similarly, it wass also estimated that in Saudi Arabia, the use of ice storage systems with gas turbines for inlet air cooling will increase the turbine's output by 30% and reduce its heat rate by 10% at a mere fraction of the cost of installing the additional capacity for power generation in order to meet the summer peak demand.

Todd Otanicar, et al. [6]: In this paper, a variety of solar cooling schemes have been economically and environmentally analyzed to reveal some key details regarding system choice. For solar electric cooling the system, the cost is highly dependent on the system COP when PV prices remain at the

current levels but when prices are lowered the impact of COP on cost diminishes. For solar thermal cooling, the cost of solar collection is much lower as a percentage of the overall cost, but the cost of the refrigeration system represents a larger percentage of the total cost. Additionally, the paper reveals that the costs for solar thermal cooling are not projected to decrease as much as PV cooling over the next 20 years due to the relatively stable cost of collection and storage. Solar electric cooling, even with the associated impact of refrigerants with global warming impact, have a lower projected emission value of carbon dioxide per kWhr of cooling than any of the thermal technologies due to the much larger COP values associated with solar electric cooling. One additional favorable aspect to solar electric cooling systems is the collector area foot print i.e. for solar PV systems, expected sizes in 2010 were between 24 and 48 m2 as compared to 78 and 106 m2 for solar thermal systems depending on system COP.

David MacPhee, et al. [7]: In this paper, the solidification process for an encapsulated ice TES is investigated. Using Fluent 6.3 software, a domain consisting of one capsule containing water as the PCM and with an outer shell made of PVC is simulated from an initial temperature of 275 K until completely frozen, using ethylene glycol as the heat transfer fluid (HTF). The purpose of this study is to assess how changing capsule geometry, inlet HTF temperature and flow rate affect the performance of the charging process. Using both energy and exergy analyses, efficiencies were calculated for each simulation, while varying the inlet temperature from 267 to 271 K, and choosing three flow rates, Q = 0.87 l/s, 1.74 l/s and 2.61 l/s. The results indicate that considerable cost and energy savings could be realized by utilizing a higher HTF temperature, perhaps a few degrees below the solidification temperature of the PCM. It is possible for the designers to increase flow rate to make up for the increase in charging time associated with this increase in HTF inlet temperature since, the losses associated with viscous dissipation and hence, International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 2, February- 2013 ISSN: 2278-0181 www.ijert.org 12 IJERT pressure drop have been shown to be inconsequential compared to other modes of losses. Doing so should allow for an increase in efficiency while still maintaining a working and effective encapsulated ice TES system.

B. Rismanchia, et al. [8]: The work in this paper investigated the feasibility and potential of employing ITS systems for the cooling application of office buildings in Malaysia along with the economical and environmental benefits of utilizing these systems. This study is mainly conducted due to the vast potential that the country has, the statistical data shows that in Malaysia, AC systems are the major energy consumers in office buildings with around 57% share. However, they are not well promoted in Malaysia and their potentials are not yet well investigated. The overall results show that the full storage strategy can reduce the annual costs of the air conditioning system by up to 35% while this reduction is limited to around 8% for a load levelling strategy. By comparing the installation, maintenance and electricity costs of the conventional system with the ITS system, it was found that

for the full storage strategy it will take between 3 and 6 years for the benefits of the investment to be equal with the investment. For the load levelling strategy this period varies between 1 and 3 years. The comparison results between the conventional AC system and the ITS system indicate that a proper design could lead to lower energy consumption due to better utilization of the equipment. It shows that the load levelling strategy consumes around 4% less energy than the conventional AC systems. The annual energy saving stated that the annual CO2 emission reduction for load levelling strategy varies from 3000 to 60,000 ton for the total system capacities of 352 and 7034 kW.

David MacPhee, Ibrahim Dincer, [9]: In this paper, a performance assessment of four main types of ice storage techniques for space cooling purposes, namely ice slurry systems, ice-on-coil systems (both internal and external melt), and encapsulated ice systems is conducted. The ice making techniques are compared on the basis of energy and exergy performance criteria including charging, discharging and storage efficiencies, which make up the ice storage and retrieval process. Losses due to heat leakage and irreversibilities from entropy generation are included. A vapor-compression refrigeration cycle with R134a as the working fluid provides the cooling load, while the analysis is performed in both a full storage and partial storage process, with comparisons between these two. In the case of full storage, the energy efficiencies associated with the charging and discharging processes are well over 98% in all cases, while the exergy efficiencies ranged from 46% to 76% for the charging cycle and 18% to 24% for the discharging cycle. For the partial storage systems, all energy and exergy efficiencies were slightly less than that for full storage, due to the increasing effect wall heat leakage has on the decreased storage volume and load. The results show that energy analyses alone do not provide much useful insight into system behavior, since the vast majority of losses in all processes area result of entropy generation which results from system irreversibilities.

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STUDY OF ABRASIVE JET MACHINE

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Abstract –

Abrasive Jet Machining (AJM) or Micro Blast Machining is a non-traditional machining process, wherein material removal is affected by the erosive action of a high velocity jet of a gas, carrying fine-grained abrasive particles, impacting the work surface. The process is particularly suitable to cut intricate shapes in hard and brittle materials which are sensitive to heat and have a tendency to chip easily. As Abrasive jet machining (AJM) is similar to sand blasting and effectively removes hard and brittle materials. AJM has been applied to rough working such as debarring and rough finishing. With the increase of needs for machining of ceramics, semiconductors, electronic devices and L.C.D., AJM has become a useful technique for micromachining. The experimental results of the present work are used to discuss the validity of proposed model as well as the other models. With the increase in nozzle tip distance (NTD), the top surface diameter and bottom surface diameter of hole increases as it is in general observation of abrasive jet machining process. As the pressure increases, the material removal rate (MRR) is also increased. The present study has been introduced a mathematical model and the obtained results have been compared with that obtained from the theoretical. Key Words: Abrasive Jet Machine (AJM), LCD, Nozzle Tip Distance (NTD), Material Removal Rate (MRR)

1.INTRODUCTION

Abrasive jet machining (AJM) is a non-traditional machining process that can machine material without generating heat and shock and also without formation of chips. Abrasive processes are usually expensive, but capable of tighter tolerances and better surface finish than other machining processes chances, delectability, costs and safety aspect etc. Abrasive jet machining (AJM) is a process of material removal by mechanical erosion caused by the impingement of high velocity abrasive particles carried by a suitable fluid (usually a gas or air) through a shaped nozzle on to the work piece. Common examples include Cutting, Drilling, Surface finishing, Etching, grinding, honing, and polishing. The erosion phenomenon in an AJM study may be considered in two phases. The first phase consists of transportation problem, that is, the quantity of abrasive particles flown, and the

direction and velocity of impinging particles as determined by the fluid flow condition of solid-gas suspension. The second phase of the problem is the determination of the material removal rate or the erosion rate.

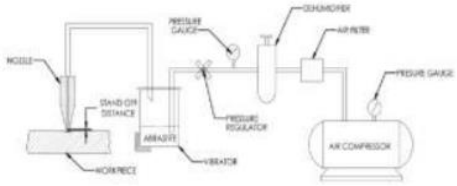

Fig -1: Schematic Layout of Abrasive Jet Machine

The erosion of a surface by impacting solid particles is a discrete and accumulative process. Hence, the models are first made on the basis of a single particle impact. The mechanism of erosion in such cases is complex, involving mechanical, chemical and material properties. The erosion is a function of several variables such as:

a) Speed and angle of impact;

b) Ductility and! or brittleness the impinging particles;

c) Elasticity of the material; of the material and

d) Shape and geometry of impinging particles;

e) Impinging particle diameter to work-material, thickness ratio;

f) Average flow stress; g) Material and density; and

h) Distance between the nozzle mouth and work piece

An AJM set-up may be of two types: one employing a vortex type mixing chamber and the other employing a vibratory mixer. In the former, abrasive particles are carried by the vortex motion of the carrier fluid, whereas in the latter type abrasive particles are forced into the path of the carrier gas by the vibrating motion of the abrasive particle container.

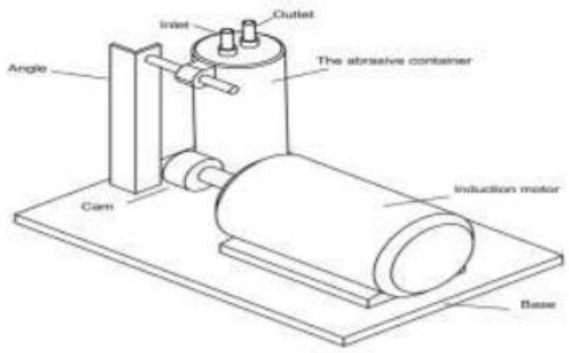

Fig -2: The vibrator assembly

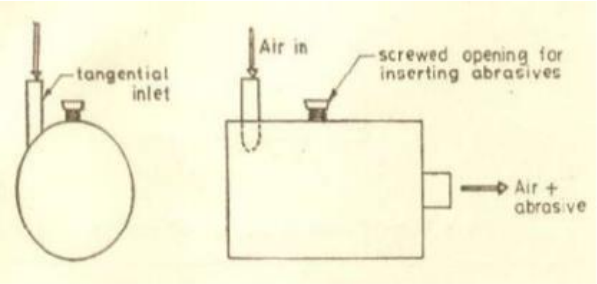

Fig -3: Vortex type mixing chamber

1.1 PROCESS PARAMETERS OF AJM

1.1.1 CARRIER GAS (MEDIUM):

(a) Carbon dioxide,

(b) Nitrogen,

(c) Air: Air is most widely used.

But oxygen never used as a carrier gas due to fire hazards.

1.1.2 ABRASIVE:

Abrasives are available in many sizes ranging from 10 micron to about 1.3 mm. the smaller sizes produce a finish cut and are suitable for polishing, cleaning and grooving. The larger sizes are more suitable for cutting and peening because of their faster cutting action.

a. Aluminium oxide suitable for cutting, grooving and debarring operations.

b. Silicon carbide used for similar operation but for harder material

c. Sodium bicarbonate is useful for light duty work like cleaning, cutting and debarring for soft materials.

d. Dolomite also is suitable for fine etching or polishing work only.

e. Glass beads can be used for polishing surface to a matte finish and debarring work.

1.1.3 VELOCITY OF ABRASIVE:

The jet velocity is a function of nozzle pressure & design. The range of jet velocity is 150-300 m/min.

1.1.4 WORK MATERIAL:

It is recommended for processing of hard, brittle, and glass sheets material.

1.1.5 NOZZLE:

AJM nozzles generally made of WC or Sapphire to resist abrasive wear due to the high velocity abrasive stream. The nozzle has either a right angled or straight edge shape.

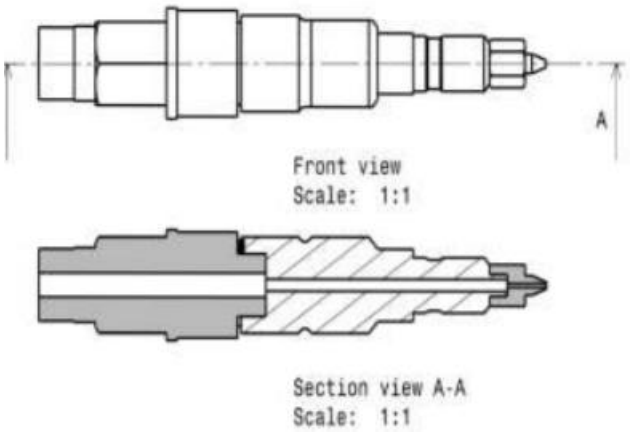

Fig -4: Nozzle

1.1.6 NOZZLE TIP DISTANCE (NTD):

It is the distance between the nozzle tip & work material. It is also called as Standoff Distance (SOD).

1.3 COMPONENTS OF AJM

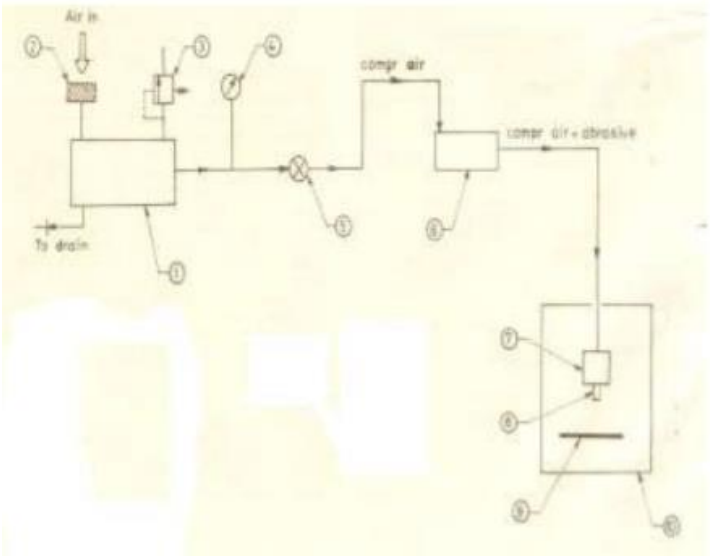

Fig -6: Components of AJM

a) Compressor

b) Air filter cum drier

c) Relief Valve

d) Pressure Gauge

e) Opening Valve

f) Mixing Chamber

g) Nozzle Holder

h) Nozzle

i) Work piece

j) Working Chamber

1.4 PROCESS

Glass was used as a test specimen, was cut into square and rectangular shape for machining on AJM. Specimens were cleaned using air jet and weighed on a sensitive scale, accurate to 0.001 gm. The compressed air from the compressor enters the mixing chamber partly prefilled with fine grain abrasive particles. The vibratory motion of the air created in the mixing chamber carries the abrasive particles to the nozzle through which it is directed on to the workpiece. The nozzle and the work-piece are enclosed in a working chamber with a Perspex sheet on one side for viewing the operation. The abrasive particles used were SiC, Al2O3, Sodium Bicarbonate (grain size 60 microns and 120

microns).The nozzle material was stainless steel and the nozzles used were of different diameters. This type of set-up has the advantage of simplicity in design, fabrication and operation. The equipment cost is much less except the compressor. The machine work-piece was then removed, cleaned and weighed again to determine the amount of material removed from the work piece. The size of hole at the top surface and bottom surface was measured and the results were tabulated.

1.5 ADVANTAGES

a) Ability to cut intricate holes shape in materials of any hardness and brittleness.

b) Ability to cut fragile and heat sensitive material without damage.

c) No change in microstructure as no heat is generated in the process.

d) The process is characterized by lower consumption and capital investment.

e) There is no contact between the tool and work-piece.

f) Good surface finish of 10 to 50 microns is possible with the process using finer abrasive.

g) Cutting action is cool because the carrier gas serves as a coolant.

1.6 DISADVANTAGES

a) Material removal rate is low about 15 mm3 / min.

b) The parts manufactured by this process have to be cleaned.

c) Embedding of the abrasive in the work-piece surface may occur while machining softer material.

d) The abrasive material may accumulate at nozzle and fail the process if moisture is present in the air.

e) It cannot be used to drill blind holes.

f) Nozzle wear rate is high and abrasive particles may get embedded in the work surface.

1.7 APPLICATIONS OF AJM

a) Machining of hard and brittle materials like ceramics, quartz, glass, sapphire, mica etc.

b) Fine drilling and micro-welding.

c) Machining of semi-conductors.

d) Production of intricate profiles on hard and brittle materials.

e) Cleaning and finishing of plastic compounds. Ex. Nylon, Teflon.

2. WORKING PRINCIPLE OF AJM

Fine particles are accelerated in gas stream. The particles are directed towards the focus of machining. As the particle impacts the surface, it causes a small fracture, and the gas stream carries both the abrasive particles and the fractured (wear) particles away.

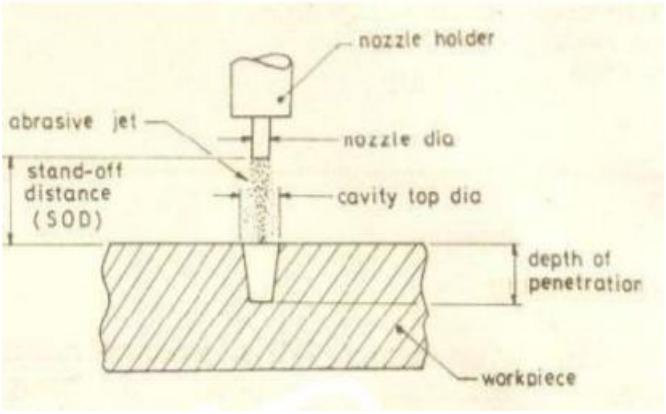

Fig -6: Working principle of AJM

Abrasive jet machining (AJM), also known as abrasive micro blasting, pencil blasting and micro-abrasive blasting. “Abrasive blasting machining process that uses abrasives propelled by a high velocity gas to erode material from the work piece.” The working principle of Abrasive jet machining (AJM) is similar to sand blasting in which AJM effectively removes hard and brittle materials. AJM has been applied to rough working such as debarring and rough finishing. Common uses include cutting heat-sensitive, brittle, thin, or hard materials. Specifically it is used to cut intricate shapes or form specific edge shapes. A machining operation is basically a material removal process, where material is removed in the form of chips. In a machining operation, the output parameter is achieved by controlling various input parameters. Drilling of glass sheets with different thicknesses have been carried out by Abrasive Jet Machining process (AJM) in order to determine its machinability under different controlling parameters of the AJM process.

2.1 EXPERIMENTAL SET-UP

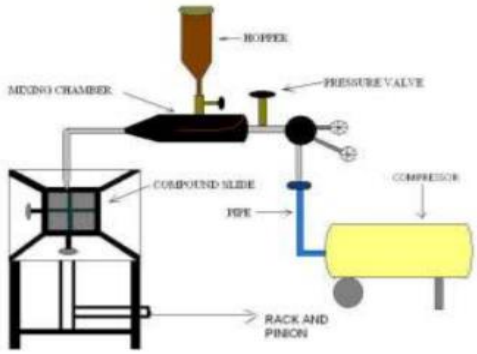

Fig -7: Schematic Diagram of Experimental Set-Up

The compressed air from the compressor enters the mixing chamber partly prefilled with fine grain abrasive particles. The vortex motion of the air created in the mixing chamber carries the abrasive particles to the nozzle through which it is directed on to the work-piece. The nozzle and the workpiece are enclosed in a working chamber with a Perspex sheet on one side for viewing the operation. The nozzle and mixing chamber are shown below.

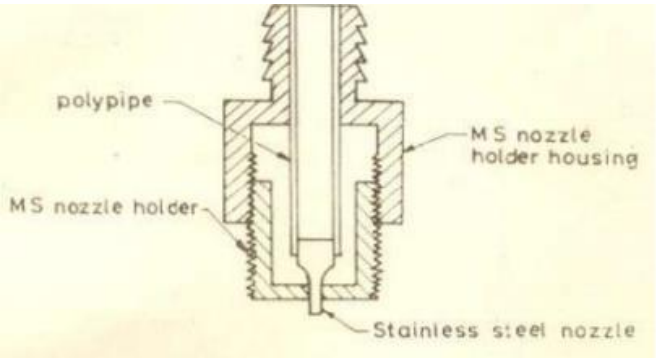

Fig -8: Nozzle Assembly

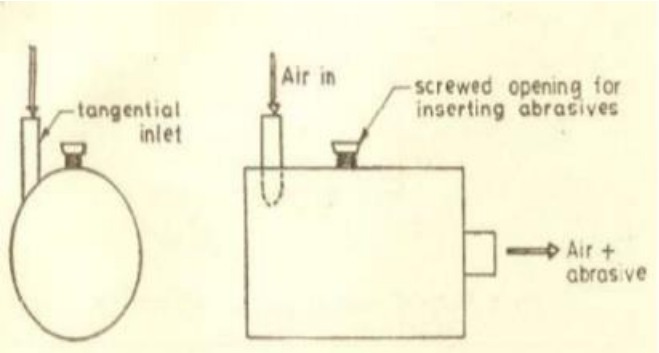

Fig -9: Vortex

Type Mixing Chamber The abrasive particles used were SiC (grain size 60 microns and 120 microns). The nozzle material was stainless steel and the nozzles used were of diameters 1.83 mm and 1.63 mm. This type of set-up has the advantage of simplicity in design, fabrication and operation. The equipment cost is much less except the compressor. The mixture ratio is controlled by the inclination of the mixing chamber. The mixture ratio is defined as: Where mp is the mass flow rate of the abrasive particles and ma the mass flow rate of air.

3. CONCLUSION

It is very clear that AJM is greater Non-conventional machining process which is used as a multipurpose system. It is also a most effective among various affordable systems. This system is eco-friendly. Even some of the companies in India like ABB, L & T and ESSAR are already using this system with CNC programming. This system is also use as Water Jet Machining (WJM) in which abrasives such as garnet, diamond or powders can be mixed into the water to make slurry with better cutting properties than straight water. Further development in WJM is called Hydrodynamic Jet Machining (HJM) which combines the principle of Water Jet Machining and Abrasive Jet Machining process. AJM is also used as Abrasive Flow Machining (AFM), Ultrasonic Machining (USM).

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Thermo electric refrigerater

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Abstract

The global increasing demand for refrigeration in field of refrigeration air-conditioning, food preservation, vaccine storages, medical services, and cooling of electronic devices, led to production of more electricity and consequently more release of CO2 all over the world which it is contributing factor of global warming on climate change. Thermoelectric refrigeration is new alternative because it can convert waste electricity into useful cooling, is expected to play an important role in meeting today's energy challenges. Therefore, thermoelectric refrigeration is greatly needed, particularly for developing countries where long life and low maintenance are needed. The objectives of this study is design and develop a working thermoelectric refrigerator interior cooling volume of 18L that utilizes the Peltier effect to refrigerate and maintain a temperature from 33 °C to 22 °C. The design requirements are to cool this volume to temperature within a time period of 1 hr and to obtain COP in the range of 0.2 to 0.6. The design requirement, options available and the final design of thermoelectric refrigerator for application are presented.

Key Words: Carbon dioxide, thermoelectric refrigerator, interior cooling volume, time period, COP etc.

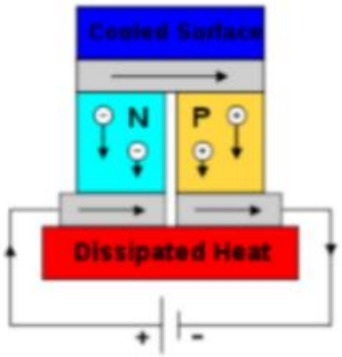
1.INTRODUCTION

Refrigeration means removal of heat from a substance or space in order to bring it to a temperature lower than those of the natural surroundings. Thermoelectric cooling is a way to remove thermal energy from a medium, device or component by applying a voltage of constant polarity to a junction between dissimilar electrical conductors or semiconductors. Thermoelectric Refrigeration provides cooling effect by using thermoelectric effect i.e. Peltier effect rather than the more prevalent conventional methods like those using the 'vapor compression cycle' or the 'gas compression cycle'. Thermoelectric Refrigeration finds applications in electronic systems and computers to cool sensitive components such as power amplifiers and microprocessors. TER can also be used in a satellite or space application to control the extreme temperatures that occur in components on the sunlit side and to warm the components on the dark side. In scientific applications like digital cameras and charge-coupled devices (CCDs) TER are used to minimize thermal noise, thereby optimizing the sensitivity

and image contrast. The coefficient of performance (COP) of compression refrigerators decreases with the decrease in its capacity. Therefore, when it is necessary to design a low-capacity refrigerator, TER is always preferable. Also, better control over the space temperature is the major advantage of the TER. Hence, TER is good option for food preservation applications & cooling of pharmaceutical products.

1.1 PRINCIPLE

Peltier Effect: It states that when electric current is maintained in a circuit of material consisting of two dissimilar conductors, one junction becomes cold and the another junction becomes hot.



1.2 MATERIAL REVIEW

Thermoelectric module is made of two different semiconducting materials, which generate thermoelectric cooling effect (Peltier effect) when a voltage of similar polarity & in appropriate direction applied through the connected junction. Two heat sinks & fans are attached to hot and cold sides of thermoelectric module in order to enhance heat transfer and system performance. There exists an optimum current & optimum voltage for maximum coefficient of performance (COP) for a specific module and fixed hot/cold side temperatures.

a good thermoelectric material should have high Seebeck coefficient, high electrical conductivity, and low thermal conductivity. Commonly used thermoelectric materials are Bismuth Telluride (Bi2Te3), Lead Telluride (PbTe), Silicon Germanium (SiGe) and Cobalt Antimony (CoSb3), among which Bi2Te3 is the most commonly used one. These materials usually process a ZT value (figure of merit at temperature) less than one. From 1960s to 1990s,developments in materials in the view of increasing ZT value was modest, but after the mid-1990s, by using nano structural engineering thermoelectric material efficiency is greatly improved. Thermoelectric materials such as primary bulk thermoelectric materials like skutterudites, clathrates and half-Heusler alloys, which are principally produced through doping method are developed but not exploited for commercial use. [10]

The best commercial thermoelectric materials currently have ZT values around 1.0. The highest ZT value in research is about 3. Other best reported thermoelectric materials have figure-of-merit values

of 1.2-2.2 at temperature range of 320-5200C. It is estimated that thermoelectric coolers with ZT value of 1.0 operate at only 10% of Carnot efficiency. Some 30% of Carnot efficiency could be reached by a device with a ZT value of 4. However, increasing ZT to 4 has remained a formidable challenge. Bell also mentioned that if the average ZT reaches 2, domestic and commercial solidstate heating, ventilating and air-cooling systems using thermoelectric material would become practical. [10]

2. LITERATURE REVIEW

Jincan Chena et al.,[1]:- According to non-equilibrium thermodynamics ,cycle models of single-stage and two-stage semiconductor thermoelectric refrigeration were experimentally investigated. By using the three important parameters which governs performance of thermoelectric refrigerator i.e.coefficient of performance (COP), the rate of refrigeration, and the power input, development of general expressions performances of the two-stage thermoelectric refrigeration system took placed. It was concluded that performance of thermoelectric refrigerator depends on temperature ratio of heat sink to cooled space. When this ratio is small, the maximum value of COP of a two-stage thermoelectric refrigeration system is larger than COP of a single-stage thermoelectric refrigeration system; however maximum rate of refrigeration is smaller than that of a singlestage thermoelectric refrigeration system. Hence it is convenient to use single stage thermoelectric refrigerator when ratio is small. When temperature ratio is large two stage thermoelectric refrigerator is observed to be superior than single stage by both parameters i.e. maximum value of COP and maximum rate of refrigeration.

X.C. Xuan et al., [2]:- In this paper Two stage thermoelectric refrigerator was investigated with two design configurations. Two configurations were pyramid style and cuboid style as shown in respective figures. In pyramid style configuration top side is being coldest as current is unidirectional. In cuboid style configuration current can be alternated causing top and bottom side to be switched between heating and cooling mode. To obtain optimization methods other multi stage designs can be used. The point of maximum cooling capacity and maximum COP both were taken into consideration while investigation for optimization for the two-stage TE coolers. It was concluded that value lies between 2.5-3 for both parameters that is optimum limit of ratio of number of thermo electric modules of two stages in pyramid style TE cooler and optimum limit of ratio of electric current between stages of cuboid style TE cooler. Maximum temperature difference of pyramid-style cooler is greater than single stage cooler.

Jun Luo et al., [3]:- Using finite time Thermodynamics theory performance of a thermoelectric refrigeration system, with multielements was analysed. To improve and maximise the cooling load and coefficient of performance (COP) optimisation of the ratio of the heat transfer surface area of the high temperature side to the total heat transfer surface area of the heat exchangers was done. The

analysis of number of parameters which affects optimum performance of Thermoelectric system was done , parameters were number of thermoelectric refrigerating elements, the Seeback coefficients, internal heat conductance, the heat source temperature and internal electrical resistance. As well as the analysis of other parameters like influences of total heat transfer surface area and working electrical current on the optimum performance was done. They concluded that the cooling load and coefficient of performance (COP) of TE system is greatly influenced by total heat transfer surface area and working electrical current. These results can be used for designing and manufacturing of practical Thermoelectric refrigerators.

D. Astrain et al.,[4]:- In this paper a device using phase change material based on Thermosyphon principle was developed. This device was used and tested as a heat dissipater for hot side of TE cooler. Performance of TE cooler with this device was compared with TE cooler with conventional heat dissipater made up of fins. It was concluded that with the help of developed phase changing device it is possible to reduce thermal resistance between hot side of TE cooler and atmosphere up to 23.8% at 293 K ambient temperature and 51.4% at 308 K ambient temperature, compared to commercial finned heat sink . Decrease in thermal resistance ultimately causes heat to dissipate more effectively from heat sink of TE cooler, therefore improving the COP of TE cooler. At the same values of temperatures it was observed that COP increases by 26% and 35% respectively.

Yuzhuo Pan, et al, [5]:- Author of this paper designed and analyzed an Irreversible multi-couple thermoelectric refrigerator, which operates between two reservoirs maintained at constant temperature. Effect of other factors like external and internal irreversibility of thermoelectric refrigerator on performance was also studied. They have specified many important parameters which affects coefficient of performance (COP) of system. Results of obtained from experiments leads to knowledge of information about performance characteristics of real multicouple thermoelectric refrigerator. This information may be used to manufacture and design thermoelectric refrigerator which will perform at its optimum level.

Hongxia Xi.et al, [6]:- In this paper Author done survey on solar based driven Thermo electric technology. A brief history of development of solar based driven Thermo electric technology was presented. It's today's status and drawbacks present in current Technologies were reviewed. Applications, future scope, advantages over conventional technology where also discussed. In this paper they have discussed about two main modes, that are solar based thermoelectric power generation and refrigeration. Current status of both Technologies was described. Problems related to this technology and there possible solutions were presented. Ultimately these Technologies with some more development may lead to solve demand of Environment protection and energy conservation.

SuwitJugsujinda et al, [7]:- In this paper they have fabricated thermoelectric refrigerator using thermoelectric cooler. Thermoelectric refrigerator (25 × 25 × 35 cm3) and thermoelectric cooler (4 × 4 cm2). This system was applied to 40 W electric power without any cooling fan as heat dissipater at heat sink. They have measured temperature of this system at ten different points. It was concluded that these experiments results into temperature of cold side of thermoelectric cooler to be decreased from 30°C to -4.2°C for 1 hour and decreased to -7.4°C for 24 hours with heat plate temperature being 50 °C. Temperature of cold side of thermoelectric refrigerator decreased from 30°C to 20°C for 1 hour and decreased further in 24 hours. 3 and 2.5 are the maximum value of coefficient of performance (COP) of thermoelectric cooler and thermoelectric refrigerator respectively. S.A.Omer et al, [8]:- This paper presents some results of thermoelectric refrigeration system using phase change materials (PCM) integrated with thermosyphones. They investigated two models of thermoelectric refrigeration system, one with conventional finned devices as heat dissipater and other with phase change material (PCM) as heat dissipater. After results they have concluded that coefficient of performance (COP) and effectiveness of thermoelectric refrigeration system with Phase Change Material (PCM) is higher than conventional one. They have also compared thermoelectric refrigeration system of two kinds, one is using phase change materials (PCM) without thermal diode and other integrated with thermal diode (Thermosyphones). Results shows that thermosyphones used prevent leakage of heat during power off. Overall they have concluded system can be work with the help of renewable energies like solar energy producing electricity. It is suited for medicine and food storage.

3. CONSTRUCTION

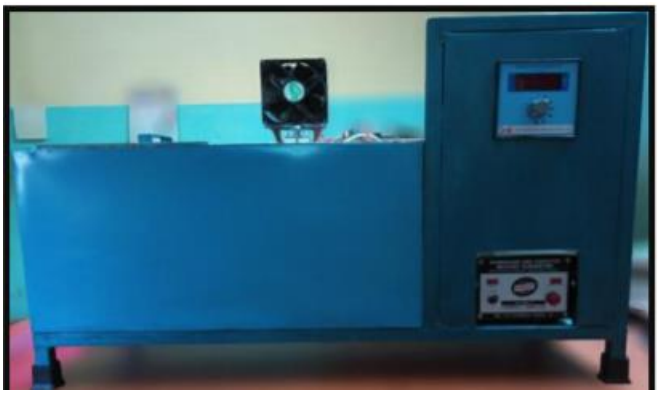
The cabin of volume 21 lit. is fabricated using galvanized sheets and polyurethane foam(puff). The inner surface of the cabin is insulated completely using puff (3.8mm) so as to isolate the cooling cabin from the atmosphere. The thermoelectric module is sandwiched between two CPU heat sinks of different sizes using thermal paste to set a single unit. Thermal paste plays a vital role in conduction of heat from Peltier module to the aluminum heat sinks. One such unit is made. These units are placed in the cut slots with the smaller CPU heat sink facing the interior of the cooling cabin and the larger CPU heat sink on the outside of the cabin to establish greater heat rejection. Additionally, fans are fitted on the inner and outer side of the heat sinks. Electrical connections are made and power is supplied from a 12V battery eliminator. K type thermocouples are placed inside the cabin and outside the heat sink to record the temperatures. Separate control panel containing dc eliminator switches and temperature indicator is made for taking readings.

4. WORKING

Experiments are conducted to analyses the COP. The power supply from the battery eliminator is given to system and readings of temperatures at different places are taken by placing the

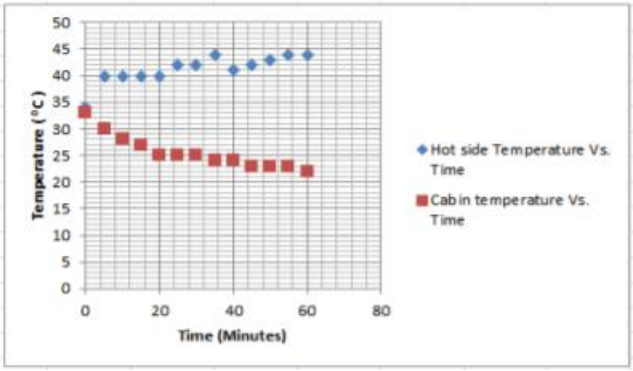
thermocouples near modules, at center and outside the heat sink for every 10 minutes of time. The readings are tabulated and check for least temperatures occur in cabin and maximum temperatures occur at the outside heat sink. After that the power is switch OFF and checks for the storage times of the cabin and readings are taken. The tabulated values are plotted as temperature vs time for power ON and OFF conditions.

5. EXPERIMENTAL SETUP



6. RESULT AND DISCUSSION

Sr. No.	Parameter	Values
1	Maximum temperature difference in ºC	22
2	Time taken in minutes	60
3	$(COP)_{theoretical}$	0.4855
4	$(COP)_{actual}$	0.3143



From result table and graphs, it can be concluded that as time goes on increasing, the temperture inside the cabin falls down gradually. At the same time, hot side temperature remains constant (near about 40°C).

7. CONCLUSIONS

1. The Coefficient of performance of the system for TEC1- 12706 is calculated from the average of readings. It is observed that COP of Thermoelectric refrigeration using TEC1-12706 is lesser than COP of VCRS.

2. Solar power can be used as power source to the system as it is a renewable source of energy. This immensely decreases the working cost of the refrigerator and burden on the earth.

3. Liquid cooling at hot side can be used to increase the refrigeration effect.

4. Waste heat can be recovered using ducts for heating purpose.

5. Number of Peltier modules or multistage Peltier modules can be used to increase the cooling effect.

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VENDING MACHINE

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Abstract –

This paper presents different beverage machines each includes unique operation like vend beverage when user will insert coin or design of vending machine depends on FSM etc. Vending Machine is a system which can vend or offer different products normally installed in supermarkets like household goods, railroad lines, offices, institutes and various other public region. Dispense different products is an automated process, without man power easy to save precious time of human normally seen in fast moving cities because of fast paced life. This paper compares different aspects or response like space, time, speed, power dissipation of a vending machine that is automated product to create our day to day life more suitable and to cover market viability. Key Words: Vending Machine, FSM, Human Machine Interaction, Xilinx ISE and Cadence, etc.

1.INTRODUCTION

Vending Machine (VM) is a machine which can automatically vend different products according to user demand. Vending machine is a machine which uses digital and mechanical energy or mechanisms uses actuators etc. in order to dispense items like medicines, food products, passes or licenses to users automatically means without man power on payment into slot. In most cases vending machines receive two sets of instalment, Credit/Debit Cards and Cash. Credit/Debit Card attributes require to be seized for sales along credit cards. Coffee vending machines can be installed anywhere such as bus station, office, residential region, construction, etc. Accordingly, humankind who likes to drink coffee or tea can buy a cup of coffee or tea anywhere and anytime from them.

2. SURVEY ON DIFFERENT VENDING MACHINES

A great flavoring drink permits workers, guest and customers a bit of gratification in a overdone day. All foods, beverages and constituents offered for disposal through vending machines will be constructed, handled and developed in creations.

2.1 Influential Factors of Vending Machine to Enhance the Interaction Performance

General VM buy activity. The entire operation carried 5 steps, namely starting buy, selecting, filtering, instalment and closure. The selected particular performance solutions in each step were clarified and costumers' tasks in each selection were examined.

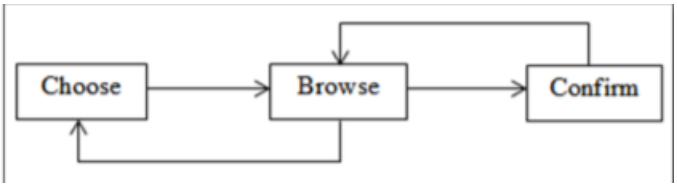

Fig. 1 : Concept of model

Vending machine interface action is mostly divided into four important steps of click, browse, confirm and return. Click, browse and confirm are the three important steps as the main important action. Phase return is considered as an coincidental performance, that is, return demands are constructed when the costumer handles incorrectly. Return is splited into two kinds: return to the previous step and return to the start sheet. Choose - browse - (return) – establish the correctness that can be deliberated into the less time for T=a+b+c as stated by to buying operation. Buy time is being enlarged when the return performance appears. Then the total time for the buy action can be decided as T0=a+b+c+d. They hypothesize that increase the time of buy are 2 return actions: 1. The first time to considering for the return button. 2. Returning to the start sheet, click on the return button and halting on each sheet before this one. The concept of model is shown in above figure. It market viability with improving intellectual benefits or regulation, shortens buy time and stay away from performance defeats.

2.2 Comparison of different attributes in FSM based Vending Machine

They speak about two different set of rules for a vending machine as delineated below and then detecting out the changing speed, timing restraint, power, space demand andusability of logic present in stratixfpga family in order to observe out more well organized and synthesizable that is covert HDL into actual component machine as for this vending machine specification. Vending machine characteristics to be executed is related as below:

1The machine withdraws multiples of Rs10 only.

2. The machine can disburse:

Water:Rs 20 (Wi)

Snacks: Rs 20 (Si)

Soft Drink: Rs30 (Ci)

3. It has a Cancel key or tab (Cc)

4. Only one input may be operate at a time

5. A system can be disbursed in one complete clock cycle

6. If more than Rs 30 is put, the money is automatically that is without physical interaction the extra money come back means returned

7. If no inputs are active lively, the state system remains in same state that is in the current state

. 8. Outputs: All construct a pulse that operates the deliver contraption:

Ro: Return out (all money in the system)

Wo: Water out, Co: Soft drink out

So: Snacks out,

out10: Rs 10 out

Originally the system was in its set initial position or condition which called state A for the design reason. Given an input of Rs 10 the system design moved in its 2nd condition which was state B involved with this point the vending system is griping Rs 10 in its balance and the user has 2 selections either to reject the vending operation with the input of Cc that is cancel which is available on the system or set in another Rs 10 note in the system and go on to the next condition which is state D. Now at this period vending system assembled Rs 20 accordingly user is qualified to select options between water or snacks both of which are of Rs 20 and then go back to its inceptive condition besides beat Cc (cancel) key to finish the operation or besides set in another Rs 10 note in the machine to vend the soft drink which prices Rs 30 so by now the user has extended state G, another Rs 10 note will be directly discarded and signal out10 goes high radiating off the additional Rs 10 out of the system from this condition user can prefer any one of the three outcomes to vend from the vending system that is soft drink (Co), water bottle (Wo) or snacks (So) or one can comparable Cc (cancel) and all money will be get back by forcing Ro signal. Total number of conditions utilized is from A to H that is 8 conditions constructing it a little redundant. Next the same vending system with same characteristics with a little more expert or skillful way so as to reserve some space and condition demand and then observe out the wanted system is well organized or not than the foregoing space proceeding system in phrases of different essential features of a design cycle. Differentiating two dissimilar algorithms, the key difference is under timing restriction permitting positive setup time and negative hold time. One design finding one more additional condition it is better organized in terms of timing restriction and space.

2.3 Smart Coffee Vending Machine

A smart vending system accommodates a sensor and actuator network which made up of a gateway, arising from a person's surroundings sensors, and controllers. A gateway suits an overpass between the network and an implementation managing on a smartphone that is mobile along Bluetooth. The gateway presented with some missives associated to the arising from person's surroundings conditions (for example, cleaning status) of the system from the sensors. Those missives are sent to the supplication. In inclusion, the gateway sends command missives involving the customer's predilection on the taste of coffee to the controllers. On an approach of the verification of abstraction, they establish two magnetic sensors and three controllers. The vending system and the apparatuses established in the vending system. The magnetic sensors are established interior the system: one is connected to the substances mixer and the other is connected to the body of the system. The sensor on the body is joined to a sensor interface which conveys resolute data to the gateway. The sensors react like a switch. If the mixer is isolated from the body, an unsecured happening occurs. Otherwise, a secured happening occurs. The remoteness of the mixer is examined to be the cleaning status of the system. The substances mixer is a tool in which water, coffee, sugar and powered coffee creamer are motley to create a cup of coffee. As a much of remnant of thosesubstances are connected to the internal exterior of the blender, the blender should be cleaned from time to time. The blender has to be disconnected from the system while it has been washed. Accordingly, it is supposed that the blender is wash if it is isolated from the system. By the supposition, the role of the sensors examines whether the system is washed or not for a definite time interval. With the details of data collected from the sensors, the gateway computes the constituting wave of cleaning for a particular time and regulates whether the system is clean or not. The gateway conveys these detailed data to a smart phone application when the supplication links to the gateway. The controllers adjust and manage the quantity of coffee, sugar and powered coffee creamer depending on whether to customer's predilection on the taste of coffee. The customer's predilection is collected from a smartphone supplication through the gateway. Each controller handles the gyration of a motor which regulates the quantity of each substance. The quantity of the gyration is handled in three steps: less, normal, and much. Smart vending system which can automatically that means without man power and without physical contact with that object evaluate its own under cover situated arising from person's surrounding conditions and handle the quantity of coffee, sugar, and powered coffee creamer to create a cup of coffee depending on whether to customer's predilection on the taste of coffee. A sensor and actuator network which made up of a gateway, magnetic sensors, and controllers and a smartphone supplication depended on Android. The network and the supplication interchange some data through Bluetooth.

2.4 Automatic Beverages Vending Machine and it's performance on Cadence and Xilinx 13.1

The popular behavior of any vending favors the as a result of steps with available make different depended on the end user demands. The systems generally work, when some money is set in a time period. Then, a key or tab requires to be forced or a bar dragged. If the exact amount value is loaded into the time period of the system, the selected object will be dribbled to a flat container, where it can be drawn out by the person creating the buy. Selection: User creates a selection of product. Waiting for money placing: When user puts money or cash, money token allows the quantity of cash or money placed into the vending system. Product Delivery: If accurate quantity of cash value is placed the product will be dropped and if there is any assess will quantity that will be get back to user. Service: The vending system will request for service if the product is not able to be used in the system.

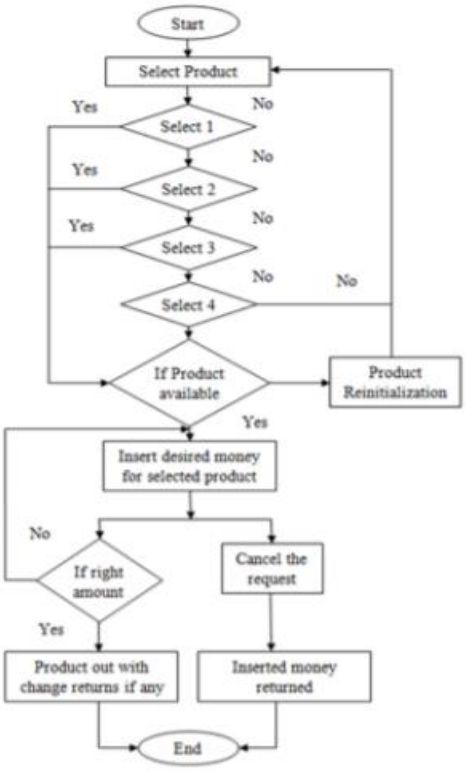

Fig. 2 : Flowchart for Vending machine

This same design they executed or contrivance on xlinix 13.1 and cadence so ultimately they judge regarding these execution, operating cadence permits optimized or improving efficiency related to space, power and delay.

2.5 Vending Mahine based on the short message payment

The vending system is predominantly collected of 3 parts: vending system correlated interact with system (containing vending system interface plate, monolithic integrated circuit and GPRS module), GPRS communication networks which are containing mobile diverting middle of GPRS base station

controller, GPRS service support node as well as GPRS backbone networks etc. and the control center. The vending system communication interface module is predominantly collected with of monolithic integrated circuit and GPRS module and so on.

The monolithic integrated circuit obtains vending system's condition or position information via the Multi drop bus (MDB) protocol, reserves it to the burn and then sealants the user datagram protocol (UDP) data packet depending on whether to the user datagram protocol (UDP) agreement's message data, seals the IP data newspaper in addition to the IP highest part, and then seals the point to point protocol (PPP) frame depending on whether to the point to point protocol (PPP) frame's form, broadcast it to the managing main center through the GPRS module by the IP protocol, assembles communication between monolithic integrated circuit and GPRS module via PPP. The user first sends the information data to the guest facility managing center and then the buying or selling from user center sends back the information frame to the user and the vending system GSM module. The user inputs the information data frame on the vending system and then the automatic managing vending system handles the information data frame to send the managing instructions automatically. The information data frame which the GSM module accepts is transferred to the buying and selling action of user center to assemble the last information data processing. The short message payment by acquiring M68HC11 and MC35 and construct it have the task of the short message shopping and assemble it simple to use and handle.

3. EXAMPLE OF IMPLEMENTATION OF VENDING MACHINE USING XILINX 14.2

Vending system that sells soda canes that costs are a 20 each. Additionally system has only 3 types of coins: 10, 20 and 50. System purpose is to design a state machine with different conditions that regulates when to disburses a cane, how to get back the change. In this design cane pay no attention to the volume of the storage, which means, it will suppose that there will ever be cane in the vending system. Also, suppose that only one operation could be created in every “clock cycle” or position. Understanding the possibilities : There are quite few options:

1) invading no money

2) placing 10 reproduced by another 10 => acquiring the can

3) placing 10 reproduced by 20 => accepting modification => acquiring a cane

4) placing 10 reproduced by 50 => accepting modification => getting a cane

5) placing 20 and acquiring the cane

6) placing 50 => accepting change => acquiring a cane.

State Diagram:



Fig. 3 : State Diagram

Explaining the states:

1) put_money: this is the first condition after idle condition; here the user sets in the coins.

2) in_5: If the user place 50, the system proceed to this condition. Pay attention that the machine gives back a 20 change without disbursing the cane yet.

3) change_1: after providing a 20 change for the user who paid 50 they require to get back another 10 change. Here, in this condition they do absolutely that. Again, note that the cane still has not been disbursed yet.

4) in_1, in_3, in_6: acquire to those conditions be controlled on the sum of money that been entered by the user.

5) soda_out: disbursing out the soda cane.

Simulation Result:

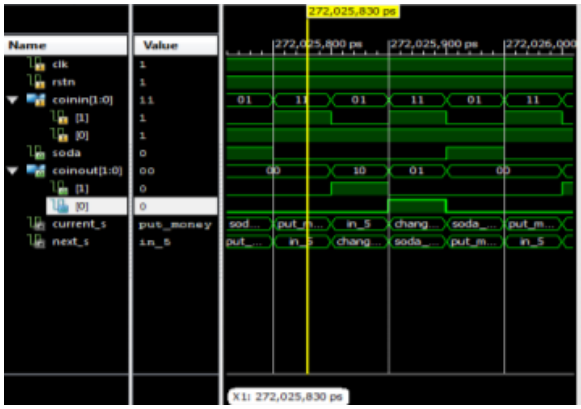

Fig. 4: Waveforms gives detailed information about system

4. CONCLUSIONS

Compared different vending machines and all are designed with different aspects like area, power and delay because of time, switching speed, etc. In smart coffee vending machine is more optimized system with customer preferences. Because according to customer choice they can also select amount to prepare coffee or tea. This is optimized system with some aspects which are power, area and time. Also explain with one example of dispensing soda according to inserted coin to cover market feasibility.

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WIND ENERGY VEHICLE

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Abstract-

Due to scarcity of fossil fuel in future and its detrimental effect on the environment, an alternative energy has to be discovered. Wind power is clean and sustainable natural resources that has yet to be fully utilized in the automotive industry. Also, the sun is probably the most important source of renewable energy available today. The hybrid system has been designed and installed to generate power which combines wind turbine and solar panel. The hybrid model system is renewable energy system, which helps conserve energy by reducing the use of fuel in vehicle. Hence developing a new method for the economical evaluation of Hybrid Systems for electricity production. Keywords- Scarcity, fossil fuel, environment, alternative energy, natural resources, renewable energy.

1. INTRODUCTION

Here the hybrid car is specially designed so that the energy limitation can be easily overcome y using the hybrid technology. As the battery running are beneficial for the society and more often this type of technology is fruitful for the environment. so to overcome the energy limitation we have installed wind with solar energy and that is called the regeneration of A. Reducing Carbon Dioxide Emissions The most effective way to reduce carbon dioxide (CO2) emissions is to reduce fossil fuel consumption. Many strategies for reducing CO2 emissions from energy are crosscutting and apply to homes, businesses, industry, and transportation.

B. SOLAR ENERGY

Solar energy is radiant light and heat from the Sun harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic's, solar thermal energy, solar architecture and artificial photosynthesis. The large magnitude of solar energy available makes it a highly appealing source of electricity.

C.WIND ENERGY

Wind power is the use of air flow through wind turbines to mechanically power generators for electricity. Wind power, as an alternative to burning fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation, and uses little land.

2. FIELD OF INVENTION

The fixed wind powered electricity generation systems in use, till now are dependent on wind direction and the force of the wind. But the wind is not available at all places and all time throughout the year. Therefore, there exists an immense need of a system for generating electricity from wind induced by moving vehicles which is available throughout the year at various places and with sufficient force of wind. Also solar powered electric vehicle is there but need to install it as an auxiliary fuel for fuel vehicle. Therefore, need of inventing a hybrid renewable energy source as an auxiliary source for fuel vehicle. Therefore, this invention provides a solution to the problem for generating electricity in this manner.

3. OBJECTIVES

1. The main object of the present invention is to provide a method and a system for generating electricity using easily available wind induced by moving vehicles and solar energy in transit or in operation.

2. The other objective is to provide a solution for reducing pollution created by fuel vehicle by use of freely available renewable energy source i.e. solar and wind energy.

4. METHODOLOGY

This paper deals with how energy can be stored by moving or standstill vehicle which has a fuel kit using wind and solar energy.

5. WORKING

Here first of all the vehicle that is presently running on battery say for ola electric vehicle can be modified by installing various new circuits. The solar panel will charge the battery on the day time. The circuit attached to the battery will protect the battery from damages the sunlight intensity is more in the summer the solar panel passes more amount of voltage than required by the battery and this leads to the battery damage so forstabilizing the voltage the circuit will be installed between the solar and the battery. As there is no one in the electric car we can install the carborator fan and the fan will be attached to the generator and the vehicle is in moving position even in the night time when the solar panel will not work the battery will be charged through the wind energy that is from

the fan with dynamo attached and the battery will be charged. Clips are attached so that the user can change power source for charging the battery from solar to wind when required. And in another part the sensor based circuit is also installed this circuit will connected to the motors of the vehicle in the night time or at that when the driver forgets to apply brake in the traffic portion or when driver fall asleep while driving in the night time this sensor circuit will continuously bypass the invisible rays and the rays will detect the in front object of the vehicle if suddenly in front objects say for any vehicle has applied brake and the driver forgets to apply brake this sensor will automatically will calculate the distance and the both objects comes closer then the sensor will pass command to the circuit and the brakes will be applied automatically. This system can save lot of life even it can avoid accidents. For increasing the loading capacity of the motor the gear section that is the gear box is also installed that will increase the loading capacity of the motor without consuming more voltage and power from the battery.

Chart -1: CIRCUIT DIAGRAM

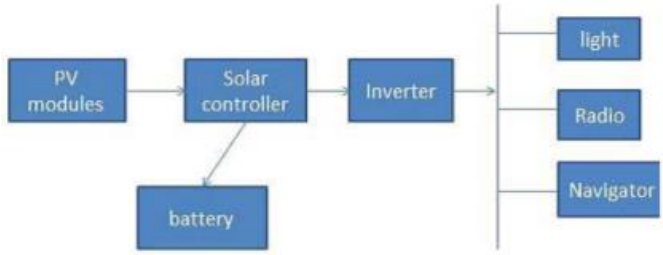


A. CONVERSION OF WIND ENERGY INTO ELECTIC ENERGY:

In this prototype the wind capturing device is a fan. Fan is mounted on the front side of the chesis with the truncated cone in front of it. Fan will get rotated by the wind blown by the blower which will get directed toward the fan due to cone where in actual it will be the wind around the vehicle when vehicle is in running condition. Rotating fan will convert the captured kinetic energy of wind into mechanical energy .The centre shat motor which is connected to battery will convert this mechanical energy into electric energy which is going to stored in the battery. Fig shows below the energy stored by prototype from wind energy.

B. **CONVERSION OF SOLAR ENERGY INTO ELECTRIC ENERGY:**

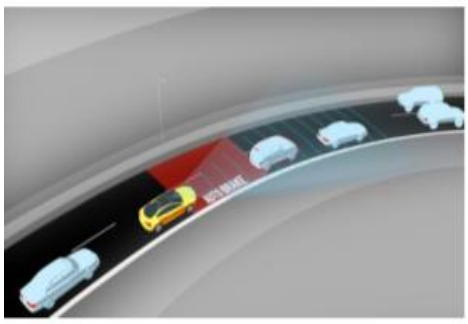
Solar panel is situated on the top of battery in the prototype. Where in actual vehicle it will be mounted on the upper body of chess is of four wheeler. While the vehicle in running position or stand still and have a sufficient solar energy the solar panel will trap that energy and due to the photovoltaic effect of solar panel, it will convert this solar energy into electric energy which will get stored into the battery.



6. AUTOMOTIVE TRACKING SENSORS

The sensors used to track objects and monitors, the movement of the host vehicle as well as the movement of the surrounding objects to predict collisions are known as 'tracking sensors'. In automotive applications, cost of the sensor is a major factor.





7. ADVANTAGES

1. Zero Carbon emission

2. Accidents are avoided due to automatic braking

3. Use of brushed motor

4. Vehicle speed has been increased

5. Can run in the city as well as on highways.

8. DIS-ADVANTAGES:

1. Limited vehicle speed

2. Limited distance covered

3. Takes more time to charge the battery.

4. Only can be used in city.

9. CONCLUSIONS

After making the final completion of project it is found that project is in working condition. It is found that prototype captured the solar energy through solar panel and wind energy through fan induced on it. There are huge potential for producing electricity from renewable sources. This paper gives a clear idea that vehicle powered with the help of solar energy and wind energy is more effective than fuel vehicle.

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WIND MILL BASED WATER PUMPER

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Abstract –

The main source of energy has been coal, oil, natural gas, nuclear energy, wood and coal. However, all these sources are limited and are the main cause of pollution and this has led to development and more focus on sustainable energy supply with minimum pollution effects. Hence research and analysis has shown that wind energy, solar energy and biomass are the most prominent solutions to the above problems because they are eco-friendly and readily available in nature. Wind energy can be generated using windmills that provide mechanical energy that is used directly on machinery e.g. water pump and grinder; or wind turbines that provide electrical energy. The main objective of our project was to design a windmill and therefore our scope will be limited to a windmill for water pumping water. Windmills are classified into two main types based on the axis about which they rotate. Horizontal axis has the main rotor shaft running horizontally and if the rotor must be oriented in the direction of the wind, a wind vane is coupled with a servomotor. Vertical axis has the main rotor shaft running vertically. The rotor assembly can have two or more blades depending on the desired solidity. In our design, we used a horizontal axis windmill with 3 blades, tensile strength 31 N/mm², density 0.855 g/cm3, length of blade 30 inch (2.5 feet) and strength of blade is 4500- 6000 psi. Key Words: natural resources, renewable energy, wind pumps, insufficient fuels, aerodynamic blade.

1.INTRODUCTION

Energy today has become ultimate need of world. Today every application which has been develop in the world require energy supply for its functioning but population of the world is increasing causes tremendous pressure on the energy and mineral resources leading to their exploitation. More ever the greenhouse gases are increasing due to exploitation of these resources. So we need to focus an alternative solution for this problem. Light, wind, Biomass, water etc. are some of the alternative for this problem. Wind is one of the most clean and highly abundant resources in nature.

1.1 Definition

Wind This is air in motion and it is a natural resource that is freely available in space and moves at varying speeds depending on the geographical location Wind energy Wind energy originates from solar energy where the sun heats the atmosphere unevenly causing some parts to be warmer than others. The warmer patches of air rise and other air patches blow in to replace them. Thus alternating air flow which results in wind. Windmill Windmills are machines that are used to harness the kinetic energy of the wind which blows over the blades rotor assembly causing it to rotate on a shaft. The resulting shaft power is then used to provide mechanical work for pumping water.

1.2 Objective

- Lifting the water without using electricity and fossil fuel.
- Setup must be non-polluting and less noise operation.
- Setup cost should be less and maintenance free, one time investment is preferable.
- It must produce some amount of power.
- Installation must be easy and cheap.
- Fuel must be cheap, clean and renewable.
- Solution for the above problem must be eco friendly

2. MATERIAL SELECTION

There are various materials available for design of blade such as wood, fiber, steel, aluminum, carbon fiber, polypropylene plastic. Out of which we have used polypropylene plastic (pp) type material for our design because of following reasons: Polypropylene blade performance and also to decrease process temperatures by adding special particles like nano, fillers.etc in order to replace the current thermo sets by utilizing the benefits associated with the thermoplastics like emission free, process-ability, recyclability, and weld-ability. Polypropylene materials offer higher strength to weight properties than thermo sets, therefore leading to lighter aero foils which can lead to cheaper transport costs and reduced turret weights.

3. MANUFACTURING

3.1 DESIGN OF BLADE

Aerodynamic performance is fundamental for efficient rotor design. Aerodynamic lift is the force responsible for the power yield generated by the turbine and it is therefore essential to maximize this force using appropriate design. A resistant drag force which opposes the motion of the blade is also

generated by friction which must be minimized. Turbines operate for long periods at ground level where insect and dust particulate build up is problematic. This build up known as fouling can have detrimental effects on the lift generated. Provision is therefore made for the reduced sensitivity to fouling of wind turbine specific aero foil designs. The structural requirements of turbine blades signify that aero foils with a high thickness to chord ratio be used in the root region. Such aero foils are rarely used in the aerospace industry. Thick aero foil sections generally have a lower lift to drag ratio. Special consideration is thereforemade for increasing the lift of thick aero foil sections for use in wind turbine blade designs.

3.2 CRANK SHAFT

Another most important component for the smooth functioning of prototype is crankshaft. Crankshaft should poses high strength, rigidity and toughness due to these requirement they are manufactured by casting and forging production techniques. Crankshaft is component connected between the turbine blade and connecting rod. With the rotation of turbine blade, certain mechanical motion is obtained which is transmitted to the crankshaft leading to rotary motion of connecting rod with piston in the pumping assembly.



3.2.1 DESIGN OF CRANKSHAFT

The size of crankshaft was too large so we have fabricated it to the required size for our project. Above table shows the original size & required size.

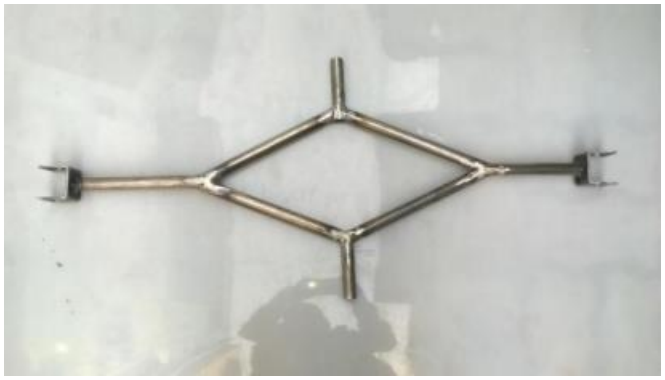
3.3 CONNECTING ROD

Connecting rod is long slender component between crankshaft and piston assembly via sew-saw mechanism. Mechanical motion obtained from the crankshaft for the reciprocation of piston rod in pumping assembly is transmitted via connecting rod. Connecting rod should have high ultimate tensile stress, resistance for the bending, fatigue stresses so it should be manufactured by casting and forging production techniques



3.4 SEW-SAW MECHANISM

Sew-saw mechanism is the basic principle for reciprocation of piston in pumping assembly is achieved by sew-saw mechanism. Blade rotate further leading to the rotary motion of crankshaft. This rotary motion is further transmitted in the form of transverse motion for the reciprocation of piston rod in pumping assembly.



3.5 PUMP

There are two types of pumps;

1. Volumetric (Positive displacement pump)

2. Centrifugal (Roto-dynamic pump)

Out of which we have used positive displacement pump. Positive Displacement Pump are further categorized as

- Rotary lobe pump
- Progressive cavity pump
- Rotary gear pump
- Piston pump

- Diaphragm pump
- Screw Pump
- Gear pump
- Hydraulic pump

Hence for better displacement and sufficient water discharge we have used “Piston Pump (single acting reciprocating pump)” Piston pumps are generally connected to a surface-mounted motor and used to pump water from shallow wells, surface water sources, and pressurized storage tanks, or through long pipes. The suction head is limited to 6 meters. They are not tolerant to silt, sand, or abrasive particles because the piston seals are easily damaged. Filters may be used to remove the dirt

4. WORKING

To conduct trail, we have done set up of wind operated water pump. Windmill blades made up of polypropylene (pp) plastic. Turbine is fixed on crank shaft. Crank shaft is mounted on supporting stand. To permit relative angular motion crank shaft is mounted between bearings. One end of connecting rod is connected to crank shaft and other end connected to sew-saw mechanism by using connecting pin. A piston rod of pump is connected to one end of sew-saw mechanism. All these assembly mounted on structure insucha manner so that we should get the desired motion of piston rod. When wind is imparted on blade kinetic energy of wind is converted into mechanical energy as an angular motion of crank shaft. This angular motion of crank shaft is converted into transverse motion by sew-saw mechanism. Transverse motion is given to piston of pump so that piston will move in transverse direction. When crankshaft rotates the piston will moves in upward and downward direction inside the cylinder. When piston moves from bottom dead centre to top dead centre of cylinder, vacuum is created due to which water is sucked inside cylinder. When piston moves from top dead centre to bottom dead centre pressure of water increased above atmospheric pressure at the end water is discharged through pipe. Due to pump is single acting reciprocating pump thus there is alternate flow of water in the delivery pipe. The shaft power can be used to generate electricity by using alternator, which is mounted on crankshaft.



6. CONCLUSION

The goal of project is accomplished from the requires analysis and fabrication of prototype that is utilization of wind power to pumping water and generate electricity. Most preferable and suitable material from the design consideration point of view satisfying all the optimum condition and requirement is found to be Polypropylene Plastic. From result we have seen the efficiency of aerodynamic shape blade.

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WIND WATER PUMPING

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Abstract:

In our project wind energy is used to rotate the wind blades. This blade coupled to the shaft. At the end of shaft, the flywheel is placed. The eccentric arrangement is provided in the flywheel. When the blade rotates automatically fly wheel also rotates. Due to the eccentric arrangement the rotation motion of the flywheel is converted into linear motion. This reciprocating motion is given to the handle of the pumping system. The up down motion of the handle is given to the piston, where the water is sucked using pressure variation from lower ground. Finally the water is supplied to the outlet. Wind blade provides the continuous motion which helps to supply the water continuously .Since time immemorial, the main source of energy has been coal, oil, natural ga s, nuclear energy, wood and coal. However, all these sources are limited and are the main cause of pollution and this has led to development and more focus on sustainable energy supply with minimum pollution effects. Hence research and analysis has shown that wind energy, solar energy and biomass are the most prominent solutions to the above problems because they are eco -friendly and readily available in nature. Keyword: Fly wheel, Reciprocating pump, Blade, and etc….

INTRODUCTION

Energy from the air can be utilized in multi various ways. It can be tapped directly from air in the form of electrical energy. The contribution of these sources in the total consumption of energy in the world is about 15%. The scope for application of air energy now stands inherently enhanced through intensive research and development carried out all over the world. Air can be directly utilized for the purpose of cooking and drying. By the same time, it can be also used for boiling of water, air heating and refrigeration. Furthermore, wind energy can be utilized for driving motors for pollution free riding at this time, where air pollution plays a major problem for environmentalist

II. EXPERIMENTAL PROCEDURE

The experimental analysis of this project started with a detailed study of various mechanisms that could be used in this project and their practical applications. Since this project involves the effective

utilization of energy derived when a nature air the design aspects may not actually coincide with the requirements for the fabrication and practical applications. Hence, the method of Reverse Engineering was adopted in this project. As per this method the tower was first fabricated based on the requirements with standard parts keeping in mind various safety precautions. Testing and then the basic designing of the parts followed this. If any of the parts was found to possess strength lesser than the required, it was replaced by a standard part of greater strength. The wind energy is converted into mechanical energy. Initially this project had a nature air area and tower with a fly wheel leaf reciprocating pump arrangement .Also the rotation of the flywheel was not found to be satisfactory, reducing the efficiency of the leaf. This flywheel and leaf has a velocity ratio of 1:1. Leaf is attached to the flywheel. Windmills generally consist of two basic types with the classification being based on the orientation of the axis of the rotor. The main classifications are discussed below:

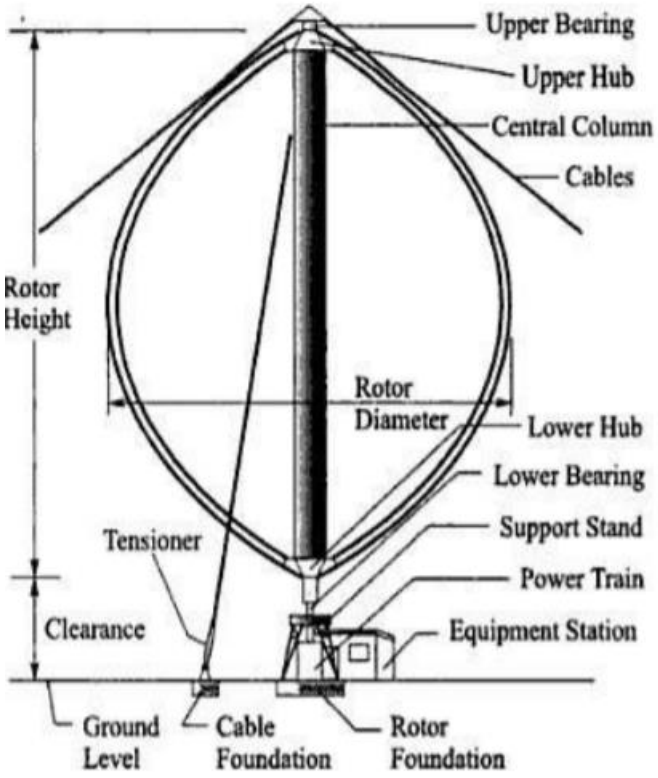

Figure.1. Wind Mill with Pump

2.1 Vertical Axis Wind Turbine (VAWT)

This has blades which are arranged on the vertical axis and are rotated by wind and therefore it doesn't require a yaw mechanis m since it can harness wind from any direction. It does not rely on the direction of the wind to generate power as in the case of the horizontal axis. They usually operate closer to the ground which has an advantage of allowing for placement or replacement of heavy equipment. However this is a disadvantage as winds are lower near ground level hence less power output. 2.2 There are two main types of the VAWT namely: Savonius It operates like a water wheel

which uses drag forces. It has a simple design and is therefore relatively simple and cheaper to build. It is mostly used in situations that do not require large amounts of power. However, it is less powerful than most HAWT because it uses drag to rotate itself and has a higher power to weight ratio. The total amount of turning torque of the mechanism relies on the drag force on each blade. Darrius It uses blades similar to those used in the horizontal axis wind turbine (HAWT). It has two or more curved blades that depend on wind in order to revolve around a central column. It functions by generating a lift using the rotating motion of the blades. The wind acting on the blade creates a rearward momentum change which propels the blade in the direction of rotation. This cannot occur unless the blades are already rotating and therefore they require a separate means of starting i.e. they are not self-starting. Figure.2. Vertical Axis Wind Turbine

2.3 Horizontal Axis Wind Turbine (HAWT)

It has blades that are similar in design to aircraft propellers where air flow over the air foil shaped blades produces a lifting force that turns the rotor. They should be placed on towers to ensure maximum use of the winds at higher levels. For large scale types, they have an active yaw mechanism with wind direction sensors and motors that will rotate the nacelle. In both upwind and downwind the rotors should be perpendicular to the direction of wind and if the rotor is held in a fixed position, only 21% of the wind energy will be captured (Wortman, 1983).For upwind type, the rotor rotation is accomplished by using a vane to measure the direction of the wind and then the information is communicated to the yaw drive. The yaw drive then drives the rotor so that the turbine is facing the direction of wind for maximum harness. They don’t suffer from wind shade phenomenon as the wind is tapped early enough before obstruction by the tower. For downwind types, they don’t use a yaw drive because the wind itself orients the turbine. The blades are situated on the downwind side and therefore capture the wind and rotate following its direction. These designs are prone to “wind shade” a process in which the wind flow is obstructed by an object e.g. the tower thus reducing amount of wind and therefore a reduction in the power output.

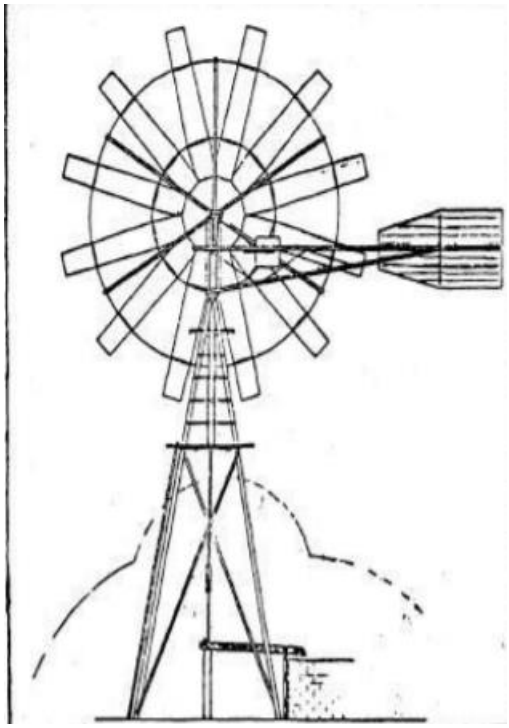

Figure.3. Wind Mill

III. DES CRIPTION

3.1 Field of the Invention

The present invention relates generally to the recovery of water from an underground source through the use of a reciprocating pump system. The present invention relates more specifically to an improved water pumping system adapted to be driven by a windmill that utilizes an air lift fluid pump for generating a flow of water to the surface.

3.2 Description of the Related

Art Water pumping windmills may be found on farms and ranches worldwide and provide critical water supply for domestic and livestock use, especially in areas where electrical and fuel driven pumps are not practical. The type of technology associated with these windmill water pumps has enjoyed continuous use since the late 19th Century and may be generally illustrated by U.S. Pat. No. 1,632,188 assigned to the Dempster Mill Manufacturing Company (1927). This type of windmill pumps water by means of a positive displacement, reciprocating pump, submerged below the static water level of a drilled well. The pump is conventionally connected and supported by a water discharge pipe which leads to the surface and a reservoir for the water. The pump is driven by a reciprocating rod, typically made of wood or fiberglass, which reaches down from the windmill's transmission to the pump through the discharge pipe. It is typical in reciprocating water pumps of this type to utilize a barrel or cylinder within which a piston is moved in a reciprocating motion by the pump rod. Both the piston and the bottom of the pump barrel incorporate check valves that allow

water to flow only in the upper direction. The check valve at the bottom of the cylinder is commonly called the foot valve, while the valve in the piston is commonly called the lift valve. When the piston is lifted by the pump rod attached to the surface windmill, the lift valve closes and the piston lifts the entire column of water above it until water overflows out of the discharge pipe at the surface. At the same time a slight suction is formed under the piston causing the foot valve to open and water to flow in under thepiston. During the next half of the cycle the piston moves down causing the foot valve to close and the lift valve to open such that water flows through the piston into a position to be lifted during the next half cycle. Water flow valves, such as those described above, must be periodically replaced. The lift valve, which is typically made of leather or rubber, eventually wears due to particles of sand or earth in the water. Other check valves involved with the system also have finite useful lives and must be replaced on a regular basis. Replacement typically involves the removal of the pump rod, discharge pipe and pump by lifting the entire assembly up from the drilled well in order to access the valves. Such replacement efforts involve considerable labour and expense and greatly affect the down time of the windmill pumping system. Obviously, many efforts have been made in the past to replace the windmill pumping system powered by electrical motors and internal combustion engines. The present concern relates only to such efforts that have sought to improve upon wind driven pumping systems. One effort in the past is described in U.S. Pat. No. 3,367,281 issued to Gray on Feb. 6, 1968 entitled apparatus for pumping water from wells using wind power. The Gray patent discloses a water pumping device in which compressed air is generated by a windmill, stored in a tank, controlled through a pressure regulator, and delivered to a displacement type water pump. This invention, although not overly complex, is not directly adaptable to the typical windmill structure. The Gray disclosure describes a down stroke of a windmill pump rod as the compression stroke which does not lend itself well to application in conjunction with typical windmills that are designed to apply force and power on the upstroke of the pump rod. The pump rod conventionally made of wood would likely snap if used to compress air on the down stroke. The Gray invention also utilizes solenoid valves that are electrically controlled to effectuate the air compression cycle. Such electrically controlled valves are typically not practical in remote windmill locations. Finally, the Gray invention further requires the use of an air hold-up means and a pressure regulator. U.S. Pat. Nos. 4,385,871 and 4,358,250 provide further examples of inventions generally related to the conversion of wind energy into compressed air for the purpose of water pumping. These earlier efforts, however, also do not address an appropriate adaptation of the air compressing mechanis m to the typical windmill structure or to the utilization of the same in conjunction with an air injection type water pump. **IV. S ELECTION OF SITE TO WORKING**

The viability of a windmill is greatly affected by its location. The site must have sufficient wind power to move the windmill and also be away from obstructions that might cause turbulence. The speed of wind for a given location is not constant and thus the climatic condition of the site should be

examined for over on a year and recorded on a wind map which is then used to analyze the suitability of the sit. To avoid distractions, most windmills are located on hilly areas or the rigs are tall enough to ensure the rotor is far above the obstacles. The site of our windmill had been identified and there was no need for selection of another site. However, we did an analysis on the site to determine its suitability and the findings were as follows. The location of the windmill is strategically away from tall buildings and tree.

V. CONCLUS ION

The total torque output of the windmill is 106.4572 Nm and this is sufficient to sustain the desired flow rate of (0.1736 X 10-3) m3 per second with a maximum head of 30m, and also to overcome other barriers to 5motion e.g., friction. The number of blades used is 24 with a total surface area of 0.5585 m2 and this gives a solidity of 0.8, the minimum (optimum) value of solidity for a windmill and therefore ensures conformity with the standard specifications. Gears and bearings are subject to very high heat losses due to friction and this will be greatly minimized by application of oil and grease and therefore greatly improving the efficiency. All materials used are locally available and at a low cost making the model economically viable.

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A Finite Iteration Technique for A Fuzzy Quadratic Programming Problem	Ashfar Ahmed	Mathematics	Studia Rosenthaliana (Journal for the Study of Research	Aug-20	1781-7838	http://www.jsrpublication.com/	http://www.jsrpublication.com/gallery/3-jsr-aug-s519.pdf	WOS
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MHD Radiative Heat Source/Sink Fluid Past A Vertical Porous Plate With Effect On Radiation Absorption	P. Naga Lakshmi Devi	Mathematics	GIS SCIENCE JOURNAL	OCT, 2020	1869-9391	http://gisscience.net/	https://drive.google.com/file/d/1rk7Vmf_HLszCI3B9oLLPyH4UUO-lEo_S/view	SCOPUS

INNOVATIONS AND EMERGING TRENDS IN MANAGEMENT SCIENCES

9th & 10th July, 2020

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Edited by

Dr. T. RAVINDRA REDDY

Professor & Dean SoMS, NNRESGI, Hyderabad, T.S.



Nalla Narasimha Reddy Group of Institutions
NNRG Integrated Campus

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About NNRG

Nalla Narasimha Reddy Education Society`s Group of Institutions (NNRESGI), popularly known as NNRG was established in 2009 is approved by AICTE and affiliated to Jawaharlal Nehru Technological University Hyderabad and the institute has been accredited by NAAC and NBA-(ECE, CSE, and MECH). The institute is an integrated campus having three schools Viz. School of Management Sciences (SMS), School of Engineering (SOE) and School of Pharmacy (SOP). The institution offers MBA, M.Tech, M.Pharm, B.Tech and B.Pharm Courses, having more than 2500 students in various disciplines on the campus, the institution encourages multi-disciplinary research by providing the state of art infrastructure, library and lab facilities along with the committed and dedicated faculty.

About SMS

The School of Management Sciences (SMS) is a part of integrated campus. The School offers Masters Degree in Business Administration with an intake of 120 students having well qualified and highly experienced faculty in all areas of Management. Ever since the inception of the School in 2009, application and research oriented education has been its top priority.

About the Conference

The National Conference on Innovations and Emerging Trends in Management Sciences (IETMS-2020) is organized by the School of Management Sciences. The basic objective of the conference is to bring together academicians, experts and students from different parts of the country to exchange knowledge and ideas in the crucial areas of Management Sciences.

Conference Themes

This conference provides an opportunity to discuss innovations and emerging trends in management sciences. The papers are invited on the following sub-themes.

Financial Management, Human Resource Management, Information Technology Management, Marketing Management, Operations & Production Management, Knowledge Management, Pharmaceutical Management and Entrepreneurship.

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Chairman
Nalla Narasimha Reddy Education Society's Group of Institutions

MESSAGE

I am very happy to know that the School of Management Sciences of Nalla Narasimha Reddy Education Society's Group of Institutions is holding an Online Conference on "Innovations and Emerging Trends in Management Sciences (IETMS-2020)" on 9th and 10thJuly2020, in our institution. To begin with, I offer my sincere appreciation and gratitude to the members of the organizing committee and Prof.T.Ravindra Reddy, convener of this conference. I also extend my greetings to all the participants. The conduct of this Online Conference is a testimony that the School of Management Sciences of our Institution looks beyond and finds solution to situations. The COVID-19 has triggered unprecedented restrictions not only on movement of people, but also economic activities. Even during this time, there are certain sectors like pharma, telecomwhich are growing.So, this online conference on a nice theme "Innovations and Emerging Trends in Management Sciences" can bring students, academicians, entrepreneurs to a virtual platform to address the challenges and opportunities in the corporate world. I believe this conference will find aninnovative solution for disaster management. I wish the organizers all the success they deserve on account of systematic planning and careful organizing this conference during such period in our life.



Dr.C.V.Krishna Reddy
Director
Nalla Narasimha Reddy Education Society's Group of Institutions

MESSAGE

It is a matter of great pride that the School of Management Sciences of Nalla Narasimha Reddy Group of Institutions is organizing a two day online National Conference entitled "Innovations and Emerging Trends in Management Sciences (IETMS-2020) on 9th and 10thJuly 2020. I extend a wholehearted welcome to all the participants and offer sincere appreciation to the members of the organizing committee.

The theme of the conference is the Innovations and Emerging Trends in Management Sciences which focuses on the challenges and opportunities in the corporate world. The present challenges in the corporate world due to COVID-19 pandemic will have far-reaching impacts as forecasted by reputed institutions like IMF and World Bank.Theaviation, tourism, hospitality industries,Small and Medium Enterprisesare facing serious challenges.There is a real threat of significant declinesin revenue, insolvencies and job losses. During this Challenging time, IETMS 2020 will provide an excellent opportunity for different stakeholders in the society to develop innovative ideas and feasible solutions that will address the challenges faced amidst COVID-19. I would like to congratulate Dr. T. Ravindra Reddy, convener of this conference as well as the entire organizing team and wish an all round success of the national conference.



DR. T. RAVINDRA REDDY
Convener- IETMS2020
Dean, School of Management Sciences
Nalla Narasimha Reddy Education Society's Group of Institutions

MESSAGE

It gives me immense pleasure to present you all a two day online National Conference on Innovations and Emerging Trends in Management Sciences (IETMS-2020).This online national level conference is being organized by our school on 9th and 10thJuly 2020. The successful outcome of the 1st editions before this, generated an overwhelming response from all our students, academicians, guest speakers, resulting in a unanimous request for the continuation of the conference on Innovations and Emerging Trends in Management Sciences. Today we are passing through a phase that we never imagined, never wished, absolutely unprecedented and the coming reality may be very tough to digest due to COVID-19. We never gave a single thought a virus can lock the entire world, can imprison everybody and can create a bizarre human behaviour.Here I quote Robert H. Schuller, "Tough Times Never Last, But Tough People do". We at NNRG planned to conduct online conference during this phase. The sharing of knowledgeand experience of all the participants on this virtual platform will enlighten all of us for a better tomorrow. I am confident this conference will provide innovative and feasible solution during this dark period. On behalf of School of Management Sciences, NNRG, I congratulate all the participants and my sincere thanks to our Hon'ble chairman, Sri Nalla Narasimha Reddy, Director Dr. C. V. Krishna Reddy for their continuous support and inspiration. I sincerely appreciate all the members of the organizing committee and advisory board for their active participation in the conference.

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A Study on Utility of Mobile Banking Technology in Hyderabad City, Telangana

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ABSTRACT:
Abstract Mobile banking is a term used for performing balance checks, account transactions, payments, credit applications, loans to farmer households, time demand deposits transfer, third- party depository, customized message, account management, personal setting and etc. Technology has a major impact in helping banks service their customer was with the introduction of the Internet banking. Internet Banking helped the customers to access their account at any time. Customers could check out their account details, get their bank statements, perform transactions like transferring money to other accounts and pay their bills sitting in the comfort of their homes and offices. The main benefit is that cell phone is more portable than even the smallest notebook. Mobile banking is convenient. Any time any where account access makes seat-of-the-pants one management possible. In this paper deals the utility of mobile banking and to study gives adoption and acceptance of mobile banking system, perception of mobile banking users, and analyze important factor is needed to adopt mobile banking system in Hyderabad City, Telangana.

Keywords: Mobile Banking, Internet Banking, Utility, Adoption, Perception and Acceptance

1. Introduction:

Although millions of dollars have been spent on building mobile banking systems, reports on mobile banking show that potential users may not be using the systems, despite their availability. Thus, research is needed to identify the factors determining users' acceptance of mobile banking. Mobile Banking is one of the significant functions of the bank. Mobile banking is a system that allows customers of a financial institution to conduct a number of financial transactions through a mobile device such as a mobile phone or tablet. Technically speaking most of these services can be deployed using more than one channel. Presently, Mobile Banking is being deployed using mobile applications developed on one of the following three channels. 1) Interactive Voice Response 2) Short Messaging Service 3) Wireless Access Protocol. The factors affecting the acceptance of an emerging IT artifact such as mobile banking have piqued interest among researchers and remain unknown due in part to consumers' trust and risk perceptions in the wireless platform

2. Research Methodology

2.1 Primary objective

The Primary objective of this study is to analyze the utility of mobile banking system in Hyderabad City, Telangana.

2.2objectives of a study

1. To study the adoption of mobile banking system by the bank customers in Hyderabad City, Telangana.
2. To know the perception level of mobile banking system.
3. To identify important factors this decides the acceptance of mobile banking system.
4. To give valuable suggestions to banking sector to promote mobile banking technology among the bank customer

2.3 Research design

Descriptive research design is used in this study. Descriptive research design is a scientific method which involves observing and describing the behaviour of a subject without influencing it in any way.

2.4 Source of Data

In this study questionnaire method was used for primary data collection. The format of the questionnaire consists of four parts. They are Demographic information, Mobile banking perception, important factor to adopt and Accept mobile banking system.

2.5 Sampling

Simple Random Sampling technique was used in the study. Simple random sampling is one form of probability sampling. All the researcher needs to do is assure that all the members of the population are included in the list and then randomly select the desired number of subjects.

2.6 Sample size

150 respondents who are the customers of various banks in Hyderabad City, Telangana.

2.7 Limitations of the Study

It covers only respondents from Hyderabad, by keeping a sample of 150. The time period of the study between September 2019 to February 2020 and all the results confined to this time period alone.

3.Review of Literature

Hsiu-Fen Lin (2011), Rapid advances in mobile technologies and devices have made mobile banking increasingly important in mobile commerce and financial services. Using innovation diffusion theory and knowledge-based trust literature, this study develops a research model to examine the effect of innovation attributes (perceived relative advantage, ease of use and compatibility) and knowledge based trust (perceived competence, benevolence and integrity) on attitude and behavioural intention about adopting (or continuing to use) mobile banking across potential and repeat customers.

Chian-Son Yu (2012), Fast advances in the wireless technology and the intensive penetration of cell phones have motivated banks to spend large budget on building mobile banking systems, but the adoption rate of mobile banking is still underused

enrich current knowledge about what affects individuals to use mobile banking is required. Consequently, this study employs the Unified Theory of Acceptance and Use of Technology

(UTAUT) to investigate what impacts people to adopt mobile banking.

V Devadevan (2013), in this article titled as Mobile banking in India- issues and challenges mobile banking has an opportunity to adopt mobile users due to technological implementation. This article discussed about challenges which transaction limitation, security and authentication issues. This also highlighted some other issues related with mobile banking. The major problem was identified like facilities in mobile banking, different languages used for communication.

Muhmmad Zeeshan (2014), in their article Internet versus Mobile banking have compared that how internet banking differ from mobile banking. It explained that usefulness of internet and mobile banking are same but differs. Because the internet banking the user have to sit in front computer to operate longer time, but mobile banking is portable and easy to carry anywhere but still internet banking has used in superior level.

BossiMasamila (2015) [6], in this article State of Mobile banking in Tanzania and security issues tells about perception of Tanzania people. Most of them have mobile banking but not bank accounts. So mobile banking has been created big opportunity to increase the bank growth. Finally, there are number of opportunities to increase mobile banking user and surely mobile banking increases bank and country growth.

Harun R Khan (2016) [4], in this article titled as Digital India: Emerging challenges and Opportunities for the banking sector. It discussed about Migration from cash to electronic payments and there are over 900 million mobile users in the country. RBI conducted number of awareness program to increase mobile banking users. The plan of digital India is connecting all the Gram Panchayat through broadband network by **2017.**

Aijaz A. Shaikh, HeikkiKarjaluoto (2018), the article analyzes and synthesizes existing studies of m-banking

adoption and maps the major theories that researchers have used to predict consumer intentions to adopt it.

4. Data Analysis and Interpretation

The table 1.0 shows that 45(90.0%) view account activity, 5(10.0%) do not view their account activity, 8(16.0%) are using mobile banking for deposits 48(96%) are not, 25(50%) uses to transfer money and 25(50.0%) are not. 26(54.0%) pay bills by mobile banking rather 24(46.0%) are not. 11(22.0%) are using mobile banking for ticket booking 39(78.0%) are not. The responds do not prefer other operations through mobile banking. It shows that most of the customer prefers mobile banking to view account activity followed to transfer money, Pay bills, Ticker booking and deposits

Table 1.1: Some Important Factor to Adopt Mobile Banking in the Future Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Security	150	1	5	4.44	0.884
Privacy	150	1	5	4.24	0.960
Reliability	150	2	5	4.04	0.903
Service charge	150	1	5	3.62	1.105
Perceived usefulness	150	2	5	3.92	0.922
Perceived ease of use	150	1	5	3.74	0.986
Valid N (list wise)	150	-	-	-	-

Mobile Banking Operations		Frequency	Percent	Valid Percent	Cumulative Percent
View Account Activity	Valid No Yes Total	5 45 50	10.0 90.0 100.0	10.0 90.0 100.0	10.0 100.0
Deposits	Valid No Yes Total	48 8 50	84.0 16.0 100.0	84.0 16.0 100.0	84.0 100.0
Money Transfer	Valid No Yes Total	25 25 50	50.0 50.0 100.0	50.0 50.0 100.0	50.0 100.0
Pay Bills	Valid No	26 24 50	52.0 48.0 100.0	52.0 48.0 100.0	52.0 100.0
Ticket Booking	Valid No Yes Total	39 11 50	78.0 22.0 100.0	78.0 22.0 100.0	78.0 22.0 100.0
Others	Valid No	50	100.0	100.0	100.0

The above table 1.1 shows cross tabs between year of using mobile banking and important factors to adopt mobile banking in the future they are namely security, privacy, reliability, service charge, perceived usefulness, perceived ease of use. According to this result most of the respondents are using mobile banking 1 to 2 year. And respondent prefers security for their first choice to adopt mobile banking in the future followed by reliability, privacy, perceived ease of use, perceived usefulness and service charge.**5. Findings**

1. Mobile banking users are more in age group of 18-30 followed 31-40.

2. 68% of mobile banking user uses antivirus software in their mobile phone.

3. 76% of mobile banking user assigns password to protect their mobile.

4. Mobile banking users 100% are using mobile banking for bank account followed by commodities 90%.

5. Reasons for using mobile banking is to access 24*7 (44%) and for convenience (24%)

6. Frequency of using mobile banking is 1 to 2 times per month (44%) followed 3 to 4 times (38%).

7. The respondents 80% of them are using mobile banking to view account activity operations, 70% are using for money transfer and 58% of them to pay bill

8. Mobile banking perception differs according to the user age, qualification, occupation, monthly income and year of using mobile banking. But finally every mobile banking user accepted that mobile banking is useful and affordable service to everyone.

6. Suggestions

1. Bank provides number of facilities to their customer to attract and to increase the revenue of the banking sector. Mobile banking is an emerging technology which is used by most of the bank customers. It is mainly used by age group between 18-30 and it is also to be noted that most of the male customer uses mobile banking than female user. Mobile banking user prefers antivirus to protect their mobile and also they uses password to access it. Compare with net banking it is more convince and also portable. It has same usefulness like net banking but facilities are higher in mobile banking than net banking. In India most of them uses mobile but they do not have account. The bank can increase their customer by mobile banking.

2.The perception of mobile banking among the respondent are mostly same. Mobile banking users still worry about security of mobile banking and privacy. The mindset of the mobile banking customer should be changed. It has much security policy like net banking, but it didn't reach to the people. Most of the user accepted that mobile banking has much facilities and its convenience also 24*7 accesses. The customer can access their account at anytime and anywhere.

3. Finally, mobile banking did not reach in Hyderabad that much. The acceptance of mobile banking among the bank customer is below expectations because out of 100 only 50 of them uses mobile banking may be because low levels of awareness and acceptance, inability of banks to seed the mobile number with the account number, absence of collaboration and revenue sharing models between banks and mobile banking operators. So the banks have to take some action like awareness and training program to promote mobile banking to their customers. It will be beneficial to bank as well as to their customer.

7. Conclusion

Mobile banking is used by all age groups of people. The current research concludes that many of the people are not aware of mobile banking. Each and every technology has its own advantages and disadvantages. Mobile banking also has number of advantages but it did not reach to the bank customer properly. If bank customer has more money than they need to manage their day to day expenses, banks offer a variety of options for saving, including market accounts, high-interest online savings accounts and basic savings accounts. Using mobile banking customer can easily access their bank accounts anywhere at any time. Bank provides much security to manage their customer mobile banking. Finally, bank has to provide awareness to their customer about mobile banking to increase bank growth. Because everyone has mobile phone, so it is better opportunity to the bank to increase their revenue. People have to consider that mobile banking is an opportunity to increase their growth. It would be better to the country growth if bank and customer consider that mobile banking is an affordable service

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WEALTH MANAGEMETN A STUDY WITH REFERENCE TO WOMEN INVESTORS IN HYDERABAD CITY

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Abstract

Women investors are changing the world by changing wealth. Income of women is growing very faster. In India majority of family women plays a significant role in wealth management. The demographic, economic, and technology changes are influencing and increases women financial strength and independence. The uneducated and illiterate women required more level of awareness regarding various levels of investment. The companies are also required more transparency in their investment instruments to attract more investments. The present research is aimed to understand the perception and the behavior of women investors with particular reference to Hyderabad city in Telangana state.

Keywords: women investor, wealth management, women behavior, economic changes, women awareness

1. INTRODUCTION

In the world women's are growing faster in wealth and income. Government also providing many schemes and loans to the women investors by this they are stronger in financial strength and independence. According to the research women wealth represents 30% of global wealth increases more 7% faster compared to men. Now a day in India many women are focused on women entrepreneur. On the other hand the Hyderabad diverse rate are increasing more and women's are facing risk for their own finances to their children case and family and single parents having more financial responsibilities to their children. By this government has came front with many schemes to the women, and women's are ready to start entrepreneurship in Hyderabad.

2. STATEMENT OF THE PROBLEM

Managing family wealth influence the economy of any nation and it plays a significance role in developed and developing countries. In India majority of family women plays a significant role. The demographic, economic, and technology changes are influencing and increases women financial strength and independence. In India the women investment are based on the economic level and their education level. It is necessary that markets and Government need to give right direction in case of uneducated and illiterates women in the segment of wealth management market. Thus the study aimed at to understand the level of behavior and perception of women in various investments in case of wealth management and also the women participation in various sectors of investments in India with special reference to Hyderabad city.

3. OBJECTIVES

- To understand the needs of women investor in various types of investment.
- To know impact of personal goals on total wealth invested by women investors
- To provided strategies for wealth management services for women investors

4. SCOPE OF THE STUDY

The study is aimed to understand the behavior of women investor in wealth management. It is confined to various places of Hyderabad city by considering 120 Number of women respondents with various backgrounds of their education

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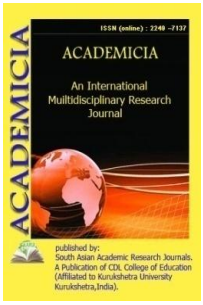

A STUDY ON HUMAN RESOURCE INFORMATION SYSTEM ON HERITAGE FOODS PVT LTD

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ABSTRACT

Human resource information system which is additionally referred to as a person's resource data system or human resource management system. It is essentially an intersection of human resources and knowledge technology through a HR software solution. this enables HR activities and processes to occur electronically. The Human Resource data system Human resource information system may be a software or online solution for the info entry, data tracking, and data information needs of the Human Resources, payroll, management, and accounting functions within a business. Their goal is to merge the numerous parts of human resource, including payroll and labour productivity.

KEYWORDS: *Human resource information system Human Resource Management system Human Resource data system*

INTRODUCTION

In today's globalized world it would like to go as per the technology changes. Human Resource data System is a software package that helps in designing, dominant the hour price. conjointly helps in win improved potency & quality in hour call creating. And for the improvement in worker & social control productivity the study of Human Resource data System is necessary. Human Resources square measure AN structure perform that deals with problems like accomplishment and choice, training, appraisal, compensation and performance management of the worker. kinsmen also are thought- about to be resources as a result of it's the flexibility of humans that helps to alter the gifts of nature into valuable resources.

Objectives

• To study the human resource information system.

• To find out the problem areas of human resource information system.

• To study the need and importance of the human resource information system.

• To find out the requirements for implementation of the human resource information system.

HYPOTHESIS:

1. HRIS is an effective tool to take decision quickly and accurately. 2. HRIS result into increased in organization efficiencies and cost saving. 3. HRIS is an effective tool for improving individual and overall development of

organization.

REVIEW OF LITERATURE:

Smith and kelly1997 believe that" future economic and strategic advantages will rest with the organization that can most effectively attract, develop and retain a diverse group of the best and the brightest human talent in the Market place. The effective management of the human resource in the firm to gain a competitive advantage in the market place requires timely and accurate information on current employees and potential employees in the labor market. With the evaluation of computer technology, meeting this information requirement has been greatly enhanced through the creation of HRIS. With technological advancements many companies have realized the need to implement more sophisticated computerized systems, like Human Resource information system.

RESEARCH METHODOLOGY

Data collection involves two methods

A. Primary Data.

B. Secondary Data.

A. PRIMARY DATA:-

These methods refer to collection of first hand data, this is directly collected from the officials of the organization. This data is collected by following methods.

1. Interview of the officials.

Dep. Manager (MIS).

Manager.

Attendance recorder.

Employees.

2. Observation of overall working of Human Resource Information System in organization.

3. Questionnaires filled by respondents.

B. SECONDARY DATA:-

This data refers to the collection of second hand data. This data is collected from the company in the written or printed format.

The sources of this data can be as follows....

a) The annual report of the organization.

b) Official records of the organization.

c) Other published articles of the organization.

RESEARCH TOOLS

Human resource departments have a lot of information to input, store and track. Performance solutions. Recruiting software. Payroll service. Benefits management platform. Employee engagement.

1. Multiple choice questions 2. Closed ended questions

SAMPLE SIZE:100

RATIO: 2:1

STATISTICAL METHODS USED:1. Bars &chart 2. Percentage analysis

STATISTICAL TOOLS USED:

VARAIBLES:

Independent variable: performance appraisal and communication.

Dependent variable: cost and time saving decision making.

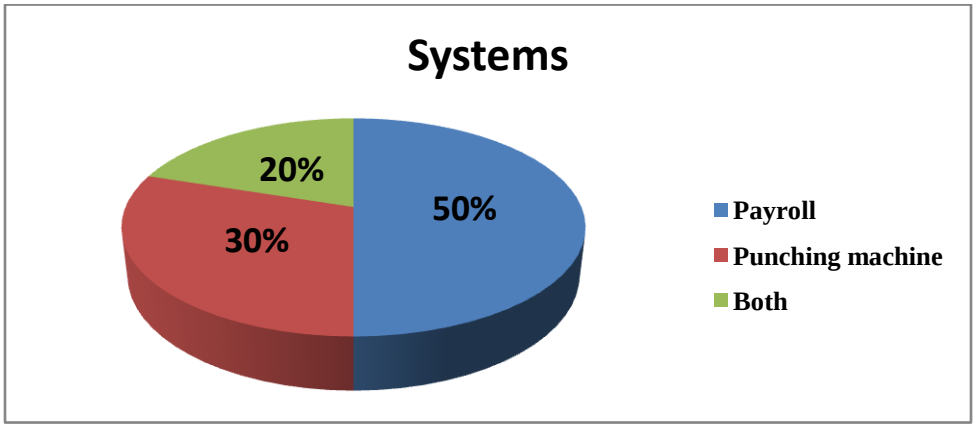
DATA ANALYSIS AND INTERPRETATION:

1: On which system you are working?

Sample size: 10

System	Respondent	Percentage (%)
Payroll	**5**	**50**
Punching machine	**4**	**30**
Both	**1**	**20**

Chart:

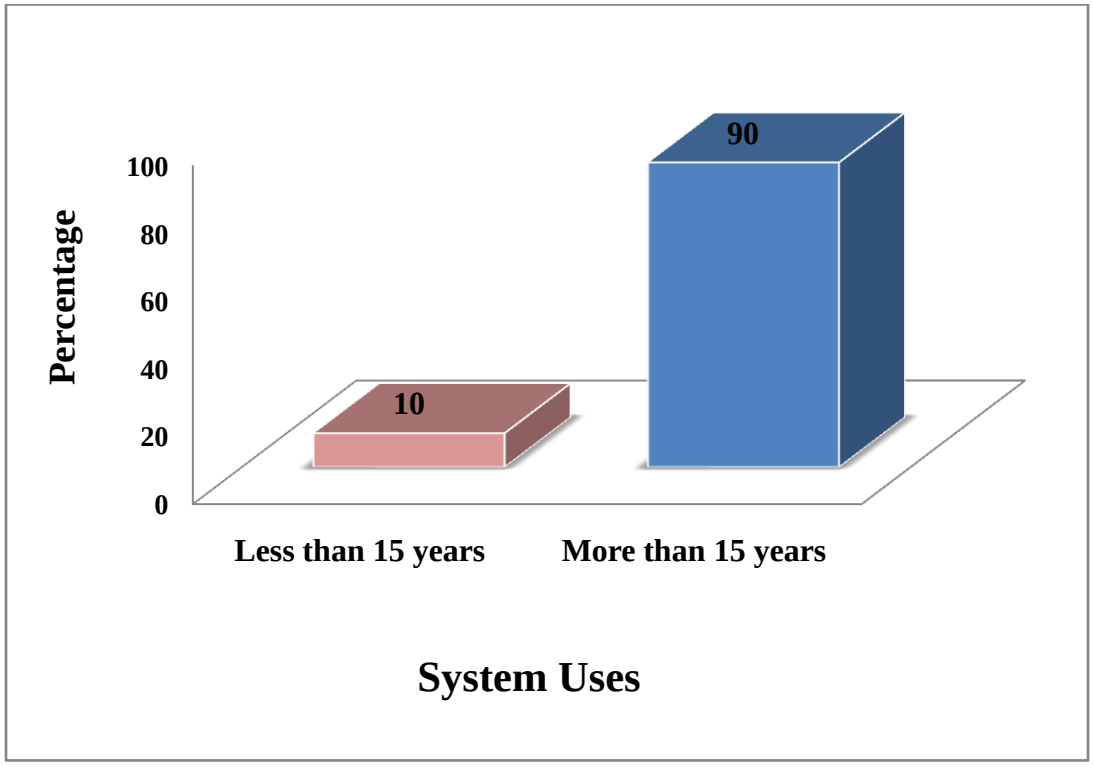


Interpretation: The above table no 1 & the diagram 50% people working on Payroll system, 40% people are working on punching machine & 10% people are working on both the system to admin.

2: From how many years you are using this system?

Years	Respondent	Percentage (%)
Less than 15 years	1	10
More than 15 years	9	90

Chart:



Interpretation: As per the above table no 2 & the diagram 90% people are working more than 15 years & only 10% people are working less than 15 years.

3: Before HRIS how the records were kept?

Record keeping	Respondent	Percentage(%)
Manually	5	50
Computerized	3	30
Both	2	20

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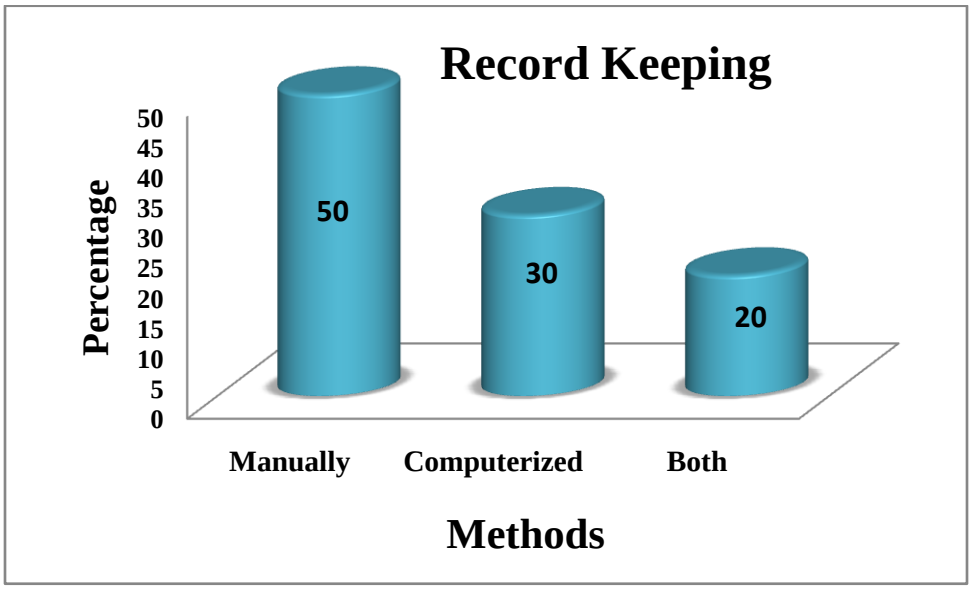
Chart:

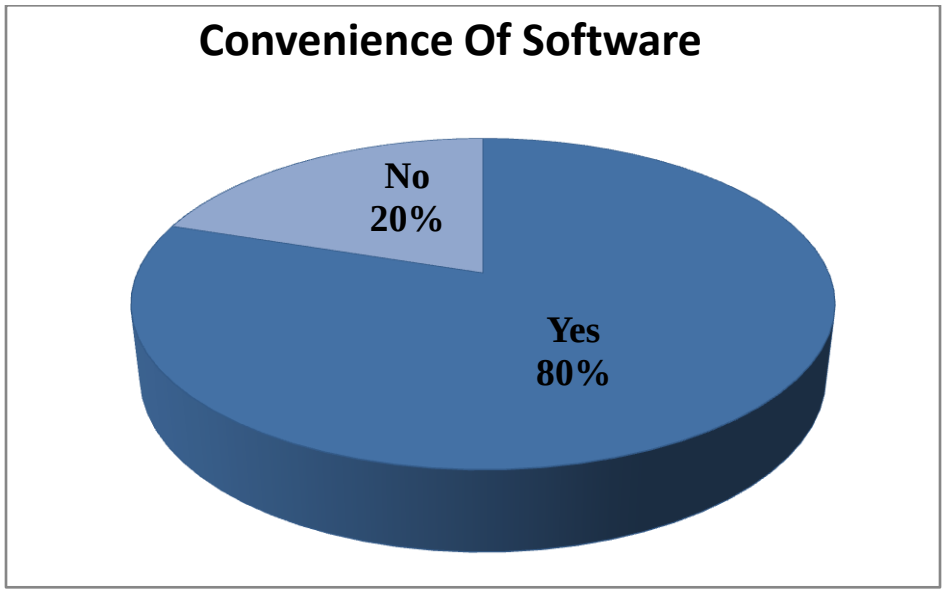


Interpretation: As per the above table no 3 & the diagram 50% people says the keep data manually, 30% computerized and 20% both types.

4: Do you think the current payroll software is convenience for keeping record?

Result	Respondent	Percentage(%)
Yes	8	80
No	2	20

Charts:

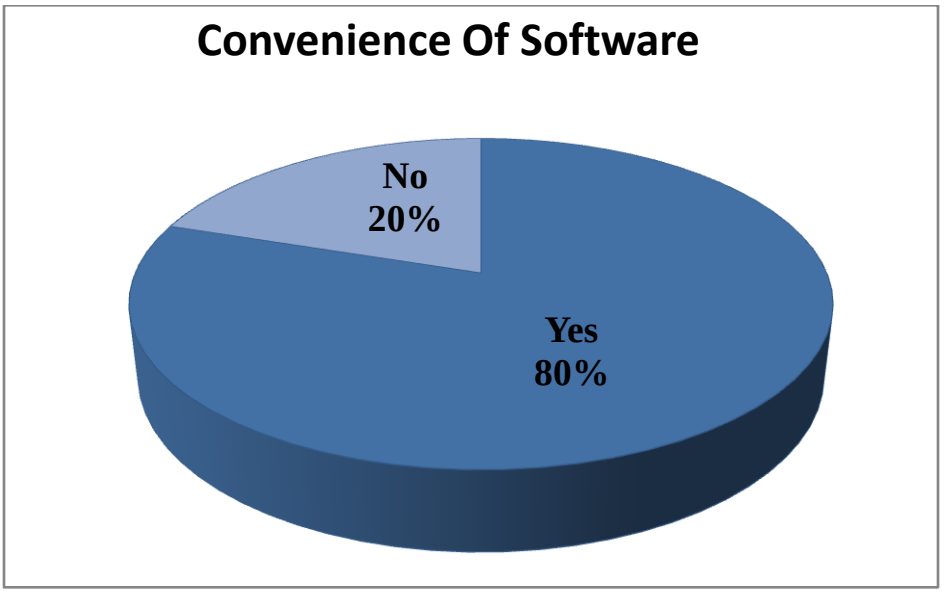


Interpretation: As per the above table no 4 & the diagram the 80% people says Payroll system is convenience & 20% are saying not.

5: Is Punching System provides better Attendance result?

Result	Respondent	Percentage(%)
Yes	8	80
No	2	20

Charts:



Interpretation: As per the above table no 4 & the diagram the 60% people says punching system provides better attendance record& 40% are saying not.

FINDINGS:

1. Most of the employees are satisfied by the performance of the existing system.
2. The system helps keeping the records of employee's attendance, payroll manager & all functioning of HR.
3. Existing system is good but there is problem implement security policy for security reasons.
4. The HRIS is important & needful and employees require changes in existing system.
5. There are 10 peoples are involved in support of existing system.

SUGGETIONS

1. The organization should implement ERP system for better decision making regarding for security.
2. They should install Login system i.e. user id & password for security reasons.
3. The software should be updated or redesigned as per the changing requirements of business or HR department.
4. Records should be recorded properly while manual booking, so that it can be entered properly in HRIS.

CONCLUSION: HRIS is very important software for the development of the company. The system helps keeping the records of employee's attendance, payroll manager & all functioning of HR. this existing system is needful but some employees needs to change as per requirement. By proper training to employees it can help to reduce all the paper work. The importance of the human resource function & HRIS is increasing day by day and it seems to benefit in future.

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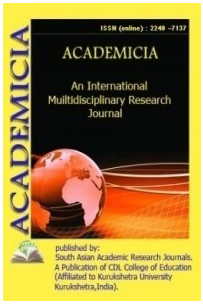

A STUDY ON RECRUITMENT AND SELECTION IN TECH STAR IT SERVICES

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ABSTRACT

From beyond decade the enterprise institutions are all the greater focusing on the human capital given that they are the most esteemed and most loved sources. While selecting the candidates the institutions desires to delineate the reachable HR in view that they make the upper hand for the institutions. The word recruitment has improved closer to turning into as a calculated of human asset capital for the numerous associations. Business institutions are propelling cutting-edge recruiting and determination strategies because of the passage of firm organizations. The point of the paper is to consider the recruitment and selection manner took after at Organisation. The best human capital accessibility in associations makes them top hand and that they grow to be the genuine blood of the associations.

KEYWORDS: *Employees, Recruitment, Selection, Recruitment Policy, Enterprise Weather, Ethical Values.*

I. INTRODUCTION

Human Resources Management is concerned with human beings, who are the energetic elements of management. The success of any organization or an enterprise will depend upon the ability, strength and motivation of person's working in it. The Human Resources Management refers to the systematic approach to the problems in any organization. It's involved with achievement, coaching and Development of personnel.Human resource is the most important asset of an organization. It ensures sufficient supply, proper quantity and as well as effective utilization of human resources..

II. OBJECTIVES OF THE STYDY:

- To study the present Recruitment Policies in "TECHSTAR IT SERVICES"
- To study the type of recruitment/methodology undertaken in the organization.
- To study the different methods of recruitment depending on the requirements of the organization.
- To find the relationship between the qualification and the jobs offered to the employees in the organization.
- To study the changes of recruitment policy in recent times in the organization.
- To know how the company fulfills its manpower requirements.

III. RESEARCH METHODOLOGY

The study was confined to territorial division of "TECHSTAR IT SERVICES" Hyderabad with special reference to its Recruitment policy.

Sample size:

The study was conducted with sample size of 60 employees selected at random from both supervisory and management staff of" TECHSTAR IT SERVICES."

Data collection:

Primary data:

A detailed and well-structured questionnaire was presented to the managerial staff at "TECHSTAR IT SERVICES". Copies of the questionnaire being distributed to the employees at random to obtain their views followed this.

Further discussions regarding the recruitment policies were held with the HRD manager to have an in-depth knowledge and future plans of the company for its effective implementation.

Secondary data:

Secondary data was gathered from academic texts and company profile from company's website.

Analysis:

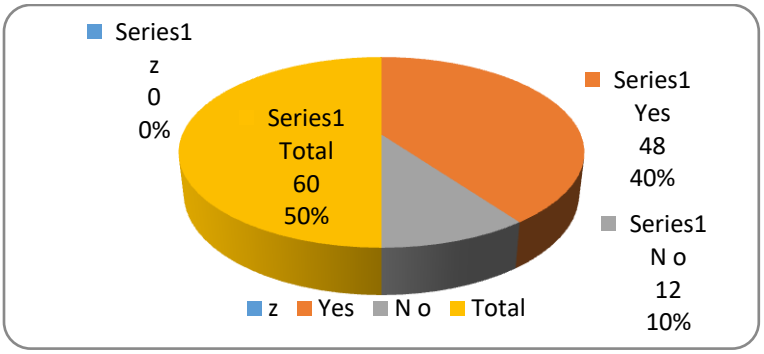
The data collected through questionnaires distributed to the employees was analyzed

IV. ANALYSIS OF STUDY

1. Employees were asked whether they were allocated the post opted by them, for which the following responses to were obtained.

options	No.Of.Respondents	Percentage
Yes	48	80
N o	12	20
Total	60	100

TABLE 1



Graph 1

INTERPRETATION: Out of the 60 respondent whose opinion was asked allocation of the post , 80% of respondents said that they were allotted the post opted by them where as 20% of the respondents said that they were no allotted the opted by them.

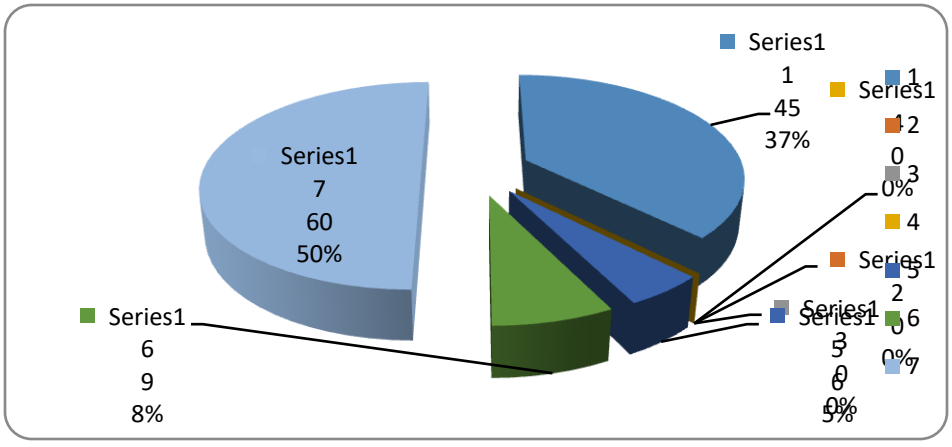
CONCLUSION:

Majority of the employees are satisfied with their allotted post in the organization, but still a few employees are dissatisfied with the posts allotted to the in the organization.

2. Employees were asked as to how they were recruited in the company for which the following responses were obtained.

Options	No.Of. Respondents	Percentage
Open competition	45	75
Recommendations	0	0
Employment exchange	0	0
Trade union recommendations	0	0
Consultancy	6	10
Campus interviews	9	15
Total	60	100

TABLE 2



Graph 2

INTERPRETATION: Out of the 60 respondent questioned about their recruitment in the organization 75% of the respondents were recruited through open competition, 10% through consultancy and 15% through campus interviews.

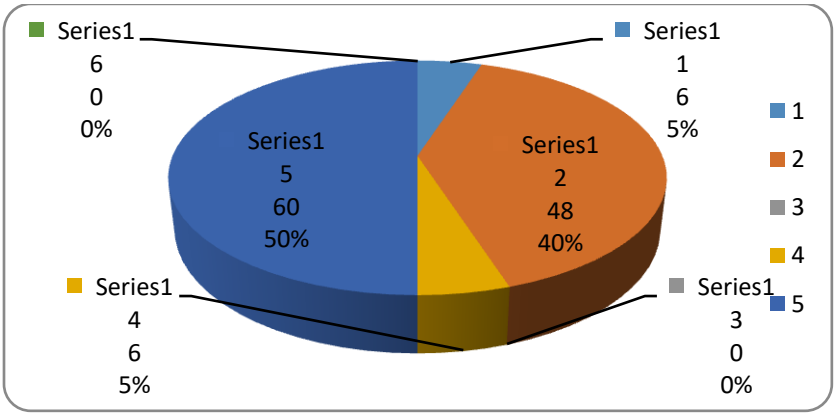
CONCLUSION:

Majority of the employees were recruited through open competition which is a good sign of transparent recruitment policy in the company.

3. Employees were asked about the time period for which they were employed, for which following the responses were obtained.

Options	No. Of. .Respondents	Percentage
Short time period	6	10
Long time period	48	80
Daily wages	0	0
Particular project only	6	10
Total	60	100

TABLE 3



Graph 3

INTREPRETAION: Out of 60 employees who were asked about the time period for which they were recruited, 80% of employees are recruited for long time period where as 10% of employees are recruited only for particular projects.

CONCLUSION:-

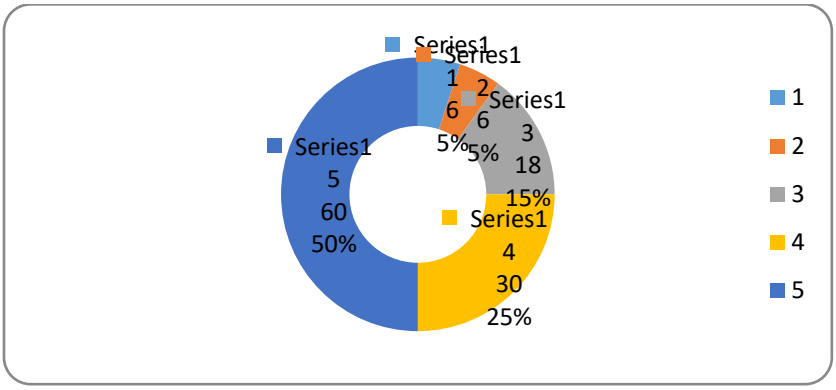
Majority of the employees have been recruited for long time periods and very few employees are recruited for particular as well for short time periods. This shows the stability of the organization and the satisfaction of the employees.

4. Employees were asked the reasons for the taking up this job, for which the response was as follows.

Options	No. Of. .Respondents	Percentage
Good pay Scale	6	10
More benefits	6	10
Career growth	18	30

All the above	30	50
Total	60	100

TABLE 4



Graph 4

INTERPRETATION:- out of the 60 employees asked about the reason for taking up their respective jobs for which 30% of the employees said that they took the job for all the reasons like 'career growth' , 'good pay scale' as well as 'more benefits'., the rest 10% answered as 'good pay scale' was the main reason for taking up the job in APDDCF Ltd.

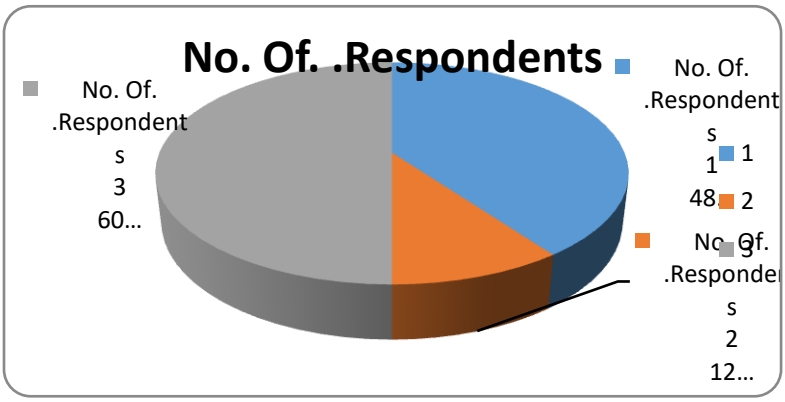
CONCLUSION:

Majority of the employees are of the opinion that all the factors like 'career growth' , ' more benefits' , 'good pay scale' was the main reason for taking up the job in "APDDF Ltd".

5. Employees were asked whether they found any relations there qualifications and the job offered to them, for which they responded in the following.

Options	No. Of. .Respondents	Percentage
Yes	48	80
No	12	20
Total	60	100

TABLE 5



Graph 5

INTERPRETATION:

Out of 60respondents who are asked whether they found any relation between their qualification and the jobs offered to them, 80% of the respondents said that they found a relation where as 20% of the respondents said that they did not find any relation.

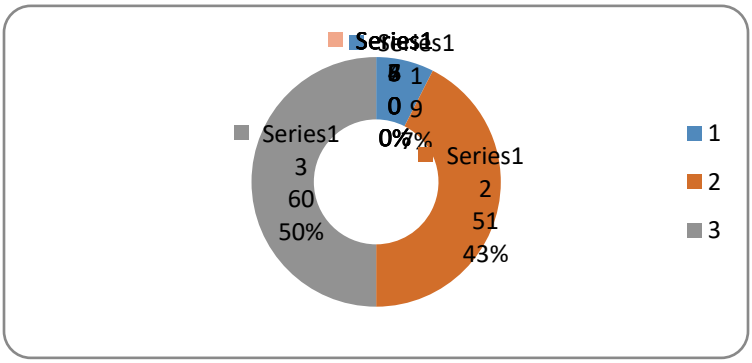
CONCLUSION:

Majority of the employees are satisfied with their jobs where as the rest of the employees are not satisfied with their jobs as they do not find any relation between their qualification an the job thus offered to them.

6. Employees were asked whether they observed any change in the recruitment process in recent times for the following responses were obtained.

Options	No. Of. .Respondents	Percentage
Yes	9	15
No	51	85
Total	60	100

TABLE 6



Graph 6

INTERPRETATION:

Out of the 60 employees questioned regarding any change in the recruitment in recent times,15% of the respondents did not find any change, where as 85% of the respondents found some change.

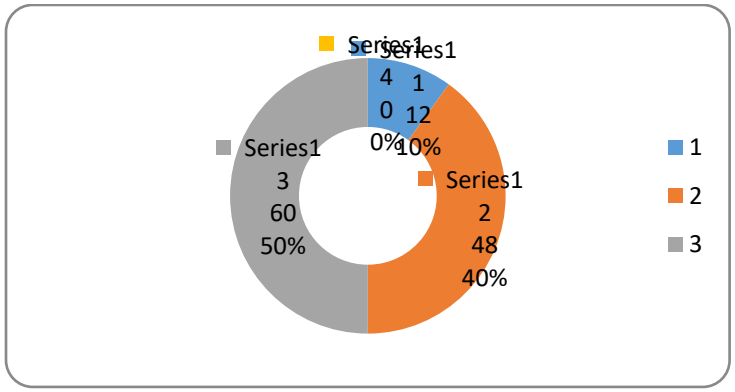
V.CONCLUSION:

Majority of the employees with vast experience, found no significant change in the recruitment policy , of the company in recent times.

Employees were asked about the type of recruitment methodology used in recruitment employees for whom the responses are in the following way.

Options	No. Of. .Respondents	Percentage
Centralized	12	20
Department Recruitment	48	80
Total	60	100

TABLE 7



VI. FINDINGS

- The most significant finding of the study on Recruitment strategy prevailing in the organization is very effective. The employees are quite satisfied with the current recruitment methods.
- The study shows that 76% of the employees who have put in long year of service have recruited via open competition. Which shows the transparency of the recruiting policies of the company?
- 92% of the employees have been working in the organization for a long period which signifies the job security and satisfaction offered by the company to its employees.
- Our study shows that 44% of the employees have joined this organization aiming for career growth, good pay scales, and more benefits which the company offers. Thus the statistics shows that the company has a positive outlook towards the career growth of its employees in addition to the other existing benefits.
- The company's approach to its recruitment policy shows that the right person is very essential for the right job, as nearly 88% of the employees felt that they were offered jobs according to their qualification and experience. Thus setting a relationship between qualification and job offered.
- The study shows that 72% of the employees were of the opinion that the recruitment policy of the company is decentralized with each department recruiting its own employees as per their requirement from the time to time.
- The company gives utmost importance to its manpower requirements by identifying it well in advance taking into consideration the contingencies like retirement, budgetary plans, and attrition rate. The planning of the manpower requirement is being don't in the light of the business plans of the company.The company has been trying to infuse new blood in the organization by appointing fresh graduates and technologists, to set a competitive so as to face the competitive world outside.
- The company has been trying to meet the expectation of its employees by providing job satisfaction to them by offering jobs as per their qualification and experience.

VII. SUGGESTIONS

1. H.R Department should be more practical and efficient so that the recruitment and selection become more effective.

2. Stress should be given on proper maintenance of database of application for future recruitment in the organization.

3. The company should follow new traits / trends in the recruitment process.

4. The stress should be given on knowledge and the experience should be the major criteria for selection of employees.

5. More stress should be given to recruit qualification & skills percentage for scrutinizing the application of prospective candidates.

VIII. CONCLUSIONS

The sources of recruitment in the organization is totally based in both the factors i.e internal and external. The recruitment of the prospective candidate for a particular post is based in experience, age, qualification and percentage in the academic year. The selection process is totally based on skills, communication and technical qualities. The formal interview is conducted by the HRD. After selection the employees are inducted for 1-5 days or more than 15 days.

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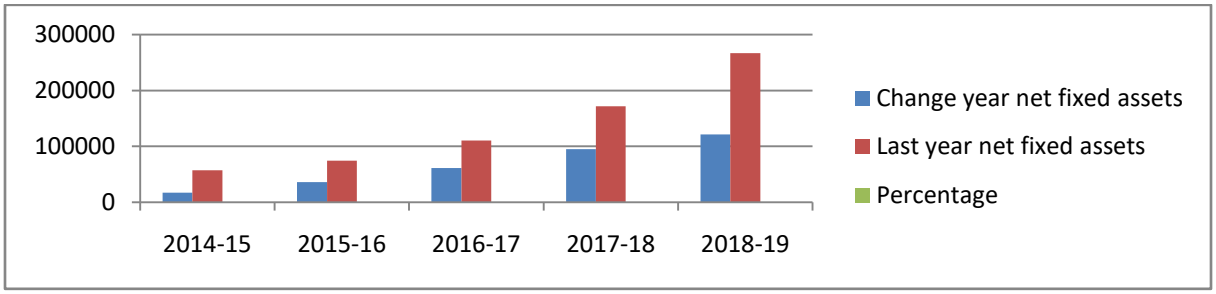
INTERPRETATION: The percentage of net fixed to total assets has consistently increased from 53.78 to 66.83.In the 2018-19 the percentage reached up to 66.83.

TOTAL FIXED ASSETS: change year net fixed assets/ last year net fixed assets AMT IN LAKHS

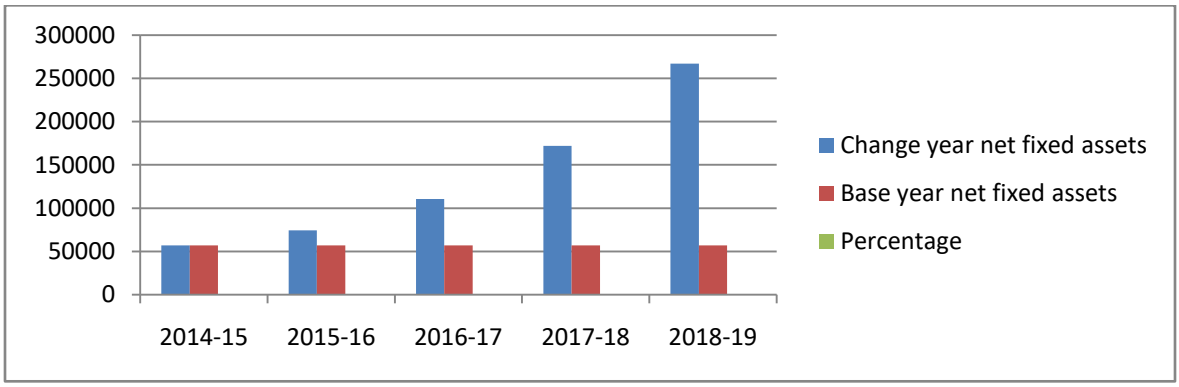
Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	17174	57148	30.10
2015-16	36197	74332	48.70
2016-17	61364	110519	55.22
2017-18	95037	171883	55.29
2018-19	121545	266920	45.54



INTERPRETATION: The level of net fixed assets was low in 2014-15 and increased in next year of 2015-16. But in 2018-19 the percentage decreased from 55.29 to 45.54.

NET FIXED ASSET: current year net fixed / base year net fixed assets AMT IN LAKHS

Years	Change year net fixed assets	Base year net fixed assets	Percentage
2014-15	57148	57148	100
2015-16	74332	57148	130.07
2016-17	110519	57148	193.390
2017-18	171883	57148	300.76
2018-19	266930	57148	467.08



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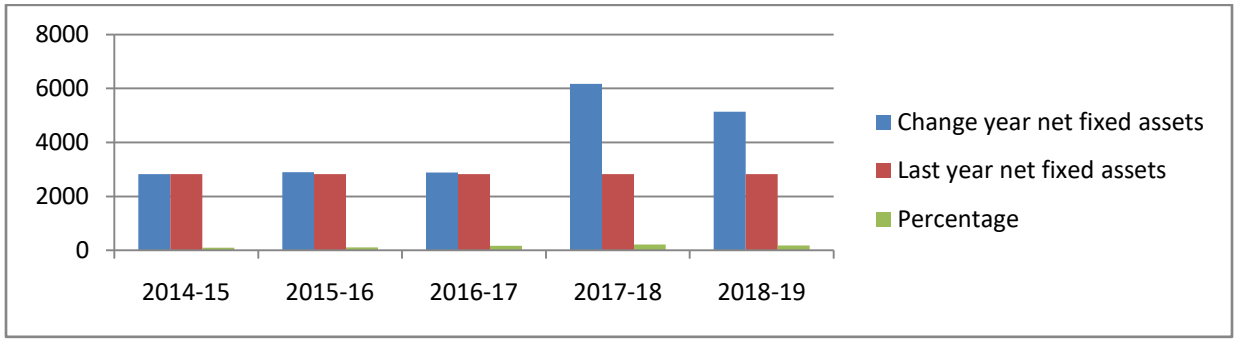
INTERPRETATION: Considering the year 2015-16 as the base year the level of fixed assets as an index show 130.07% change compared to the base year (2013-14=100) and it goes on increased further years. Up to 467.08% in 2018-19.

INVESTMENT: **change year net fixed assets/ last year net fixed assets AMT IN LAKHS**

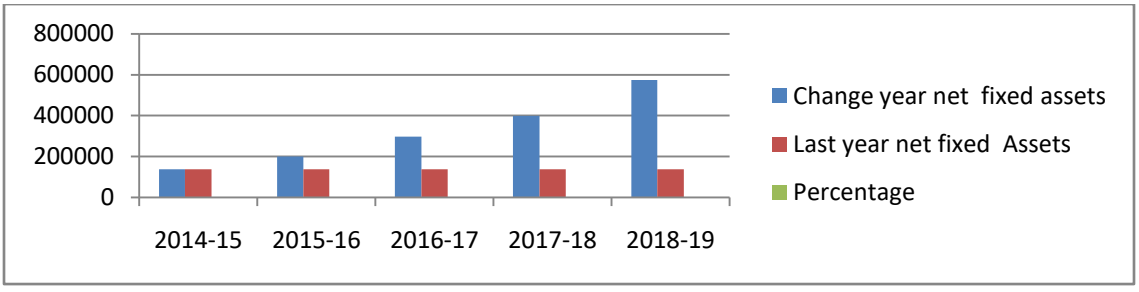
Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	2819	2819	100
2015-16	2902	2819	102.94
2016-17	2887	2819	169.63
2017-18	6178	2819	219.15
2018-19	5143	2819	182.44



INTERPRETATION: In the level of fixed asset of 2014-15 years the percentage was low and later it took a hype in the year 2014-15 and again decreased in 2018-19.

TOTAL ASSETS: CHANGE **year net fixed assets/ last year net fixed asset AMT IN LAKH**

Years	Change year net fixed assets	Last year net fixed Assets	Percentage
2014-15	138205	138205	100
2015-16	200217	138205	114.89
2016-17	297292	138205	215.11
2017-18	399267	138205	288.89
2018-19	575321	138205	416.28



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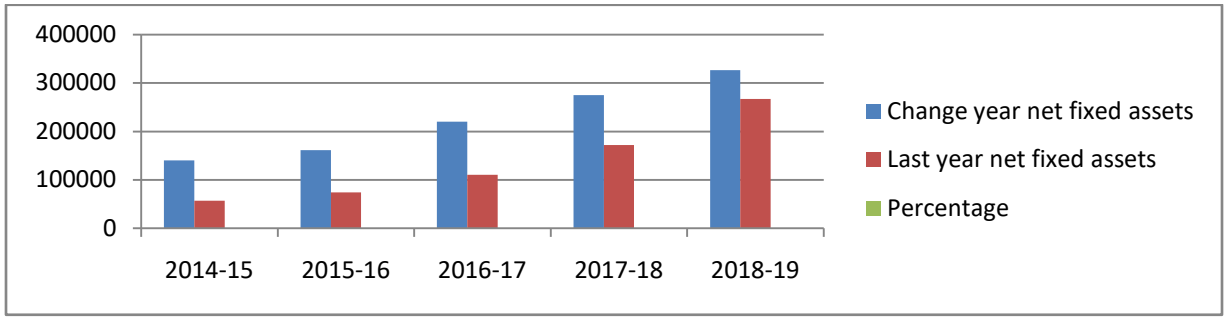
INTERPRETATION: The level of total assets has consistently increased, marginally in between the year 2014-15 and 2015-16. The increase has been significant in between the year 2009-10 and 2014-15 and 2016-17 and 2015-16 and 2018-19.

FIXED ASSET TURNOVER RATIO: Net fixed Assets/last year net Fixed assets. AMT IN LAKHS

Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	140396	57148	245.67
2015-16	161422	74322	217.19
2016-17	220410	110519	199.43
2017-18	275323	171884	160.17
2018-19	326545	266920	122.33



INTERPRETATION: The fixed asset turnover has decreased in between the year 2014-15 and 2018-19 peaking to a minimum of 122.33 during the year 2018-19.

SOLVENCY RATIO:

Solvency ratio to the ability to business to our long term obligation like interest and instalment with long term solvency ratio indicates long term stability on an organization. Lender like financial institution debentures holder, banks who give term loans to the enterprise, are interested in ascertaining the solvency of the organization.

DEBT AND EQUITY RATIO: Long term funds/share holder funds AMT IN LAKHS

years	long term funds	shareholders 'funds	d/e ratio
2014-15	44090	33879	1.3
2015-16	44663	34848	1.2
2016-17	50455	31715	1.59
2017-18	62136	41605	1.49
2018-19	87280	65444	1.33

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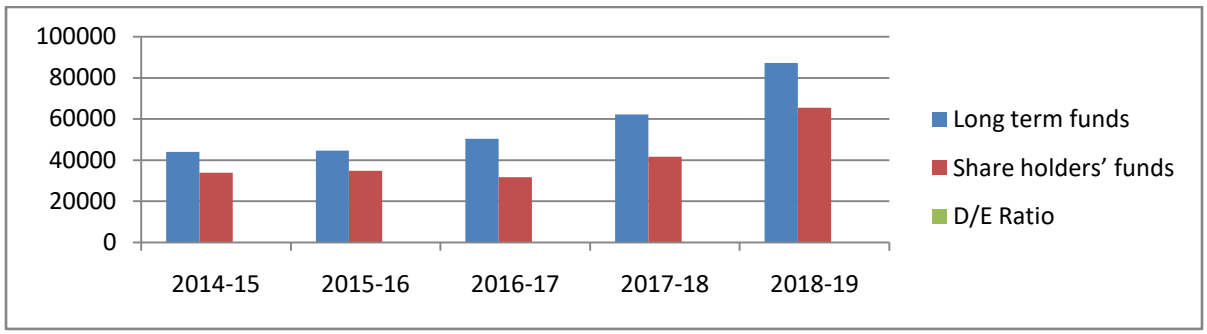
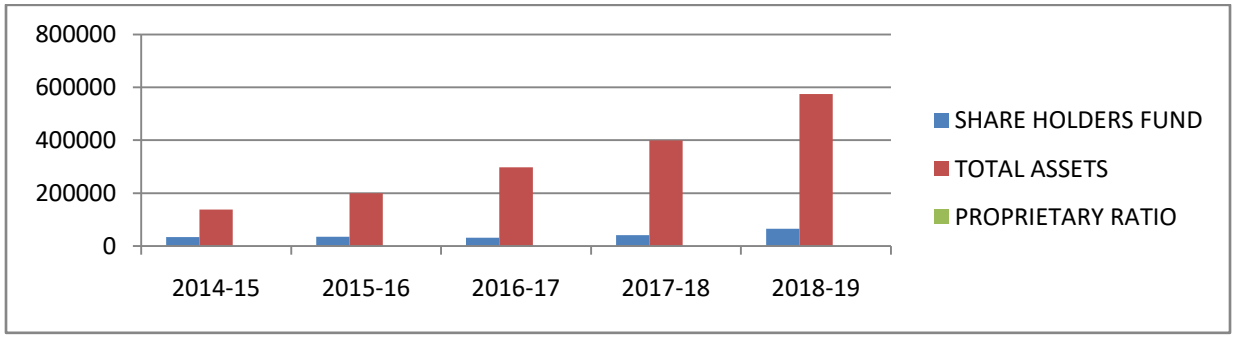


INTERPRETATION: Generally a ratio of 2:1 (2 units of debt and 1 unit of equity) is considered normal. In the case of manufacture concern it is 1.5 :1, in the Kesoram cement limited the debt equity ratio from 2014-15 to 2018-19 is below normal. It indicates that the using less debt for its operations.

PROPRIETARY RATIO:share holder funds/total assets AMT IN LAKHS

years	share holders fund	total assets	proprietary ratio
2014-15	33879	138205	0.245
2015-16	34848	200217	0.174
2016-17	31715	297292	0.1067
2017-18	41605	399267	0.104
2018-19	65444	575321	0.113



INTERPRETATION: The proprietary ratio has slightly decreased in between the year 2014-15 and 2018-19 peaking to a minimum of 11.37during the year 2018-19.

V1.FINDINGS:

1. The total turnover capacity proved well only in FY 2016. The next financial years couldn't resist to even get the margin and failed to employ the assets well.
2. Except for operating efficiency which stood high in FY 2017, other factors tend to dominate in FY2016 only. This is in fact because of the manufacturing costs which were less in FY2016 than that in other 2 years.
3. The firm neither managed margins nor did it attract the investors, as they couldn't get the rate of returns, in FY 2018 and FY 2019.Since the firm managed the manufacturing expenses in FY2016 only, it has an effect on the preceding profit margins because of the sales. Even

though FY2019 managed decent sales, the effect of inventories resulted in the poor performance

V11.SUGESSIONS:

1. Company cash positions needs to be improved.

2. The company must strive for consistency in ROE.

3. The company can take the advantage of leverage by employing further debtors in future when they required additional funds for expansion as the current debtors equity ratio is less than the standards 2:1.The firm has to take steps to convert its inventory into sales within a short time.

V111. HYPOTHESIS:

1. The repercussions of investment decisions of corporations are directly reflected in the growth

Of the company.

2. Liquidity of the corporations is a major contributor to the investing decisions of the company.

3. Self dependence in finance is appositive factor in investment decisions.

1X. CONCLUSION: The turnover of financial assets has not improved much during the years 2014-15 and 2015-16.There is a significant increase in net fixed assets during the years 2007-08 and 2015-16, however is no significant increase in the fixed assets turnover ratio during both of the year 2016-17 and 2017-18.The level of investment in fixed assets needs to proper scrutiny and analysis to ensure efficient utilization of the same. There is a surge in the investment in fixed assets in the range of more than 32654 lacks in 2016-17 and 266920 lacks in 2017-18. This requires close scrutiny and efficient management to result in effective generation of turnover out of the investment made in fixed assets.

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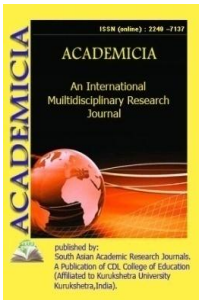

A STUDY ON COMPENSATION MANAGEMENT AT DR. REDDY'S LABORATORIES LTD

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ABSTRACT

The Study on Compensation Management focuses on employees take home profitsfrom the company. It clearly describes the breakup of the employee's salary, hisallowances and facilities provided by the Employer.The Study / research was carried out by a recorded survey of employeesof a particular organization. These records were later analyzed to prepare astatistical data. The Study concluded with the recommendations on theanalysis.

KEYWORDS: *Compensation, Recruitment, Human Resources, Personnel.*

INTRODUCATION

The literal meaning of reimbursement is to counter-balance. In the case of human aid control, compensation is called money and other benefits obtained by using a worker for presenting services to his employer. Money and advantages received can be in distinct forms-base reimbursement in cash and numerous blessings, which can be related to worker's provider to theagency like provident fund, gratuity, coverages cheme and anyother price which the worker receives or blessing she enjoys instead of such charge.

SCOPE OF THE STUDY

Compensation control helps to determine the relative well worth of a job in an organization in a systematic, consistent and correct manner. It also allow sin estimating the primary pay for each task by the importance of the job with in the organizational hierarchy.

Once a simple pay is determined, there wards, incentives, and advantages attached worth the pay, positions and overall performance also are determined.

OBJECTIVES OF THE STUDY

- To understand in detail how to set up pay costs to a unique degree of the employee.

Analysis of the study= Formula:

Number of respondents

 100

Total no. of respondent

2. Recognition & rewards are given based on employee performance.

OPTIONS	NO OF RESPONSES
Strongly agree	18
Agree	48
Neutral	16
Disagree	18

The survey revealed that most of the employees agree and strongly agree for recognition and rewards are given based on employee performance but some are disagreed.

Analysis of the study: Formula:

Number of respondents

 100 Total no. of respondent

3. Do you think that a good employee gets motivated with frequent Compensative pay? Is conducted?

(a) YES (b) NO

s.no	Options	No. of Responses	Percentage
1	YES	44	88
2	NO	6	12
	TOTAL	50	100

% of respondents

88% YES

12% NO

A majority of 88% of the employees said that a good workman gets motivated with frequent Compensative pay and 12% of the employees are not satisfied with above.

Analysis of the study: Formula:

Number of respondents

 100

Total no. of respondent

4. Do you think the reward system is fair and adequate?

(a) YES (b) NO

s.no	Options	No. of Responses	Percentage
1	YES	36	72
2	NO	14	28
	TOTAL	50	100

About 72% said that the reward system is fair and adequate and 28% responded that it is not fair.

Analysis of the study: Formula:

Number of respondents

□ **100**

Total no. of respondent

5. Do you think that incentives are needed for Compensation management programmers?

(a) YES (b) NO

S.NO	**OPTIONS**	**NO OF RESPONDENTS**	**% OF RESPONDENTS**
1	YES	100	100
2	NO	0	0
	TOTAL	100	100

From the above analysis we can say that 100% of the employees feel those incentives are needed for attending Compensation management. 0% of the employees feel those incentives are not needed for training programmers.

Analysis of the study: Formula:

Number of respondents

□ **100**

Total no. of respondent

6. Job provides scope to achieve goals?

Response	**Respondents**	**% of Respondents**
Strongly Agree	20	26.67
Agree	24	32
Neutral	10	13.33
Disagree	12	16
Strongly	9	12

From the above table, it is clear that, 32 % of employees agree that there is scope for achieving goals and 26% of them are strongly is agreed.

Analysis of the study: Formula:

Number of respondents

□ **100**

Total no. of respondent

7. Working under in human working conditions:

Response	Respondents	% of Respondents
Strongly Agree	25	33.33
Agree	30	40
Neutral	11	14.67
Disagree	4	5.33
Strongly	5	6.67

From above table 40% of employees agree with the working conditions are human and 33% of employees strongly agree.

Analysis of the study: Formula:

Number of respondents

□ **100**

Total no. of respondent

FINDINGS

1. Compensation is the Human resource management functions that deal with every type of reward that individuals receive in return for performing organizational task.
2. The compensation management is an organized which is important for balancing the work
3. And employee relationship.
4. In this alignment employee compensation will help organization and employee goals.
5. The balancing the cost of compensation and retaining the employees have become the most important priority for the organization.

SUGGESTIONS

1. They should give direct and indirect compensation to improve competencies of employees.
2. •when employees understand that they can earn more is to perform at higher standard they are generally motivated.
3. Compensation packages with good pay and advantages can help attract and retain the best employees.
4. provide proper refund to the employees for their contributions to the organization and it creates
5. A base for happiness and satisfaction of the workforce.

CONCLUSION

It can be concluded that opportunity for growth and promotion outside, compensation, working conditions, work timings/shifts, relationship with managers, location of the organization, opportunity to use skills and work load are the major reasons for employee turnover.The employer's main goal is structuring compensation and benefits programs. To attract and retaining the right employees needed to help the employer be competitive. Compensation can

increase the productivity of an organization because it provides various rewards, bonus schemes etc.

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PORTFOLIO ANALYSIS:

Expected Return of a Portfolio:

It is the weighted average of the expected returns of the individual securities held in the portfolio. These weights are the proportions of total investable funds in each security.

$$Rp = \sum_{I=1}^{n} x_i R_i$$

Where, R_P= Expected return of portfolio

N= No. of Securities in Portfolio

X_I = Proportion of Investment in Security i.

R_i = Expected Return on security i

Risk Measurement:

The statistical tool often used to measure and used as a proxy for risk is the standard deviation.

$$\sigma = \sqrt{\sum_{i=1}^{N} p\,(ri - E(r))^2}$$

$$\text{Variance}\,(\sigma^2) = \sum^{N} p(ri - E(r))^2$$

$$\text{Here}\ \ \sigma = \sqrt{\text{Variance}\ (\sigma^2)}$$

P = is the probability of security

N = Number of securities in portfolio

ri = Expected return on security

DATA ANALYSIS

PORTFOLIO – A	**PORTFOLIO – B**
TCS	ITC
DR.REDDY	MAHINDRA
SBI	BAJAJ ELECTRICALS

TABLE : Shows average annual market share price for the companies in Portfolio – A and Portfolio- B forthe years 2010 to 2019

	PORTFOLIO -A			**PORTFOLIO-B**		
Year	**TCS**	**DR.REDDY**	**SBI**	**BAJAJ ELEC.**	**ITC**	**MAHINDRA**
2019	2100.35	2704.87	308.92	444.89	270.16	612.23
2018	2427.84	2309.76	275.15	542.25	278.44	824.91
2017	2475.36	2549.38	285.59	344.28	277	1324.03
2016	2419	3112.15	219.07	225.38	285.57	1310.06

2015	2537.39	3603.92	266.61	243.05	334.01	1252.41
2014	2369.28	2822.36	1997.59	273.68	347.3	1151.7
2013	1691.39	2149.51	1975.24	174.99	320.72	901.74
2012	1238.04	1690.03	2106.94	190.99	248.27	754.16
2011	1116.43	1566.86	2279.52	216.33	190.05	720.52
2010	862.52	1401.76	2524.05	283.32	227.36	745.26

CALCULATION OF RETUN AND RISK

Expected return and risk are calculated as shown below for BAJAJ ELECTRICALS

EXPECTED RETURN = 2939.2/10 = 293.92=X'

$(X-X')^2$ = 125565.51, RISK = Sq root of (125565.51) = 354.35

THE RISK AND RETURN OF EACH COMPANY

PORTFOLIO A

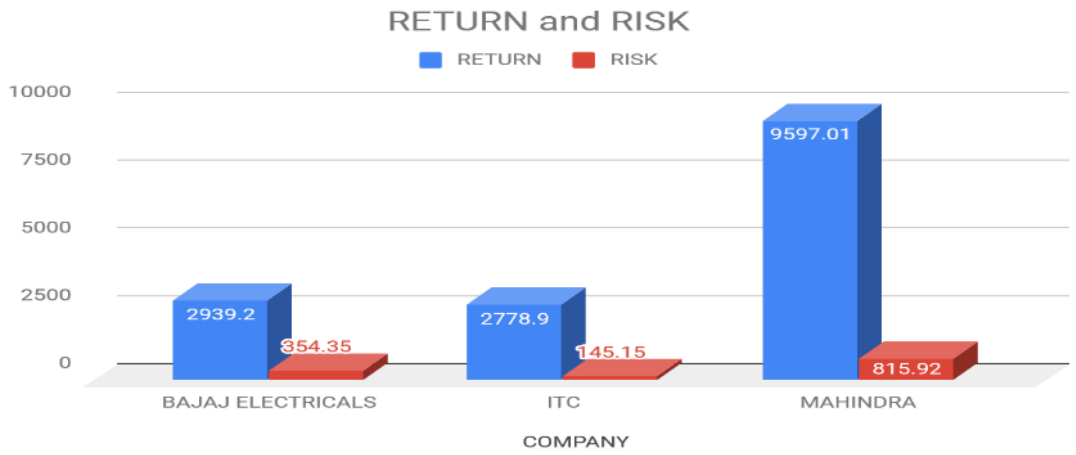
SL .No	COMPANY	RETURN	RISK
1	TCS	19237.6	1926.67
2	DR.REDDY	23910.6	2124.85
3	SBI	12238.7	3048.18



The above graph shows share price movement could explain volatility for selected company reveals whether it's good performance or not. Markowitz an efficient portfolio is one with "Minimum risk, maximum profit" therefore; it is advisable for an investor to work out his portfolio in such a way where he can optimize his returns by evaluating and revising his portfolio on a continuous basis.

PORTFOLIO B

SL .No	COMPANY	RETURN	RISK
1	BAJAJ ELECTRICALS	2939.2	354.35
2	ITC	2778.9	145.15
3	MAHINDRA	9597.01	815.92



From the above figures, it is clear that in total there is a less return on portfolio A companies when compared with portfolio B companies. But at the same time if we compare the risk it is clear that risk is less for companies in portfolio A when compared with portfolio B companies. As per the Markowitz an efficient portfolio is one with "Minimum risk, maximum profit"

therefore, it is advisable for an investor to work out his portfolio in such a way where he can optimize his returns by evaluating and revising his portfolio on a continuous basis.

FINDINGS:

- The investor can recognize and analyze the risk and return of the shares by using this analysis.
- The investor who bears high risk will be getting high returns.
- The investor who is having optimum portfolio will be taking optimum returns with minimum risk.
- The share values are standard for every year it is changing day to day.
- The profitability of the investor is related to his selection of portfolio.
- The fluctuations always effect the returns of the investors and increase the risk to the investor than expected.

CONCLUSIONS:

A portfolio is the collection of different securities and assets by which we can satisfy the basic objective "Maximize yield minimize risk. Every company faces fluctuations of share price in market despite their favorability or if they are in blue chip companies.So, In the study we analyze two portfolios to help investors make a great profit by taking informed decision. TCS, DR.REDDY, SBI are in portfolio A and BAJAJ ELECTRICALS, ITC , MAHINDRA are in portfolio B. In the analysis we conclude that portfolio A have high return compare to the risk,

while portfolio B has less return compare to the risk.By the analysis in the study of portfolio management it is clear that the analysis of portfolio plays a vital role in the investment process and helps the investor to increase his profit.The main factor is that the investor should always be in contact with the market, if not he will face the losses.

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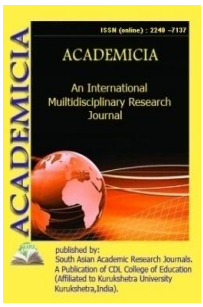

A STUDY ON CUSTOMER RELATIONSHIP MANAGEMENT AT AIRTEL COMPANY

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ABSTRACT

Customer relationship management (CRM) is a combination of people, processes and technology that seeks to understand a company's customers. It is an integrated approach to managing relationships by focusing on customer retention and relationship development. CRM has evolved from advances in information technology and organizational changes in customer-centric processes. Companies that successfully implement CRM will reap the rewards in customer loyalty and long run profitability. However, successful implementation is elusive to many companies, mostly because they do not understand that CRM requires company-wide, cross-functional, customer-focused business process re-engineering. Although a large portion of CRM is technology, viewing CRM as a technology-only solution is likely to fail. Managing a successful CRM implementation requires an integrated and balanced approach to technology, process, and people. The main objective of the project is to study to examine and analysethe CRM of airtel with the final customer satisfaction.With the sample size of 100 and statistical methods is bar graphs and the statistical tools used isChi square test. The variables used are dependent variable are customer relationship management and independent variables are domestic factors {age, income, customer type}.

KEYWORDS: *Customer Relations, Business Process Re-Engineering, Relationship Marketing, Integration.*

INTRODUCTION:

Customer relationship management (**CRM**) is an approach to managing a company's interaction with current and potential customers. It uses dataanalysis about customers' history

with a company to improve business relationships with customers, specifically focusing on customerretention and ultimately driving sales growth.

One important aspect of the CRM approach is the systems of CRM that compile data from a range of different communication channels, including a company's website, telephone, email, live chat, marketing materials and more recently, social media. Through the CRM approach and the systems used to facilitate it, businesses learn more about their target audiences and how to best cater to their needs.

OBJECTIVES OF THE STUDY:

1. To study the factors related to Customer relationship management in AIRTEL.
2. To examine the factors those are related with AIRTEL.
3. To analyze the Customer relationship management of aitel with the satisfaction of the final consumer.

REVIEW OF LITERATURE:

McKenna 1991; Shani and Chalasani 1991 Relationship marketing attempts to Involve and integrate customers, suppliers and other infrastructural partners into a firm's developmental and marketing activities.

Wilson (1995) summarized different relationship variables that affect the relationship of firm with different stakeholders, those variables are Commitment, Trust, Cooperation, Mutual Goals, Interdependence and Power, Performance Satisfaction, Structural Bonds, Comparison Level of Alternatives, Adaptation, Non-retrievable Investments, Shared Technology, and Social Bonds.

Morgan and Hunt (1994), while discussing relationship variables focused more on commitment and trust as a major variable affecting relationship between different parties involved in marketing transaction & exchange.

DATA COLLECTION METHOD

PRIMARY DATA: The crux of the study is based on the information collected from the respondents with the help of questionnaires. The primary source of information has been consumers who have filled up the questionnaire. Consumer who interviewed separately and the respondents noted down in the questionnaire for the purpose.

SECONDARY DATA: Information has also been borrowing from both internal sources such as company records and external sources like journal, magazines and internet.

RESEARCH TOOLS: A set of questions were provided to customers in order to gain information about the perception of the consumer towards Airtel.

SAMPLE SIZE: 100

STATISTICAL TOOLS: Chi square test.

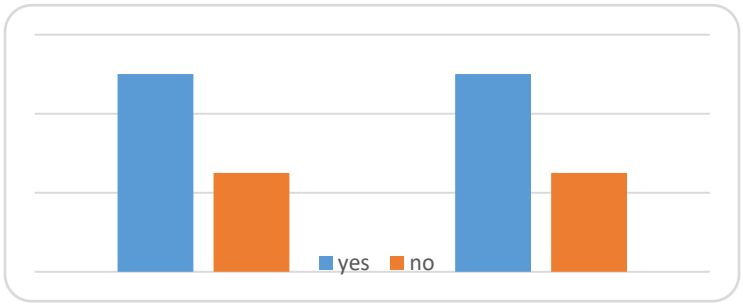
VARIABLES: Dependent variable - Customer relationship management. Independent variable-domestic factors {age, income, customer type}.

DATA ANALYSIS AND INTERPRETATION:

This study was undertaken to analyze the effect of Customer relationship management on consumer preference on purchase branded products.

1. Would you like to recommend this product to others?

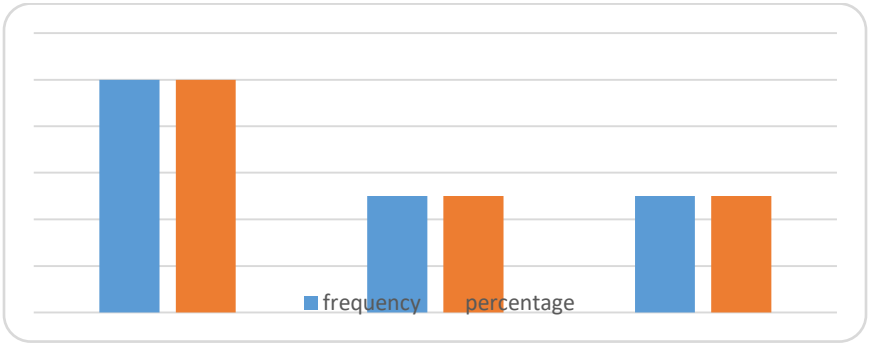
	FREQUENCY	CALCULATE	PERCENTAGE
Yes	91	91*100/100	91%
No	9	9*100/100	9%
Total	100		100



Interpretation: When the people were asked whether they would recommend this product to others 91 people that is 91% replied they would recommend this product to others, 9% replied in a negative way.

2. Do you know the logo of Airtel?

	FREQUENCY	CALCULATE	PERCENTAGE
Yes	50	50*100/100	50%
No	25	25*100//100	25%
Not Sure	25	25*100/100	25%
Total	100	100	100



Interpretation: When the sample was asked whether they know the logo of Airtel or not 50 people out of 100 people that is 50% replied that they know the logo of Airtel and 25% of the sample that is 25 people said they do not know the logo of Airtel and 25% were not sure.

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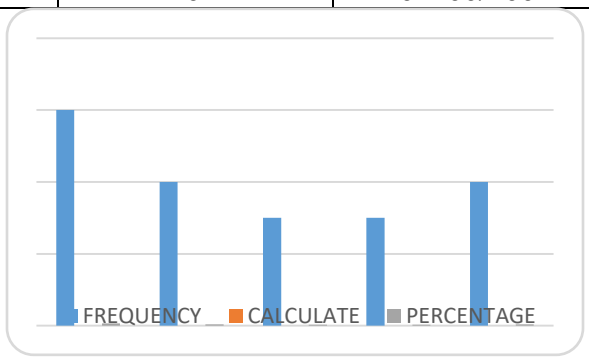
3. Why do you want to purchase this brand?

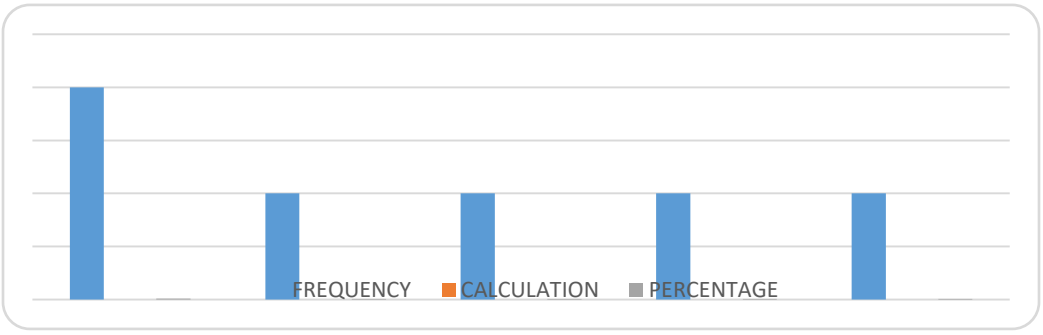
	FREQUENCY	CALCULATE	PERCENTAGE
Mileage	30	30*100/100	30%
Price	20	20*100/100	20%
Comfort	15	15*100/100	15%
Style	15	15*100/100	15%
Others	20	20*100/100	20%



Interpretation: When the sample was asked why do they want to purchase the brand Airtel or what is the attribute which enforces him or her to make the purchase decision 15% responded they were by the the product, 15% mention that the were using by the network and 20% gave the other reasons and the factors like price and network were highlighted very high by the respondent.

4. Opinion of people of different age groups on Airtel**?**

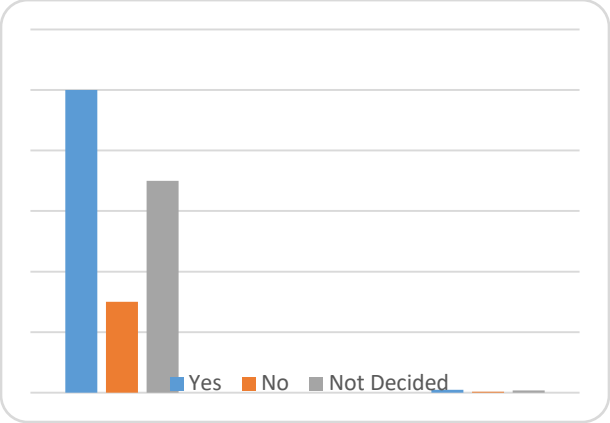
	FREQUENCY	PERCENTAGE
20-30	20	20%
30-40	30	30%
40-50	15	15%
50-60	20	20%
60 and above	15	15%



Interpretation: The analysis for this was taken with the help of open ended question and the people who were surveyed went a long way describing their wishes for and the highest rate of preference is made by 20-30 age group people and the preference rate was same in other age group people.

5. Do you wish to purchase Airtel network?

	FREQUENCY	CALCULATE	PERCENTAGE
Yes	50	50*100/100	50%
No	15	15*100/100	15%
Not Decided	35	35*100/100	35%



Interpretation: when the sample was asked about their wish to purchase the product 50% of the total sample that is 50 people replied that they wish to purchase the product, 15% that is 15 people said they do not wish to purchase the product and 35% replied that they have not decided anything regarding the product, after the analysis we came to know that the those who wanted to buy the merchandise is extremely high

STATISTICAL ANALYSIS:

HYPOTHESIS TEST:

H0: There is no relation between Customer relationship management and Customer satisfaction.

H1: There is relation between Customer relationship management and Customer satisfaction.

CHI SQUARE TEST:

O	E	[O-E]	[O-E)2/e
20	33	-13	5.12
30	33	-3	0.27
15	33	-18	9.81
20	33	-13	5.12
15	33	-18	9.81
Total			30.13

Chi square test- 30.13

Table value- 5.95

CONCLUSION: calculated value of chi square value is 30.13 is more than table value 5.97 where H0 is rejected and H1 is accepted. Hence there is relationship between brand loyalty and customer satisfaction.

FINDINGS:

1. Most of the respondents were aware by the internet and suppliers (63%). E magazines (25%) also helped in providing information to the respondents.
2. 82% of the respondents were aware of AIRTEL brand.
3. In advertisement media magazines (25%) were much affective and internet was only a major advertising media.
4. Many factors like word of mouth advertising were responsible for influencing the customers to buy AIRTEL products.
5. 30% of the customers were very much satisfied with AIRTEL products Where as 60% was satisfied with AIRTEL products.
6. 39% of the respondents were satisfied with the service of the AIRTEL T.
7. After sales service at door step 38% was one of the factors which help the purchaser to buy the AIRTEL product**.** Prompt service 52% also help to attract the purchaser.
8. 54% of the respondents considered the price of the AIRTEL product as higher where as only 8% considered as economical and 38% of the respondent said it as reasonable.

SUGGESTION:

1. The respondents are satisfied with the overall service provided by their dealers.
2. According to the survey, many respondents are satisfied with the quality of other services provided by the dealers.
3. Some of the respondents opined that the value added features like printer beep sound should be improved so as to enhance its comfort ability.
4. According to the study, many respondents in the age group of 30-50 years prefer Handheld billing machines at their outlets. These groups of people are basically self-sufficient.
5. The quick response of the company towards after sales service, which contributed for the increase in the prosperity.
6. Despite of increase in the continuous sales of AIRTEL, they are still maintaining good customer relations with the help of marketing research and service as their tools.
7. Many respondents feel that the price as well as the size of the machine is most suitable to business men who issues a ticket or a token or a bill as it suits to the average income level of the person..
8. A majority of the respondents feel that there shouldn't be any changes to be made to the application, as they feel that the POS APP is tailor made for them.
9. The dealers responsiveness towards the customers related to service should be more effective in order to maintain the reputation of the company.
10. Half of the customers give their machine for servicing and software updating according to their convenience. This shows that most of the customers use the machines with ease and is user friendly.

11. Due to the accuracy of the post sales service of the company, most of the respondents are satisfied.

CONCLUSION:

Most of the people are satisfied with the features of the POS machine and does not want any changes to be made to it. As far as small electronic manufacturing industry is concerned, we can say that AIRTEL is the brand leader in India as compared to the other brands. Many customers are opined that they did not face any major technical problem with the machine from the time of purchase till date. This made a positive referral for others. Many respondents also feel that the maintenance cost of the POS machine is also affordable. This enables the customer to use the machine on regular basis and in more numbers When asked about which billing machine you would prefer next, many customers said that they would go for AIRTEL itself for the next purchase. This shows the image of the company as well as the customer's belief in the company. Some of the customers also felt that the CRM service of the POS machine should be made more efficiency with addition of innovative services. Many customers complained about the other services that are provided to the POS machine like beep sound when the printer is opened. They feel that these features should be improved in order to make it more efficient. According to the respondents, they feel that AIRTEL POS machine is the most efficient billing machines in comparison of other small and large billing machines. Due to the affordability nature of the car i.e., economical pricing, which is inspiring the respondent to go for this car. Overall we can conclude that AIRTEL is the brand leader in the Indian market as far as small electronic billing device manufacturing industry is concerned providing maximum satisfaction to its customers.

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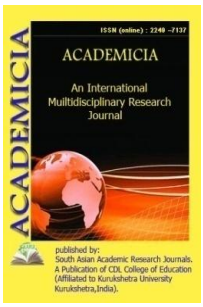

A STUDY ON EMPLOYEE WELFARE AT K.P.R. Pvt. Ltd

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ABSTRACT

Human Resourse must recruit talent for all areas of the operation in a cost-effective and timely manner. Employee welfare is the most important machinery in any organizations to get the productive result from the workers. The main objective of the study is to analysis and interpreting the statutory and non statutory methods of employee welfare measures in the K.P.R.Pvt.ltd. The research tools used in this project is correlation. The Sample size taken is 100 among 260 employee with a ratio of 1:1.26. labour welfare raises the company's expenses but if it is done correctly, it has huge benefits for both employer and employee.

KEYWORDS: *Welfare Measures, Employee Satisfaction, Statutory Methods, Non Statutory Methods.*

I. INTRODUCTION

Employee welfare defines as "efforts to make life worth living for workmen". These efforts have their origin either in some statute formed by the state or in some local custom or in collective agreement or in the employer's own initiative.

- To combat trade unionism and socialist ideas.
- To build up stable labour force, to reduce labour turnover and absenteeism.
- To develop efficiency and productivity among workers.
- To make recruitment more effective (because these benefits add to job appeal).

II. OBJECTIVES OF THE STYDY

- To study the safety and welfare measures of the employee.
- To adopt suitable measures for the improvement of employee performance.
- To find the level of satisfaction of employee about the facilities given by the company.

III. RESEARCH METHODOLOGY

Definition

The Advanced Learner"s Dictionary of current English lays down the meaning of Research as, "A careful investigation or enquiry specially through search for new facts in any branch of knowledge."

Research Methodology

Research methods may be understood as al l those methods/techniques that are used for conduction of research. Research methodology is a way to systematically solve the research problem.

Sources of data

Primary data

Data collected from questionnaire. Informal interviews conducted with employees.

Secondary data

Secondary data are those data have been already collected someone else and which have been approved. Secondary data were collected from company journals, website.

Sampling method

The samples were selected by convenient sampling method. This is the method where the items that are most conveniently available are selected as part of the sample

IV. REVIEW OF LITERATURE

The ILO (International Labour Organization) defined, "welfare as a term which is understood to include such services and amenities as may be established in or the vicinity of undertaking to perform their work in healthy, congenial surrounding and to provide them with amenities conductive to good health and high morale". According to Arthur james Todd, "welfare as anything done for the comfort or improvement and social of the employees over and above the wages paid, which is not a necessity of the industry".

V. ANALYSIS OF STUDY

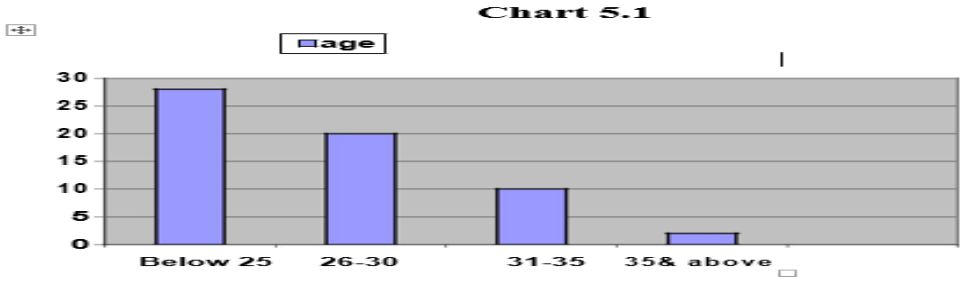
DATA ANALYSIS AND INTERPRETATION

TABLE NO:5.1

Age Group

S.No	Age group	Number of respondants	% of respondants
1	Below 25	28	46.7
2	26-30	20	33.3

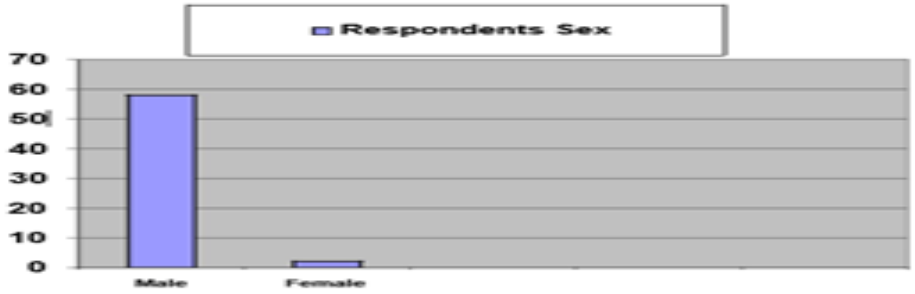
3	31-35	10	16.7
4	35 above	2	3.3
	total	60	100



In industrial sector workers are working in different age group starting from Below 25 to 35& above years. So, the age factor of workers determine their involvement, concentration and performance. The above table points out that, most of the respondents 46.7% are in the age group of Below 25, 33. 3% of respondent are in the age of 26-30 ; 16.7% of respondent are in the age of 31-35; 3.3% of respondent are in the age of 35% above.

TABLE NO: 5.2 RESPONDENTS SEX

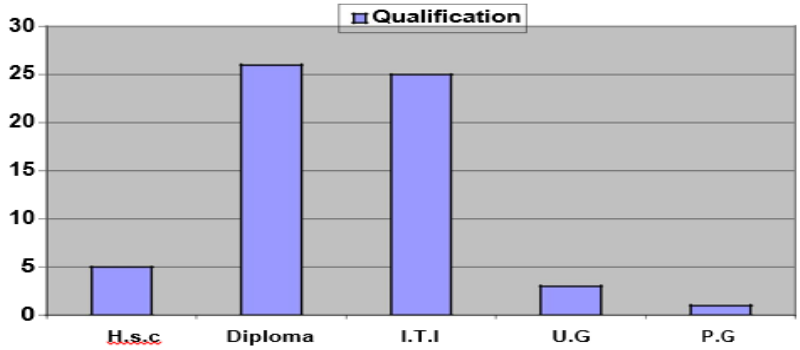
S.NO	**Sex**	**Number of Respondants**	**% of Respondants**
1	Male	58	96.7
2	Female	2	3.3
	Total	**60**	**100**



Most of the respondents (96.7%) are in sex group of male.(3.3%) of respondents are in sex group of female.

TABLE NO: 5.3 RESPONDENTS QUALIFICATION

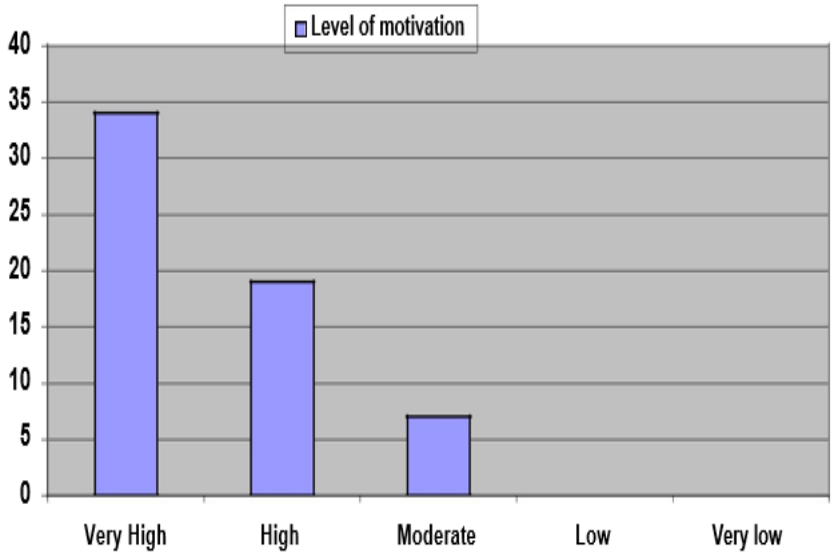
S.No	Qualifications	Number of Respondents	% of Respondants
1	H.S.C	5	8.3
2	Diploma	26	43.3
3	I.T.I	25	41.7
4	U.G	3	5
5	P.G	1	1.7
	TOTAL	60	100



The above table shows that, most of the respondents (1.7%) have studied P.G,(5%)of the respondents have studied U.G.(.41.7%)of the respondents have studied ITI (43..%) of the respondents have studied diploma and (8.3%) of the respondents have studied in H.s

TABLE 5.4 LEVEL OF MOTIVATION GIVEN TO EMPLOYEE

S.NO	Level of Motivation	No.of Respondents	% of Respondents
1	Very high	34	56.7
2	High	19	31.7
3	Moderate	7	11.6
4	Low	0	0
5	Very Low	0	0
	Total	60	100



From the table it infers that 56.7%of respondent are Very high motivated and 31.7% of respondent are high motivated.11.6% of respondent are moderate.

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TABLE 5.2.1 WEIGHTED AVERAGE FOR RANK THE WELFARE FACILITIES PROVIDED IN THE ORGANIZATION

NO	FACILITY	No. of respondents
1	Safety measures	16
2	Medical facility	13
3	Uniform facility	12
4	Education facility	5
5	Rest room	6
6	Drinking water	8

Formula:

X = WX/W

W = number of respondents

X = rating given by the respondent

Table 5.2.2

RANK	WEIGHT	X1	WX1	RANK
1	6	16	96	1
2	5	13	65	2
3	4	12	48	3
4	3	5	30	4
5	2	6	12	5
6	1	8	8	6
TOTAL		60	259	4.31667

X = 256/60

=4.31667

Inference:

From the above table most of the respondents are satisfied with welfare facilities given by organization

TABLE 5.2.3 WEIGHTED AVERAGE FOR RANK THE WELFARE FACILITIES PROVIDED IN THE ORGANIZATION INFRA STRUCTURAL FACILITY

	H.S	S	Neutral	D.S	H.D	Total
Rest room	12	22	16	7	3	60
Ventilation	16	20	15	5	4	60
Lighting	13	24	12	8	3	60
Toilets	10	24	12	8	6	60
Working environment	10	30	13	5	2	60

Weighted average for rank the Infra structural facilities provided in the organization.

Formula:

$$X = \frac{W1x1}{W}$$

Where:

W- Total No. respondents

W1- NO of respondents

X1- rating given by the respondents

X	W	X1	WX1	X2	WX2	X3	WX3	X4	WX4	X5	WX5
1	5	12	60	16	80	13	65	10	50	10	50
2	4	22	88	20	80	24	96	24	96	30	120
3	3	16	48	15	45	12	36	12	36	13	39
4	2	7	14	5	10	8	16	8	16	5	10
5	1	3	3	4	4	6	6	6	6	2	2
Total		60	213	60	219	60	219	60	204	60	221
W	3.55			3.65		3.65		3.4		3.68	
RANK	IV			II		II		V		I	

From the above table most of the respondents are satisfied Infra structural facility in working environment.

ANALYSIS OF EXPERIENCE OF THE EMPLOYEE'S & DO YOU NEED A SORT OF WORKER

USING CHI-SQUARE TEST

HO: There is no significant difference between Experiences for the Employee's & need a sort of worker

H1: There is significant difference between Experiences for the Employee's & need a sort of worker

TABLE 5.2.4 OBSERVED FREQUENCY:

		Do you Need a sort of worker		Total
		Temporary	Permanent	
Experience	Below 1yrs	6.2	5.8	12
	1-3 yrs	4.65	4.35	9
	3-6 yrs	4.03	3.77	7.8
	Above 6yrs	3.72	3.48	7.2
Total		18.6	17.4	36

CHI-SQUARE TEST

		Do you Need a sort of worker		Total
		Temporary	Permanent	
Experience	Below 1yrs	16	4	20
	1-3 yrs	8	7	15
	3-6 yrs	5	8	13
	Above 6yrs	2	10	12
Total		31	29	60

FORMULA: Σ

= (0-E)^2 /E

O – Observed value

E – Expected value

O	E	(0-E)2	(0-E)2/E
16	6.2	**96.04**	**15.49**
4	5.8	3.24	0.56
8	4.65	11.22	2.41
7	4.35	7.02	1.61
5	4.03	0.94	0.23
8	3.77	17.89	4.75
2	3.72	2.96	0.80
10	3.48	42.51	12.22
TOTAL			38.07

Calculated value: 38.07

Degree of freedom = (C-1) (R-1)

= (2-1) (4-1)

= 1X3

= 3

Table value: 7.815

Ho accepted:

Since calculated value 38.07 for degree of freedom at 5 % level of significant is greater than the table value 7.815 there fore the hypothesis is not accepted.

VI. CONCLUSION:

Employers are more than willing to understand the employee's requirement and design their welfare packages and employee benefits programmers accordingly. The time for them to understand the changes in employee needs and bridge the gap. Employers should understand what employees want and compensate them accordingly.

- What employee want :
- Proper environment
- Transport facilities
- Canteen facilities.
- Preventive guidance chart.

Thus the focus of welfare polity should be on these factors. If the organizations want to achieve the aim of attracting and retaining suitable talent from the labour market.

VII. FINDINGS

- 46.7% of the respondents are belonging to the age group of 35 & above.
- 96.7% of the respondents are male.
- 43.3% of the respondents are studied Diploma.
- 41.7% of the respondents are having above 1-3 years of experience.
- most of the respondents are having 5000 and above of monthly salary.
- In weighted average method most of the employees are satisfied with the rewards given by the company

VIII. SUGGESTIONS

The employee's felt that the transport facility is inadequate. The company can arrange additional transport facility so that the employee's will be able to come to the company without much strain.

The manager can adopt various motivation technique to motivate the employee's working in night shift.

The company have to increase welfare measures to the employees.

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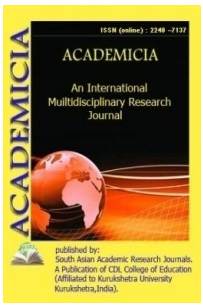

A STUDY ON INVESTORS PERCEPTION TOWARDS ONLINE TRADING AT JRG SECURITIES

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ABSTRACT

Generally, the personal savings of an individual along with contributions from friends and relatives are the source of fund to begin new or to expand existing business. This might not be feasible in case of large projects as the required contribution from the entrepreneur (promoter) would be very large even after availing term loan; the promoter might not be able to bring his or her share or equity capital. Thus availability of capital can be a major constraint in setting up or expanding business on a huge scale. This study aimed at measurement of perception of investors towards online trading with reference to JRG solutions.

KEYWORDS: *Investor Perception, Online Trading, Securities, Equity Capital*

1. INTRODUCTION

Apart from shares, there are many other financial instruments (securities) used for raising capital. Debentures or bonds are debt instruments that pay interest over their lifetime and are utilized by corporate to raise medium or long-term debt capital. If you prefer fixed income, you may invest in these instruments, which may give you higher rate of interest than bank fixed deposit, due to the higher risk. Besides, equity and debt, a mixture of these instruments, like convertible debentures, preference shares are also issued to raise capital. The market is supervised by SEBI. It ensures supply of quality securities and non manipulated demand for them. It develops best market practices and takes enforcement actions against the miscreants. It essentially maintains discipline in the market to ensure that the participants can undertake transaction safely.

2. OBJECTIVE OF THE STUDY

1. To know about investor perception towards online trading
2. To study about the online trading system in Indian stock market

3. To analyse the factor influences on investors perception on online trading

3. NEED OF THE STUDY

The processing of this order is implemented at appropriate timings since the hosts of the internet trading portal are connected to the chosen banks and stock trades though out twenty five hours.

The investments made are secure and Secured and gain is earned at appropriate time with no dispute.

- Online trading upgrades are also supplied to both investors and about the current grade of the orders through the port or email.
- The investors increase stocks and Make advancement into the corporation.

4. SCOPE OF THE STUDY

People whom returns are most important are ready to take risk to earn fair risk. The preferred mode of investment over here is shares and mutual fund. The risk factor in these modes of investment is basically the returns are performance based.

5. RESEARCH METHODOLOGY

This study considered the information from the official website of JRG SECURITIES LTD, 5paisa.com, magazines, journals, other companies websites as a source of secondary data.

Sample design:

The actual sample was selected of such who are the customers visitors of JRG SECURITIES LTD, Boring Camera Street Branch, as per convenient level.

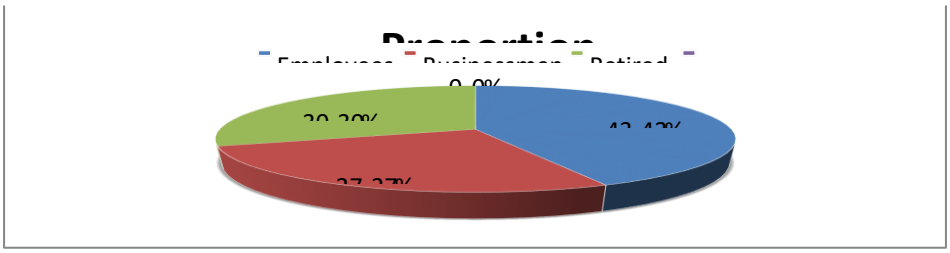
LIMITATIONS

1. Most of investors are not responding properly and
2. Sample is limited to 100 respondents only

6. DATA ANALYSIS

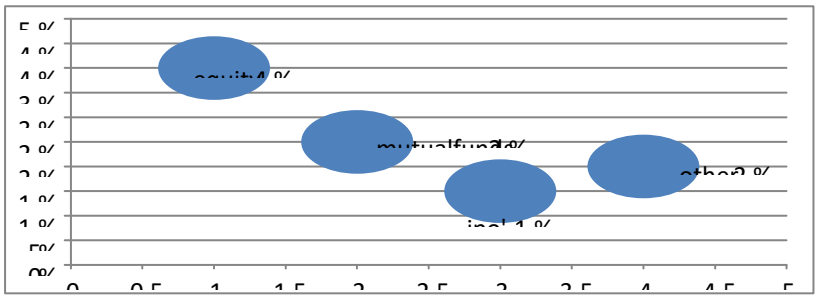
what is your profession?

Category	No. Of People	Percentage
Employees	43	43%
Businessmen	27	27%
Retired	30	30%
Total	100	100%



Ø 43% of the customer surveyed in Sri Gangbanger who visited the branch of JRG Securities ltd belongs to Govt. employees or salaried person 27% are businessmen and rest are the 30% retired persons.

Q8. How do you invest your money?

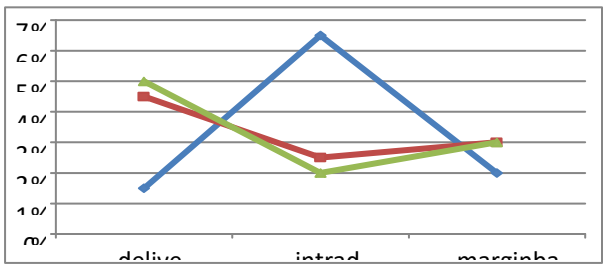


Category	No. Of People	Percentage
Equity	40	40%
mutual funds	25	25%
IPO's	15	15%
other	20	20%
Total	100	100%

Interpretation:

- The survey show that 40%invest money in equity,25% mutuslfunds,20%others and 15%Ipo'S.

What type of trading do you prefer?

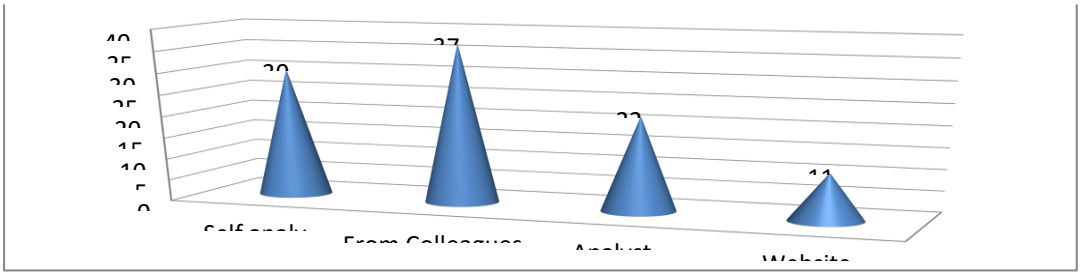


Category	Businessmen	Salaried	Retired
Delivery	15%	45%	50%
Intraday	65%	25%	20%
Margin based	20%	30%	30%

Interpretation:

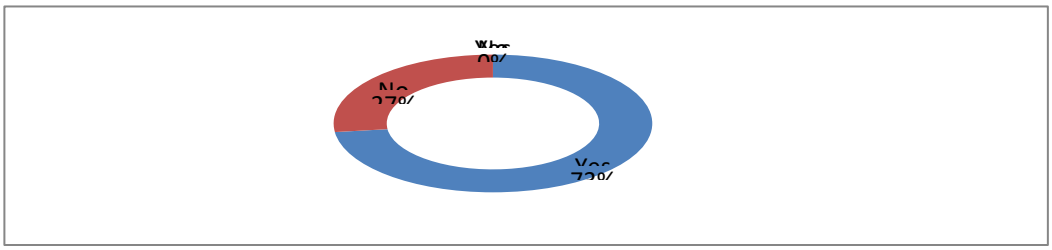
The survey show that 65% of the businessmen do intraday trading and 20% does margin based trading only 15% of the businessmen does delivery based trading as they like to earn more in less time .

How do you choose to invest in a particular type of



Category	No. Of People	Percentage
Self analyze.	30	30%
From Colleagues	37	37%
Analyst	22	22%
Website	11	11%
Total	100	100%

Interpretation: Survey show that 37% people invest ask to some of your colleagues,30% self analy,22% analyst and rest 11% from website. are you satisfied with JRG Securities ltd as a breakage house?

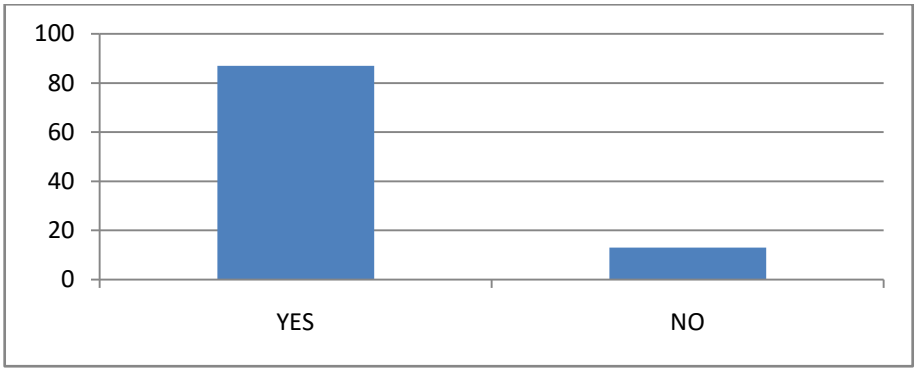


Category	No. Of People	Percentage
Yes	73	73%
No	27	27%
Total	100	100%

Interpretation: Only a proportion of 73% of individuals are satisfied with JRG Securities Ltd rest 27% individuals are not aware of the various facilities provided by JRG Securities such as research tips, margin ,free software facility, services of RM's etc that is why they are not satisfied with JRG SECURITIES ltd.

DO YOU CONSIDER ONLINE TRADING IS EFFORTLESS AND FAST WAY REGARDING TRADING?

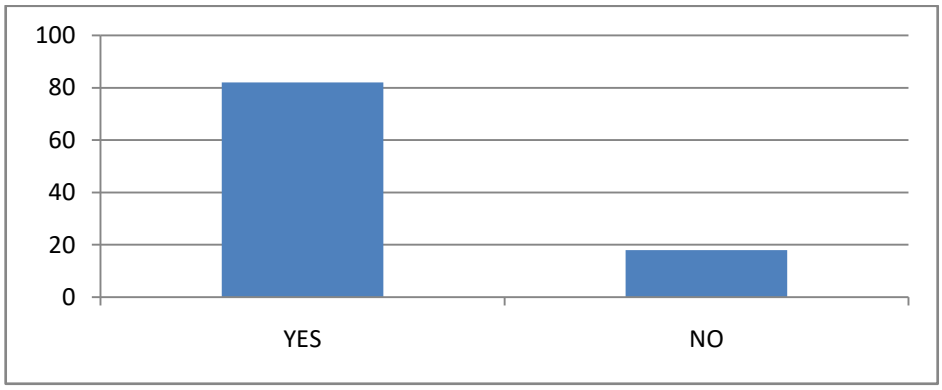
Category	No. Of People
YES	87
NO	13



Highest persons say that on-line buying and selling is straightforward and quickly means of trading while 13 persons say it is usually not easy and quickly way of trading

DO YOU CONSIDER INTRODUCTION OF ONLINE BUYING AND SELLING HAS HELPED IN APPEALING TO THE NEW INVESTORS HENCE INCREASING THE TRADING AMOUNTS AT STOCK MARKET?

Category	No. Of People
YES	82
NO	18



Concerning 82 persons feel of which online trading has aided in attracting the fresh investors while 18 persons believe it will not attract fresh investor.

7. FINDINGS

This analysis contributes to our understanding that every investor is different, with different financial goals, different tolerances to risk, different personal circumstances and different desires. The Objectives being the kind of return being sought, while constraints include factors such as time horizon, how liquid the investor is, any personal tax situation and how risk is handled. Uneducated mass do not have much information regarding the stock market but invest in stock market based on the saying of other. Businessmen make more investment in stock market whereas a salaried investors are busy at work during the week and consider trading decisions mainly during the weekend and consequently they are more likely to trade (either buy or sell) on Mondays.

8. SUGGESTIONS

- Client interaction and after sales services are the most crucial aspects for any business.

The research carried out a study to gauge the level of satisfaction of the clients with the services of JRG Securities ltd. This helped us in understanding why JRG Securities ltd has become one of the most trusted brands within a short span of its commencement.

- The Relationship Managers (RM) should be made responsible to make sure that the clients are well catered, thus, reducing switching over of a lot of time lag is there between the follow up and the change of RM, as a result, the calls could not leave a positive impact on the clients, so contacted. Therefore, follow up should be done fast with no time lag.
- The customers, who were satisfied with the services, appreciated this sort of follow up. Therefore, such follow-ups are done from time to time, to gain customer confidence.

9. CONCLUSION

Indian economy is growing faster. This is among the best growing economies among the world. You can say the best emerging economy of the world. Stock market is the reflection of economy. Naturally stock market of India is roaring. Sensex (One of the best Index of Bombay Stock Exchange) has climbed from 3,000 to 22,000 in last five years and it is believed that it will reach 40000 in coming years. Now a day's every investor and trader enjoying sweet taste of stock. More all less every day many stock prices have been increasing. Some of them are heating the upper circuit (5%, 10% and 20%).

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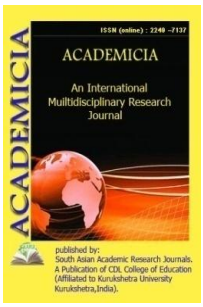

A STUDY ON RISK AND RETURN ANALYSIS OF PHARMACEUTICAL INDUSTRY

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ABSTRACT

A stock exchange is the place where the buying and selling of shares occur in a market. The main objective of risk and return analysis is to maximize returns and to keep a balance of risk. Every investor desire to avoid risk and elevate the returns. Risk and return are basically correlated and are dependent on each other. Pharmaceutical sector is one among of the major industries in India. Most of the investors consider it as a finest business for making profitable investments. This study is all about analysing the risk and return between the top 5 pharma sectors trading on NIFTY-50. It is performed using few tools such as mean, range, standard deviation and t-test.

KEYWORDS: *Risk, Return, Pharma Sector, Mean And T-Test.*

INTRODUCTION

RISK AND RETURN ANALYSIS

Risk and return are high level factors of financial management that must be considered in making new investments. Substantial the amount of risk an investor is willing to take, the greater the potential return.

The term risk and return refer to the potential loss or gain experienced in investments in securities. Risk and return concept are basic to the understanding of the valuation of the assets or securities. The concept of risk and return analysis is essential in the process of investing and finance.

Risk in investment is termed as the unevenness that is likely to occur in future cash flows from an investment. Return expresses the amount which an investor actually earned on an investment during a certain period such as interest, dividend and capital gains etc.

REVIEW OF LITERATURE

A literature review may be a search and evaluation of the available literature in your given subject or chosen topic area. It documents the state of the art with reference to the topic or topic you're writing about.

MacGregor, Slovic, Berry and Evensky (1999):

The study is cantered on how the financial decision-making process is linked to numerous aspects of investments/asset classes, specifically expert's approach of returns, risk, and risk/return associations. A survey was mailed to financial advisors in which, the 265 participants that responded were asked to provide their assessment of a series of 19 asset classes with 14 specific variables. The main findings revealed with the application of multiple regression analysis with perceived risk as the dependent variable revealed that 3 significant factors such as worry, volatility, and knowledge which explained 98% r-square of the experts' risk perception.

Finucane (2002):

He commented that the risk is of high level as a judgement was made by most of the individuals. It was concluded as substantial to the degree that the advisor would bother about the investments, that the investments had greater variance in market value over time, and how knowledgeable the advisor was regarding the investment alternative."

OBJECTIVES OF THE STUDY

1. To analyse the pharmaceutical companies, which are currently trading in NIFTY-50.
2. To determine the return of the selected pharma company's stocks.
3. To determine the risk of the selected pharma company's stocks.
4. To compare the selected firm's risk and return, and to analyse which is the best firm among these selected firms.

RESEARCH METHODOLOGY

The present study has been conducted to find out the solution for the problem "A study on risk and return on pharmaceutical companies in NIFTY-50".
Data is classified into primary and secondary data.

- Primary data:

Primary data refers to the information collected by a researcher from original sources, using methods like surveys, interviews, or experiments. the information is gathered from the main sources keeping research study in mind.

- Secondary data:

Secondary data refers to data that is collected by someone other than the researcher. Common sources of secondary data for the study include, organizational records and data that was collected for other research purposes. secondary data for this study is taken from previous journals, money control and NSE.

HYPOTHESIS FORMULATION

H0: Null hypothesis

In this hypothesis, it has no important relationship between the risk and return of the selected companies.

H1: Alternative hypothesis

In this hypothesis, it has important relationship between the risk and return of the selected companies.

STATISTICAL TOOLS

The tools used for analysis are

1. Mean
2. Standard Deviation
3. Range
4. Skewness
5. T-Test

SAMPLE DESIGN

The five companies selected for the study are from the pharmaceutical industry trading on NIFTY-50.

They are as follows:

1. Cadila Healthcare
2. Lupin
3. Cipla
4. Dr. Reddy's Laboratories
5. Sun Pharmaceutical Industries

MEAN

TABLE: 1 MEAN OF THE PHARMACEUTICALS COMPANIES

S.no	Name of the company	Mean
1	Cadila Healthcare	-2.38479
2	Lupin	-0.75668
3	Cipla	-0.24244
4	Dr. Reddy's Laboratories	0.804983
5	Sun Pharmaceutical Industries	0.251074

Mean = $\frac{\Sigma x}{n}$

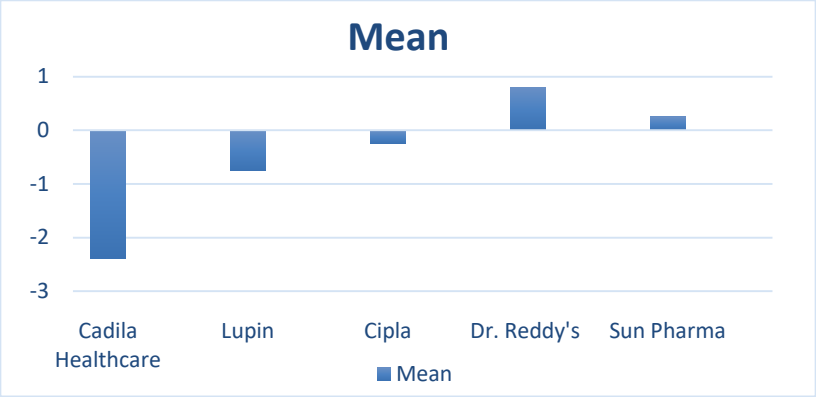

FIGURE:1 GRAPHICAL REPRESENTATION OF MEAN

In the above analysis, five selected pharma companies are compared. From the comparison we can analyse that the mean value of Dr. reddy's is highest i.e. 0.804983 and Cadila Healthcare has the least mean value i.e. -2.38479

STANDARD DEVIATION

TABLE:2 STANDARD DEVIATION OF THE PHARMACEUTICALS COMPANIES

S.no	Name of the company	Standard deviation
1	Cadila Healthcare	7.950398
2	Lupin	8.230788
3	Cipla	6.078377
4	Dr. Reddy's Laboratories	4.400525
5	Sun Pharmaceutical Industries	7.268328

Standard deviation = $\frac{1}{n}(R - \bar{R})^2$

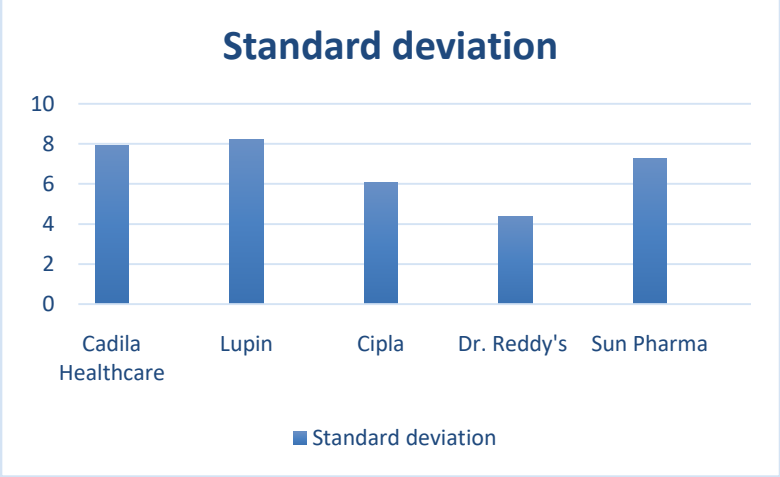

FIGURE:2 GRAPHICAL REPRESENTATION OF STANDARD DEVIATION

INTERPRETATION: In the above analysis, five selected pharma companies are compared. From the comparison we can analyse that the standard deviation value of lupin is highest i.e. 8.230788and Dr. reddy's has the least mean value i.e. 4.400525.

RANGE

TABLE: 3 RANGE OF THE PHARMACEUTICALS COMPANIES

S.no	Name of the company	Range
1	Cadila Healthcare	31.6546
2	Lupin	32.14919
3	Cipla	18.31901
4	Dr. Reddy's Laboratories	14.0572
5	Sun Pharmaceutical Industries	25.01287

RANGE = Maximum value- Minimum value

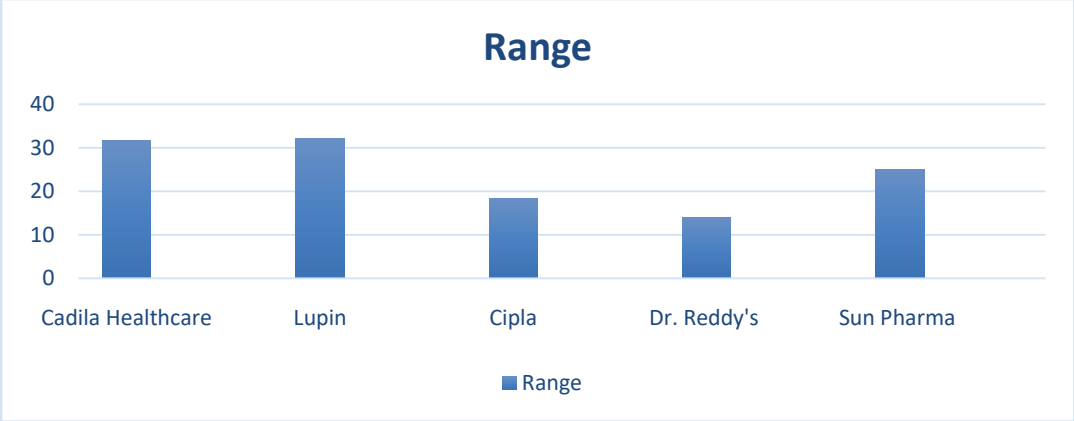

FIGURE: 3 GRAPHICAL REPRESENTATION OF RANGE

In the above analysis, five selected pharma companies are compared. From the comparison we can analyse that the range value of lupin industries is highest i.e. 32.14919 and Dr. reddy's has the least range value i.e. 14.0572.

SKEWNESS

TABLE: 4 SKEWNESS OF THE PHARMACEUTICALS COMPANIES

S.no	Name of the company	Skewness
1	Cadila Healthcare	0.204118
2	Lupin	-0.59392
3	Cipla	1.66187
4	Dr. Reddy's Laboratories	2.09452
5	Sun Pharmaceutical Industries	-0.66232

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$$\text{Skewness} = \frac{\text{Mean} - \text{Mode}}{\text{standard deviation}}$$

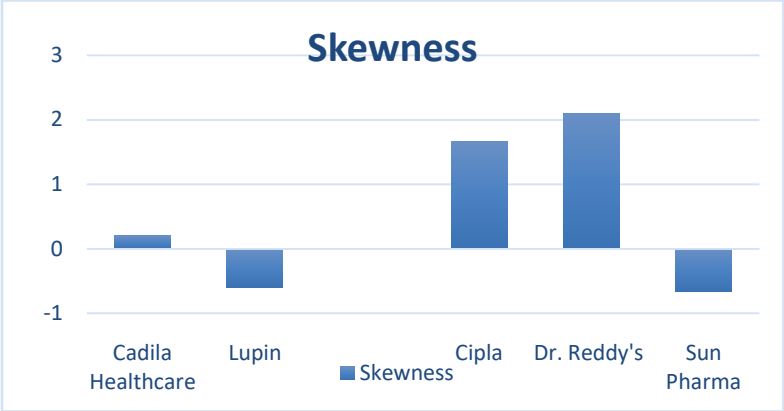

FIGURE: 4 GRAPHICAL REPRESENTATION OF SKEWNESS

In the above analysis, five selected pharma companies are compared. From the comparison we can analyse that the skewness of Dr. reddy'sis highest i.e. 2.09452and Sun Pharma has the leastvalue i.e. -0.66232.

TABLE NO: 5 T-TESTS RESULTS OF DR. REDDY WITH CADILA HEALTH

T-Test: Two-Sample test result for Dr. reddy with cadila health		
TABLE COLUMN SUB HEAD	**DR. REDDY**	**CADILA HEALTH**
Mean	0.8049825	-2.384790833
Variance	21.12504201	68.95508364
Observations	12	12
Pooled Variance	45.04006283	
Hypothesized Mean Difference	0	
df	22	
t Stat	1.164222409	
P(T<=t) one-tail	0.128402207	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.256804414	
t Critical two-tail	2.073873068	

From the above table, calculated value is (1.16422<1.71714). Hence the hypothesis H0 is accepted.

TABLE NO: 6 T-TESTS RESULTS OF DR. REDDY WITH LUPIN

T-Test: Two-Sample test result for Dr. reddy with Lupin		
TABLE COLUMN SUB HEAD	**DR. REDDY**	**LUPIN**
Mean	0.8049825	-0.756675
Variance	21.12504201	73.90459158
Observations	12	12
Pooled Variance	47.5148168	
Hypothesized Mean Difference	0	

df	22	
t Stat	0.554941095	
P(T<=t) one-tail	0.292266846	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.584533692	
t Critical two-tail	2.073873068	

From the above table, calculated value is (0.55494<1.71714). Hence the hypothesis H0 is accepted.

TABLE NO: 7 T-TESTS RESULTS OF DR. REDDY WITH CIPLA

T-Test: Two-Sample test result for Dr. reddy with Cipla		
TABLE COLUMN SUB HEAD	**DR. REDDY**	**CIPLA**
Mean	0.8049825	-0.24244425
Variance	21.12504201	40.30545098
Observations	12	12
Pooled Variance	30.7152465	
Hypothesized Mean Difference	0	
df	22	
t Stat	0.462937417	
P(T<=t) one-tail	0.323977933	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.647955866	
t Critical two-tail	2.073873068	

From the above table, calculated value is (0.46293<1.71714). Hence the hypothesis H0 is accepted.

TABLE NO: 8 T-TESTS RESULTS OF DR. REDDY WITH CIPLA

T-Test: Two-Sample test result for Dr. reddy with Sun pharma		
TABLE COLUMN SUB HEAD	**DR. REDDY**	**SUN PHARMA**
Mean	0.8049825	0.251074
Variance	21.12504201	57.63118336
Observations	12	12
Pooled Variance	39.37811268	
Hypothesized Mean Difference	0	
df	22	
t Stat	0.216215192	
P(T<=t) one-tail	0.415406123	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.830812247	
t Critical two-tail	2.073873068	

From the above table, calculated value is (0.21621<1.71714). Hence the hypothesis H0 is accepted.

FINDINGS

1. During the period of study, the mean returns for the selected five pharmaceuticals companies shares are both positive and negative. values.
2. The standard deviation of the five pharmaceutical companies are adequate.
3. The range of the five pharmaceutical companies have all positive values.
4. Based on the returns calculated for the five pharmaceutical companies, Dr. reddy's returns are highest and Cadila health returns are lowest among the five companies.

SUGGESTIONS

1. When there is more risk, based on it the returns will also be high but might not be in all the situations such as economic crisis.
2. When the market price is sliding down steeply and has no protection against the risk on investment done. it is very important for an investor to analyse the market conditions and the fluctuations before investing in any sector or company.
3. Pharmaceutical companies are one of the best sectors for making investments for higher return and low risks.

CONCLUSION

Investors are mainly concerned about risk and return factors before investing their valuable money in any company. Through this study on selected pharmaceutical companies trading on NSE, we can analyse that the pharmaceuticals have moderate returns in the year 2019. From the study it is concluded that Dr. reddy's has the highest returns among the five selected pharma companies.

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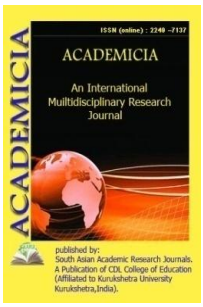

A STUDY ON TRAINING AND DEVELOPMENT AT MAHINDRA AND MAHINDRA

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ABSTRACT

No industrial organization can long ignore the training and development needs of its employees without seriously inhibiting its performance. Even the most careful selection does not eliminate the need for training. Since people are not molded to specifications and rarely meet the demands of their jobs adequately. Give a man a fish and you have given him meal. Teach man to fish and you have given him a livelihood. This ancient Chinese proverb seems to describe the underlying ration ale of all training and developed programs. Four important developments, which seem to have contributed in recent years, to greater attention being given to training are as follows first, it is now beloved that training can cannot be taught second with the raid change in technology every individual needs to be own narrow functional area. He must also possess a general understanding of the tasks and culture every individual to be able to behave effectively, must be trained in interpersonal skills diverse gaffes, lifestyle and attitudes of people in other countries as well. They need to learn many things such as how to introduce on self before a foreign client, converse and negotiate, talk on telethon, use body language and so on. To avoid the cultural shook, cross cultural orientation of employees in becoming equally important.

KEYWORDS: *Adequately, Inhibiting, Gaffes*

INTRODUCTION:

Training and development has emerged as a major educational system in the last two decades in India, it has been widely accepted as critical input for improving managerial performance and organizational effectiveness. Every organization needs to have well-trained and experienced people to perform activities that have to be done. If the current job occupant can meet this requirement, training is not important. But when this is not the case, it is necessary to raise the skills levels and increase the versatility and adaptability of employees. Inadequate job

performance or a decline in a productivity or changes resulting out of job redesigning or a technological break-through require some type of training and development efforts

OBJECTIVES OF THE STUDY:

- To analyze and examine the effectiveness of training and development programmers in Mahindra & Mahindra
- To assess how often training programs are conducted and how much are the employees satisfied.
- To study to what extent the training programs are applicable to their jobs.
- To study the employee's opinion on the training and development in Mahindra & Mahindra

NEED OF THE STUDY:

The purpose of study is to learn the practical applicability of the theoretical knowledge gained about training and development process.

- To gain knowledge about, the process of training and development in Mahindra & Mahindra
- To know the effectiveness or ineffectiveness of the process of training and development in Mahindra & Mahindra

SCOPE OF THE STUDY:

This study covers all aspects of training and development programs in Mahindra & Mahindra. The study covers the New Entrant Manager response towards the training programs in the organization.

RESEARCH METHODOLOGY:

Sources of data:

For the fulfillment of the study the student researcher has relied on two types of Data i.e. primary data and secondary data.

Primary Data:

This study is almost based on primary data which is more acquainted for social science research. The primary data has been collected by administering Questionnaire to the selected respondents. Another sources of primary data is overall observations of companies working, companies attitude on training and development. The student researcher has conducted sufficient discussions with both the employer and employee to gather the information for the aspects of Questionnaire.

Secondary Data:

The Secondary data has been obtained by studying existing training and developmental program in Mahindra & Mahindra. Data is also obtained by referring to the earlier studies conducted in smaller areas and also the annual reports, brochures, and other materials served as secondary data.

REVIEW OF LITERATURE:

Every organization irrespective of its nature and size has four resources namely men, material, and machinery. Of these men I. e., people are the most vital resources and they only make all the differences in an organization. In this connection L.F. Urwick says that "Business houses are made broken in the long –run note by the markets or capital, patents, or equipments, but by men". Peter F. ducker says that, "man, of all the resources available to name can grow and develop". This gives geneses to the concept of HRM, the sub –system. HR is the central sub-system of an organization. As the central sub- system, it controls the functions of each sub –system and the whole organization. Human resource management is concerned with the human beings in an organization. It reflects a now philosophy, a new outlook, approche and strategy, which views an organization's manpower as its resources and assets. Human resource management is a managerial function which facilitates the effective utilization of people (manpower) in achieving the organizational and individual goals.Simply, HRM is a management function that helps the managers to recruit, select, train and develop the organizational members for the purpose of achieving the stated organizational goals In the present scenario, HRM is used as a synonym to personnel management and the personnel department is called as hr department.

"The part of management which is concerned with the people at work and with their relationship within an enterprise. It aims to bring together and develop into and effective organization of the men and women who make up an enterprise and having regard for the well-being of the individuals and of working groups, to enable them to make there best contribution to its success"

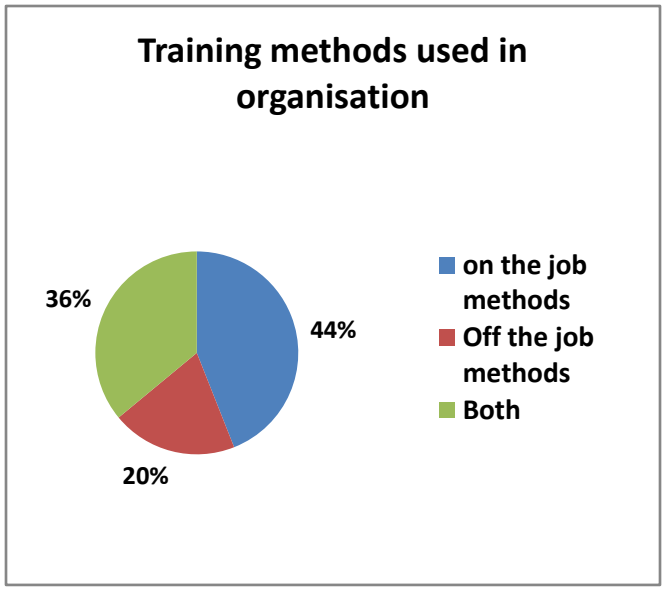
"Human resource management is a series of decisions that affect the relationship between employees and employers; it affects many constituencies and is intended to influence the effectiveness of employees and employers".

DATA ANALYSIS & INTERPRETATION:

1.**What kind of training methods do you prefer**?

a) On the job training methods b) Off the job training methods c) Both.

S.NO	NO.OF RESPONDENTS.	% OF RESPONDENTS.
1	24	44%
2	11	20%
3	20	36%



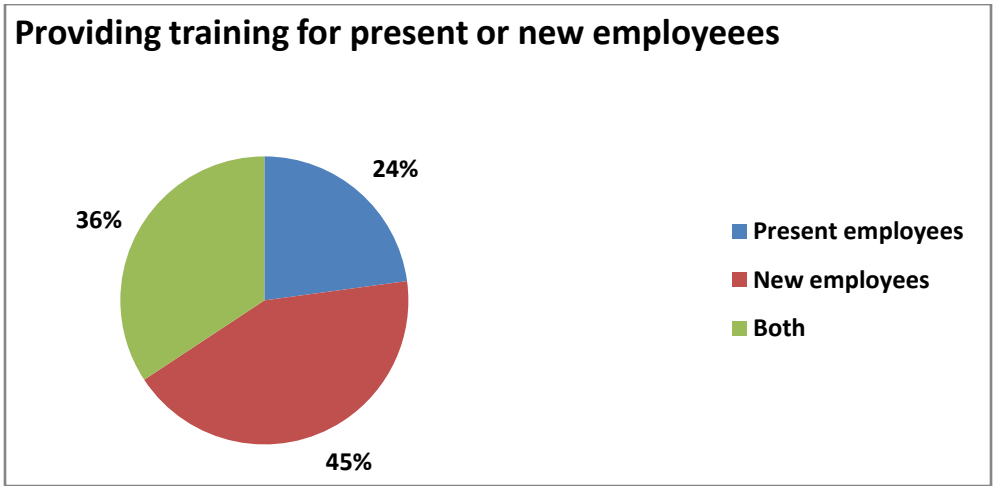
Data analysis*:* 44% of the employees say that they prefer on the job training. 20% of the employees say that they prefer off the job training 36% are said that they prefer both the type of training methods.

Interpretation: Above analysis say that company mostly offers on the job training. As they have better training faculty.

Does the Organization provide training for present employees or new employees?

a) Present employees b) New employees c) Both.

S.NO	NO.OF RESPONDENTS.	% OF RESPONDENTS.
1	13	24%
2	25	45%
3	17	31%



Data analysis*:* 24% of the employees say that company give training to the present employees, 45% says that company give training to the new employees and 31% says that company give training to the both employees.

Interpretation: Above analysis say that company provides training to the new employees in order to increase their efficiency and productivity and training is also provided to the existing employees to update their knowledge and skills.

FINDINGS:

- The report in training and development in Mahindra & Mahindra
- It has brought into light the total picture of the employee's attitude towards training and development.
- Most of the respondents have expressed that they are interested in the on- the- job method.
- Most respondents expressed that feedback is collected from all the participants in the program.
- The employee in the organization are well participated in the training program.

SUGGESTIONS:

Some of the suggestions made by the employees are:

- Learned/ expert personalities from outside should be called in relevant subject and they should important demonstration.
- The training should be result oriented and people oriented.
- Pre schedule training programmer to be planned at all level on continuous basis.
- It should be beneficial for an employee and for organization.

CONCLUSION:

There is a healthy relationship between the peers, subordinates, superiors. In this organization maximum no. of employees are agree with the management considering their ideas and suggestions on some occasions only. In this organization Training programs will helps the employees in achieving both individual goals and organizational goals. Maximum no. of employees are satisfied with the Training program conducted by Mahindra & Mahindra. Employers are gained knowledge at work place after attending this Training program. For new joiners in organization training method are conducted like coaching and besides orientation programs. Training will be very useful to employees in their present job. Training program helps employees to take new challenges in their present job. Most of the employees are using new skills in their present job. According to the training program employees to take new roles in the organization .with the help of training program employees will increase their productivity. After this Training program they are doing their job more confidently.Training program brought positive impact on employee behavior.

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COMPARATIVE ANALYSIS OF SECTORAL INDICES WITH NSE INDEX

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ABSTRACT

The Indian capital Market has witnessed a tremendous growth. There was an explosion of investor interest during the nineties and an Equity Guilt emerged in statutory legislations has helped the capital market. Foreign Exchange regulation act is one such legislation in this direction. An important recent development has been the Entry of Foreign Institutional investors are participants to the primary and secondary markets for the securities. In the past several years, investments in developing countries have increased remarkably. Among the developing countries India has received considerable capital inflows in recent years. The liberalization policy of the government of India has now started fielding results and the country is poised for a big leap in the industrial and economic growth. The Economy of the country is mainly based on the development of the corporate sectors. A better understanding of the stock market trend will facilitate allocation of financial sources to the most profitable investment opportunity. The behavior of stock returns will enable the investors to make appropriate investment decisions. The fluctuations of stock returns are due to several economic and non-economic factors. The study is aimed at ascertaining the behavior of share returns. This project analyses the equity share fluctuations in India Selected Industry. It also measures the strength of the trend and the money involved in investing in the stocks. Simple moving average model is applied for selected companies which would give the investor a sell signal or buy signal.

KEYWORDS: *Nse Indices, Nifty 50, Comparative Analysis, Returns, Risk, Correlation.*

I. INTRODUCTION

The Indian capital Market has witnessed a tremendous growth. There was an explosion of investor interest during the nineties and an Equity Guilt emerged in statutory legislations has helped the capital market. Foreign Exchange regulation act is one such legislation in this direction. An important recent development has been the Entry of Foreign Institutional investors are participants to the primary and secondary markets for the securities. In the past several years, investments in developing countries have increased remarkably. Among the developing countries India has received considerable capital inflows in recent years. The liberalization policy of the government of India has now started fielding results and the country is poised for a big leap in the industrial and economic growth. The Economy of the country is mainly based on the development of the corporate sectors.

II. OBJECTIVES OF THE STUDY

- To study the analysis of price movement of shares and company performance with respect to Information Technology
- To study the various factors affecting the price movement of shares and company performance.
- To analyze the performance of select companies in IT industry
- The research report can be used by the organization to assist the investors in making investment decisions.

In order to accomplish the primary objectives the following secondary objectives are to be accomplished:

- To understand fundamental and technical analysis.

III. RESEARCH METHODOLOGY

Type of Study

The project will be exploratory in the initial stage and the knowledge thus gained will be used for further descriptive research.

Sample Size:

2 IT companies listed in the N Stock Exchange. HCL and INFOSYS

Sampling Design:

The companies for the project shall be selected using Convenience Random Sampling.

IV. LIMITATIONS:

The analysis is fully based on secondary data and hence the accuracy of data is a major concern.

Analysis helps the investor in making investment decisions but not every investment is entirely dependent on the analysis alone.

V. ANALYSIS OF STUDY

MEAN, SD,VARIEANCE INFOSYS

DISCRPTIVE ANALYSIS	
Mean	0.31
Standard Deviation	3.15
Sample Variance	9.95

MEAN, SD, VARIEANCE

DISCRPTIVE ANALYSIS	
Mean	0.31
Standard Deviation	3.15
Sample Variance	9.95

MEAN, SD, VARIEANCE

DISCRPTIVE ANALYSIS	
Mean	0.68
Standard Deviation	2.72
Sample Variance	7.39

MEAN, SD, VARIEANCE

DISCRPTIVE ANALYSIS	
Mean	-1.31
Standard Deviation	3.60
Sample Variance	12.96

MEAN, SD, VARIEANCE HCL

DESCRIPTIVE STUDY	
Mean	1.08
Standard Deviation	2.17
Sample Variance	4.70

MEAN, SD, VARIEANCE HCL

DESCRIPTIVE STUDY	
Mean	-2.11
Standard Deviation	5.89
Sample Variance	34.67

MEAN, SD, VARIEANCE HCL

DESCRIPTIVE STUDY	
Mean	-0.96
Standard Deviation	3.33
Sample Variance	11.11

MEAN, SD, VARIEANCE HCL

DESCRIPTIVE STUDY	
Mean	1.08
Standard Deviation	2.17
Sample Variance	4.70

FUNDAMENTAL ANALYSIS FOR HCL

Balance Sheet of HCL Technologies					
---------- in Rs. Cr. ----------					
	Mar '19	Jun '18	Jun '17	Jun '16	Jun '15
Sources Of Funds					
Total Share Capital	282.08	281.2	140	139.37	138.66
Equity Share Capital	282.08	281.2	140	139.37	138.66
Share Application Money	0.05	0.02	7.65	5.01	2.77
Reserves	21,226.78	19,124.53	15,605.61	10,093.36	6,465.15
Net worth	21,508.91	19,405.75	15,753.26	10,237.74	6,606.58
Secured Loans	28.16	27.22	27.45	532.66	698.87
Unsecured Loans	0.03	0	29.25	82.48	0
Total Debt	28.19	27.22	56.7	615.14	698.87
Total Liabilities	21,537.10	19,432.97	15,809.96	10,852.88	7,305.45
Application of Funds					
Gross Block	5,446.61	5,297.03	4,489.56	3,764.05	3,153.74
Less: Accum. Depreciation	2,372.86	2,232.80	2,040.99	1,809.87	1,540.03
Net Block	3,073.75	3,064.23	2,448.57	1,954.18	1,613.71
Capital Work in Progress	582.12	543.95	518.5	488.19	549.55
Investments	3,973.44	4,124.96	4,116.01	4,055.70	3,297.95
Inventories	128.56	83.65	15.54	81.84	99.99
Sundry Debtors	4,084.53	3,578.28	3,224.19	2,709.21	1,992.42
Cash and Bank Balance	8,662.96	8,829.41	7,911.08	2,808.83	1,041.20
Total Current Assets	12,876.05	12,491.34	11,150.81	5,599.88	3,133.61
Loans and Advances	6,095.02	4,690.58	3,580.61	3,861.38	2,282.21
Total CA, Loans & Advances	18,971.07	17,181.92	14,731.42	9,461.26	5,415.82
Current Liabilities	3,886.96	4,395.19	4,914.06	3,748.66	2,613.79
Provisions	1,176.32	1,086.90	1,090.48	1,357.79	957.79
Total CL & Provisions	5,063.28	5,482.09	6,004.54	5,106.45	3,571.58
Net Current Assets	13,907.79	11,699.83	8,726.88	4,354.81	1,844.24
Total Assets	21,537.10	19,432.97	15,809.96	10,852.88	7,305.45
Contingent Liabilities	975.34	1,222.24	3,519.61	4,186.27	3,644.36
Book Value (Rs)	152.5	138.02	224.94	146.84	95.25

Profit & Loss account of HCL Technologies					
	19-Mar	18-Jun	17-Jun	16-Jun	15-Jun
INCOME					
Revenue from Operations [Gross]	13,433.35	17,153.44	16,497.37	12,517.82	8,907.22
Revenue from Operations [Net]	13,433.35	17,153.44	16,497.37	12,517.82	8,907.22
Total Operating Revenues	13,433.35	17,153.44	16,497.37	12,517.82	8,907.22
Other Income	968.76	1,199.50	659.12	378.84	300.86
Total Revenue	14,402.11	18,352.94	17,156.49	12,896.66	9,208.08
EXPENSES					
Purchase of Stock-In Trade	162.66	363.76	345.37	251.66	180.51
Changes In Inventories Of FG, WIP And Stock-In Trade	-46.79	-66.23	64.75	7.83	25.85
Employee Benefit Expenses	4,854.22	5,924.62	5,123.95	4,628.61	3,923.06
Depreciation andAmortization Expenses	279.15	299.92	490.7	441.91	353.07
Other Expenses	3,339.44	4,071.69	3,652.41	3,038.99	2,267.58
Total Expenses	8,634.50	10,654.40	9,758.83	8,445.46	6,847.34
Profit/Loss Before Exceptional, Extra Ordinary Items and Tax	5,767.61	7,698.54	7,397.66	4,451.20	2,360.74
Exceptional Items	0	0	0	93.54	0
Profit/Loss Before Tax	5,767.61	7,698.54	7,397.66	4,544.74	2,360.74
Tax Expenses-Continued Operations					
Current Tax	1,240.33	1,610.45	1,555.74	924.55	416.2
Less: MAT Credit Entitlement	181.86	310.43	115.91	14.43	0
Deferred Tax	-24.54	52.57	-26.79	-70.1	-5.88
Total Tax Expenses	1,033.93	1,352.59	1,413.04	840.02	410.32
Profit/Loss After Tax and Before Extraordinary Items	4,733.68	6,345.95	5,984.62	3,704.72	1,950.42
Profit/Loss from Continuing Operations	4,733.68	6,345.95	5,984.62	3,704.72	1,950.42

Profit/Loss For The Period	4,733.68	6,345.95	5,984.62	3,704.72	1,950.42

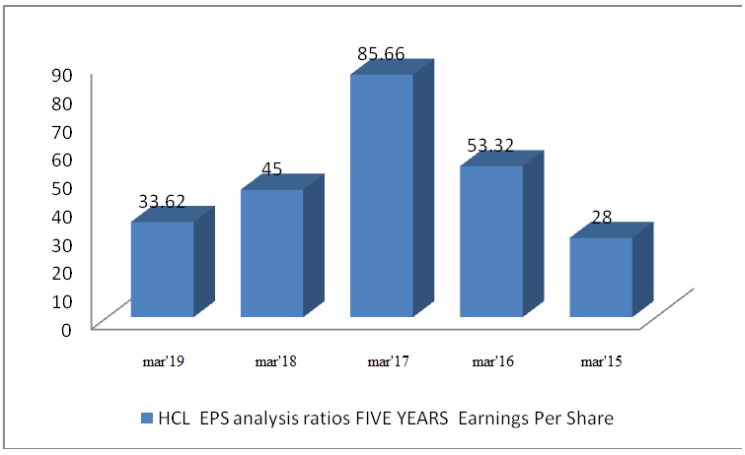
CURRENT RATIO: CA/CL

YEARS	CURRENT ASSETS	Current Liabilities	RATIO
Mar '19	12,876.05	3,886.96	3.31
Mar '18	12,491.34	4,395.19	2.84
Mar '17	11,150.81	4,914.06	2.27
Mar '16	5,599.88	3,748.66	1.49
Mar '15	3,133.61	2,613.79	1.20

INTERPRETATION:

The current ratio is used extensively in financial reporting. However, while easy to understand, itcan be misleading in both a positive and negative sense - i.e., a high current ratio is not necessarily good, and a low current ratio is not necessarily bad. Here the current ratio is satisfactory in the years 2019 & 2018,

HCL EPS analysis ratios FIVE YEARS	
YEARS	Earnings Per Share
Mar '19	33.62
Mar '18	45
Mar '17	85.66
Mar '16	53.32
Mar '15	28



INTERPRETATION:

- EPS Is Very Important For Estimating Yearly Income Positions For Any Company Performance.
- It reveals every year growth of the company.

- 20147was highest % of income generated by HCL (85.66)

FUNDAMENTAL ANALYSIS FOR INFOSYS

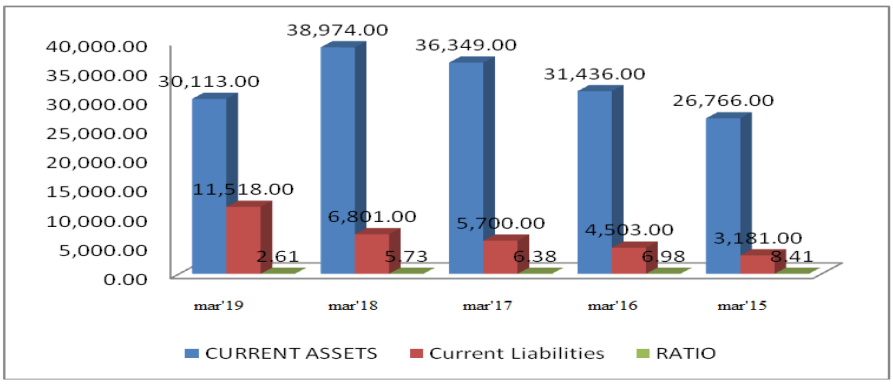
---------- in Rs. Cr. ----------BALANCE SHEET ----------					
	Mar '19	Mar '18	Mar '17	Mar '16	Mar '15
Sources Of Funds					
Total Share Capital	1,148.00	1,148.00	574	286	287
Equity Share Capital	1,148.00	1,148.00	574	286	287
Reserves	66,869.00	56,009.00	47,494.00	41,806.00	35,772.00
Net worth	68,017.00	57,157.00	48,068.00	42,092.00	36,059.00
Total Liabilities	68,017.00	57,157.00	48,068.00	42,092.00	36,059.00
Application Of Funds					
Gross Block	16,210.00	14,709.00	12,827.00	10,374.00	8,029.00
Less: Accum. Depreciation	7,605.00	6,461.00	5,480.00	4,642.00	3,576.00
Net Block	8,605.00	8,248.00	7,347.00	5,732.00	4,453.00
Capital Work in Progress	1,247.00	934	769	954	1,135.00
Investments	24,977.00	11,113.00	6,857.00	6,717.00	4,344.00
Sundry Debtors	10,960.00	9,798.00	8,627.00	7,336.00	6,365.00
Cash and Bank Balance	19,153.00	29,176.00	27,722.00	24,100.00	20,401.00
Total Current Assets	30,113.00	38,974.00	36,349.00	31,436.00	26,766.00
Loans and Advances	14,943.00	13,498.00	10,491.00	7,873.00	6,330.00
Total CA, Loans & Advances	45,056.00	52,472.00	46,840.00	39,309.00	33,096.00
Current Liabilities	11,518.00	6,801.00	5,700.00	4,503.00	3,181.00
Provisions	350	8,809.00	8,045.00	6,117.00	3,788.00
Total CL & Provisions	11,868.00	15,610.00	13,745.00	10,620.00	6,969.00
Net Current Assets	33,188.00	36,862.00	33,095.00	28,689.00	26,127.00
Total Assets	68,017.00	57,157.00	48,068.00	42,092.00	36,059.00
Contingent Liabilities	3,033.00	1,512.00	1,461.00	1,020.00	1,693.00
Book Value (Rs)	296.12	248.84	418.54	736.64	627.95

PROFIT & LOSS ACCOUNT OF INFOSYS					
---------- in Rs. Cr. ----------					
	19-Mar	18-Mar	17-Mar	16-Mar	15-Mar
INCOME					
Revenue From Operations [Gross]	59,289.00	53,983.00	47,300.00	44,341.00	36,765.00
Revenue From Operations [Net]	59,289.00	53,983.00	47,300.00	44,341.00	36,765.00

Total Operating Revenues	59,289.00	53,983.00	47,300.00	44,341.00	36,765.00
Other Income	3,062.00	3,009.00	3,337.00	2,576.00	2,215.00
Total Revenue	62,351.00	56,992.00	50,637.00	46,917.00	38,980.00
EXPENSES					
Operating and Direct Expenses	6,044.00	6,029.00	4,284.00	3,990.00	2,969.00
Employee Benefit Expenses	30,944.00	28,206.00	25,115.00	24,350.00	19,932.00
Depreciation andAmortization Expenses	1,331.00	1,115.00	913	1,101.00	956
Other Expenses	5,094.00	3,985.00	3,939.00	3,474.00	2,849.00
Total Expenses	43,413.00	39,335.00	34,251.00	32,915.00	26,706.00
Profit/Loss Before Exceptional, Extraordinary Items and Tax	18,938.00	17,657.00	16,386.00	14,002.00	12,274.00
Exceptional Items	0	3,036.00	412	0	83
Profit/Loss Before Tax	18,938.00	20,693.00	16,798.00	14,002.00	12,357.00
Tax Expenses-Continued Operations					
Current Tax	5,068.00	4,898.00	4,537.00	4,063.00	3,361.00
Deferred Tax	52	9	97	-255	-120
Total Tax Expenses	5,120.00	4,907.00	4,634.00	3,808.00	3,241.00
Profit/Loss After Tax and Before Extraordinary Items	13,818.00	15,786.00	12,164.00	10,194.00	9,116.00
Profit/Loss from Continuing Operations	13,818.00	15,786.00	12,164.00	10,194.00	9,116.00
Profit/Loss for The Period	13,818.00	15,786.00	12,164.00	10,194.00	9,116.00

CURRENT RATIO: CA/CL

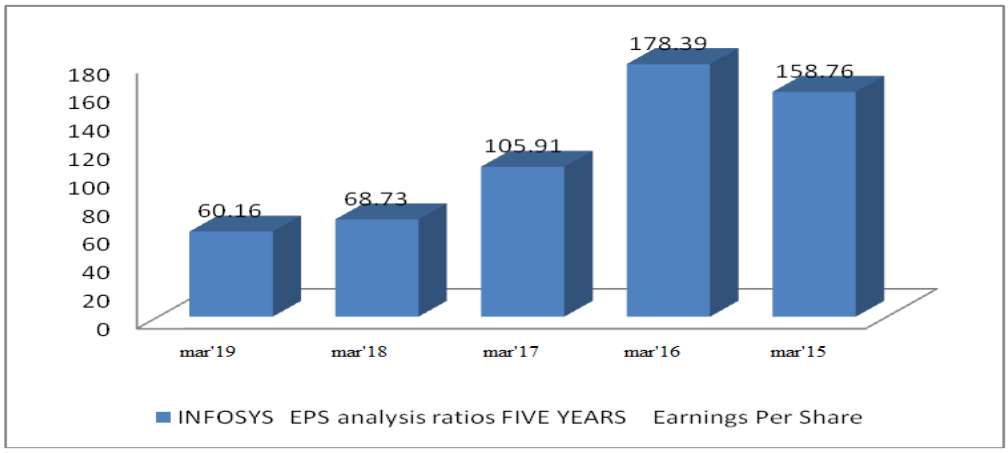
YEARS	CURRENT ASSETS	Current Liabilities	RATIO
Mar '19	30,113.00	11,518.00	2.61
Mar '18	38,974.00	6,801.00	5.73
Mar '17	36,349.00	5,700.00	6.38
Mar '16	31,436.00	4,503.00	6.98
Mar '15	26,766.00	3,181.00	8.41



INTERPRETATION:

The current ratio is used extensively in financial reporting. However, while easy to understand, it can be misleading in both a positive and negative sense - i.e., a high current ratio is not necessarily good, and a low current ratio is not necessarily bad. Here the current ratio is satisfactory in the years 2017 & 2016

INFOSYS EPS analysis ratios FIVE YEARS	
YEARS	Earnings Per Share
Mar '19	60.16
Mar '18	68.73
Mar '17	105.91
Mar '16	178.39
Mar '15	158.76



INTERPRETATION:

- EPS Is Very Important For Estimating Yearly Income Positions For Any Company Performance.
- It reveals every year growth of the company.
- 2013 was highest % of income generated by INFOSYS (178.39)

VI. CONCLUSION:

INDIAN IT INDUSTRY: The industry has recovered from the global slowdown and started to make good returns and the industry is expected to grow in the future years. So investment in the IT companies is good for long term.

- From the fundamental analysis we can conclude that the company is strong in its fundamentals and has a good future value.
- From the technical analysis we can conclude that the prices are in uptrend even though the MACD shows a bearish signal line crossover because the MACD is above zero. So the prices are expected to rise in the near future.
- From the fundamental analysis we can conclude that the company is strong in its fundamentals and has a good future value.
- From the technical analysis we can conclude that the prices are in uptrend and since EMAs are moving closer and the stock is highly volatile. The ROC is negative which shows a bearish signal. But we can see that the MACD is above its signal line. So there is strong upward momentum, but the prices may fall very soon but will rise again.
- From the fundamental analysis we can conclude that the company is strong in fundamentals and prices are expected to rise in the future.
- From the technical analysis we can see that the EMAs are rising. We can also notice that the MACD, ROC and RSI also show bullish momentum. So, we can conclude that the prices will rise in the short term.

VII. FINDINGS

High current ratio is not necessarily good, and a low current ratio is not necessarily bad. Here the current ratio is satisfactory in the years 2017 & 2018,

- 2019 was highest % of income generated by HCL (85.66)
- EPS Is Very Important For Estimating Yearly Income Positions For Any Company Performance.
- It reveals every year growth of the company.
- It reveals every year growth of the company.
- 2018 was highest % of income generated by INFOSYS (179.39)

I found that **Infosys** The current ratio is used extensively in financial reporting. However, while easy to understand, it can be misleading in both a positive and negative sense - i.e., a high current ratio is not necessarily good, and a low current ratio is not necessarily bad. Here the current ratio is satisfactory in the years 2018 & 201

VIII. SUGGESTIONS

→ Fundamental analysis is one of the most often overlooked techniques of stock picking.

→ Many investors eschew fundamental analysis in favor of the flashier technical analysis made so famous by chartists over the years. Stock market charts are now animated wonders, so who doesn't love looking at them, especially since it's a lot easier than actually pouring through SEC statements adding up the numbers.

- → But fundamental analysis never really completely goes out of style, because many of history's greatest investors, such as the greatest of all, Warren Buffett have practiced fundamental analysis as strictly as a devout person practices religion.
- → The reason great investors believe in fundamental analysis is because it's a great model of how things work.
- → Companies report on financial operations that are best explained by numbers. Analyzing the numbers rigorously, and placing personalities aside, gives a stock analyst the chance to really get a feel for how the company is doing. Why listen to hyped up PR statements when you can clearly see what a company really did, as reported by them in their statement of operations.
- → Apart from the analysis done, stocks can be analyzed on the basis of various other indicators of technical analysis or on the basis of the fundamental analysis.
- → The index considered here is not alone the best investment avenue available. Even other stock of other indexes may yield good returns.
- → The technical indicators can be utilized even for the study of Derivatives market and even for the commodities market etc.
- → The opportunity cost of capital and the returns from investing elsewhere can be calculated and compared with the investment made in stocks.
- → Apart from the factors explained in the project which would affect the stock market, many other factors also may exist.

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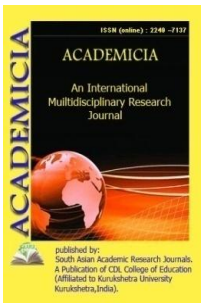

A STUDY ON ORGANIZATIONAL CLIMATE AT BAJAJ ALLIANZ

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ABSTRACT

The paper examines the influence of the organization's overall organizational climate on employee performance. It is a thorough study on preparing the organizational climate to participate and reach its future goal in stability of business environment. Organizational climate refers to the perceptions of employees about their business environment or internal work setting of their organization. A good climate is a prerequisite for the success of every organization. The key is to improve the job satisfaction inside the organization, as we realize that employees are the most essential capital that can support the supportability of an Organization. The study intends to discover the influence of organizational climate on job satisfaction in Bajaj Allianz. As I had taken the sample size as 100 from 138members with a ratio of 1:1:38.In this study I used statistical tool as chi-square. Variables which are used in this study are organization climate as independent variable and job satisfaction as dependent variable

KEYWORDS: *Organizational Climate, Job Satisfaction, Employee Performance Environment.*

I. INTRODUCTION

Organization climate consists of particular values, norms, policies, attitudes, feelings, procedures, interactions, satisfaction and supportiveness so that can influence to work motivation, commitment, individual performance and group performance of the employee. Positive climate help the employee to encourage, while negative climate has a impact to discourage the employees. 'Organizational climate' is basically refers to the working climate environment "Climate for the ability to see the characteristics of an organization" Basically, organizational climate reflects to the individual person's perception of the organization

II. OBJECTIVES OF THE STUDY

1) To study in detail about the organization climate at Bajaj Allianz (Hyderabad)
2) To examine the factors related to the organization climate at Bajaj Allianz

3) To analyze the job satisfaction of the employee towards the organization climate at Bajaj Allianz

III. REVIEW OF LITERATURE

Jegajothi (2015) had studied the connection between organizational climate and job satisfaction. The examination distinguished that there is sure relationship between organizational climate and job satisfaction and the organizational climate which influence and increase the organization effectiveness. The examination also found that working environment conduct, laborer profitability, work responsibility, work level, work status, promotions, worker preparing, employee training, employee rewards and representative prizes and so study have the positive relationship with inspiration, motivation and performance of employee. The investigation shows that the work duty helps the employee to work on a regular basis, good decision making and great dynamic.

Lakshmanan (2014) had considered the organization climate and employee performance in selected public sector ventures in Tamilnadu. The investigation had used different organizational climate measurements, for example, laborers' demeanor, workers attitudes, work attributes, working conditions, individual strategies, managerial structure and approaches, execution – reward relationship, participative management, external influence, social qualities and new innovation examination. The findings of the examination reveal that the organizational climate impacts the powerful execution of workers in an organization since it is identified with inspiration, motivation, job satisfaction and work fulfillment.

Mohanty (2012) had study the HRD atmosphere and its effect on work execution in private Insurance agencies in Odisha. The examination made an attempt to analysis the level of HRD climate pleasing in five private Insurance agencies specifically, Max New York Life Protection Co. Ltd., Birla Sun life insurance company Ltd., HDFC Standard Extra life insurance Ltd., Tata AIG life insurance company Ltd., and Bajaj Allianz life insurance company . In this examination, the HRD climate questionnaires (Rao and Abraham) and North Carolina Rating Scale (measuring job performance) was utilized. The examination has distinguished that there is acceptable/normal HRD climate and normal job performance in the private Protection sector in Odisha. The examination has concluded that there is huge connection between HRD climate and job performance.

Sofia Sherman, et.al, (2018) have explored the difficulties influencing the achievement of IAC: stakeholder involvement. To this end, we propose a vision for utilizing organizational climate hypothesis toward an effective management of IAC in programming building research or software engineering research. The above investigation establishes the framework for our vision that organization climate may fill in as a powerful methods for tending to the discussed challenges. We recommend that creating measures of organization research coordinated effort atmosphere.

According to Vijayabanu, et.al, (2017) both the business and worker accepts Positive organizational climate. A positive organization climate impacts motivates hence expanding employee performance. This present investigation concentrated on examining the relationship between organizational climate factors, for example, supervisory style, part struggle, part self-governance, receptiveness, part quality, association backing and work responsibility. The information was gathered from one hundred employees in a private sugar producing

organization. Structural equation model utilizing Smart-PLS was utilized to break down the information. It was discovered that all five independent factors emphatically anticipated worker's work responsibility aside from part quality. The R2 estimation value of this model is 67.2%. This shows the effect of six independent factors towards work responsibility. The limitation and scope for future research have too been examined.

IV. RESEARCH METHODOLOGY

Research Approach is the system of orderly assessment of any organization issue it oversees investigates organization, information assortment strategy, reviewing plan, testing procedure. Research infers a legitimate and exact mission for suitable information on a specific subject. Research is a careful assessment or requesting especially through mission for new real factors in any piece of information. Research contains describing and re-examining issues, characterizing hypothesis or suggested plan, gathering, sifting through and surveying data, making determinations and showing up at goals, lastly carefully testing the closures to choose if they fit the detailing hypothesis. Methodology is described as "the examination of systems by which we gain information, it oversees learned strategies constrained on examine to the issue rising up out of the possibility of its point".

V. METHODS OF DATA COLLECTION

PRIMARY DATA

The primary source of data collection were information from the representatives

SECONDARY DATA

The secondary sources of data collection were information obtained from books, journals, articles, magazines, websites and contacts with resource persons.

SAMPLE SIZE

A sample of 100 employees is taken for the study

RESEARCH TOOLS

The research tool which is used for the research purpose is a set of questionnaire.

STATISTICAL TOOL

The statistical tool which is used for the research purpose is chi square test

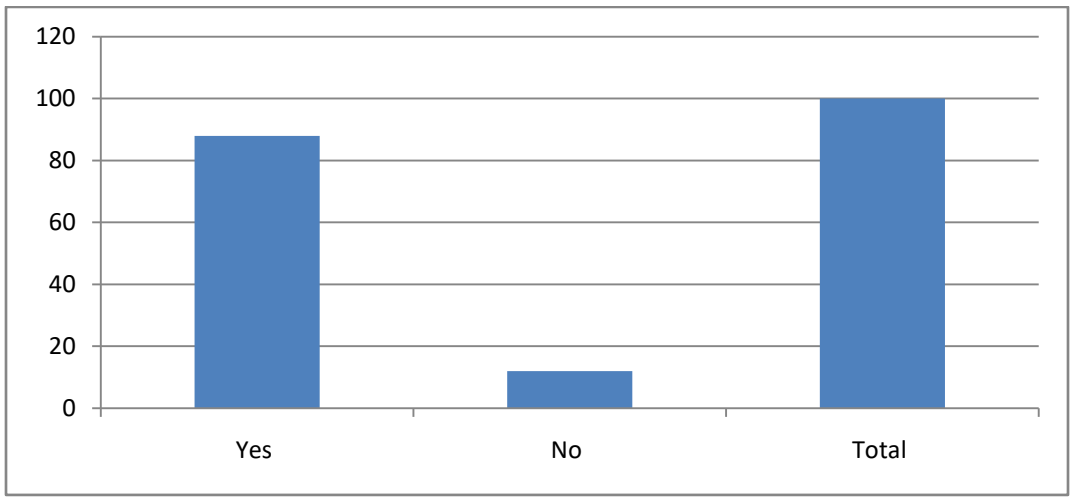
Variables: Independent variable – organization climate

Dependent variable - job satisfaction

VI. DATA ANALYSIS AND INTERPRETATION

TABLE 1: ARE YOU HAPPY WITH YOUR WORKING HOUR?

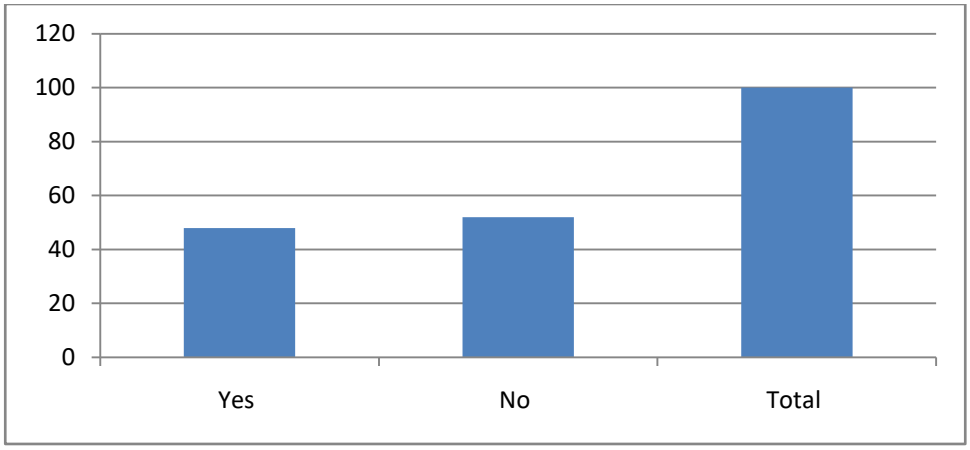
Particular	No of Respondents	% of respondents
Yes	88	88
No	12	12
Total	100	100



From the above table and graph represent that out of 88%of respondents expressed yes and 12% of respondents expressed that the working hours are not happy for them in the organization.

TABLE 2: DOES THE ORGANIZATION IS EASY TO ADOPT?

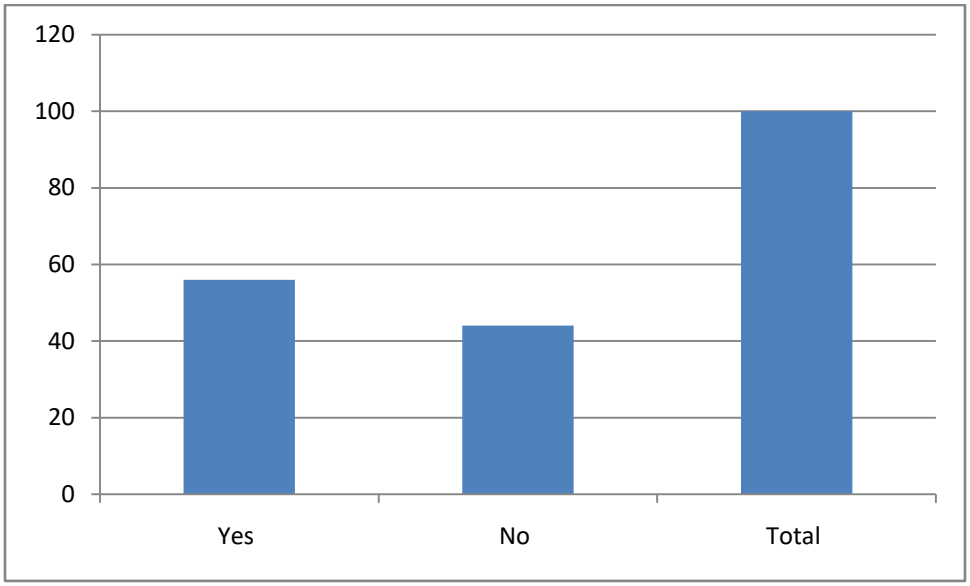
Particular	No of Respondents	% of respondents
Yes	48	48
No	52	52
Total	100	100



From the above table and graph represent that out of 48%of respondents expressed yes and 52% of respondents expressed that the organization is not easy to adopt.

TABLE 3: DOES THE ORGANIZATION IS FLEXIBLE TO WORK?

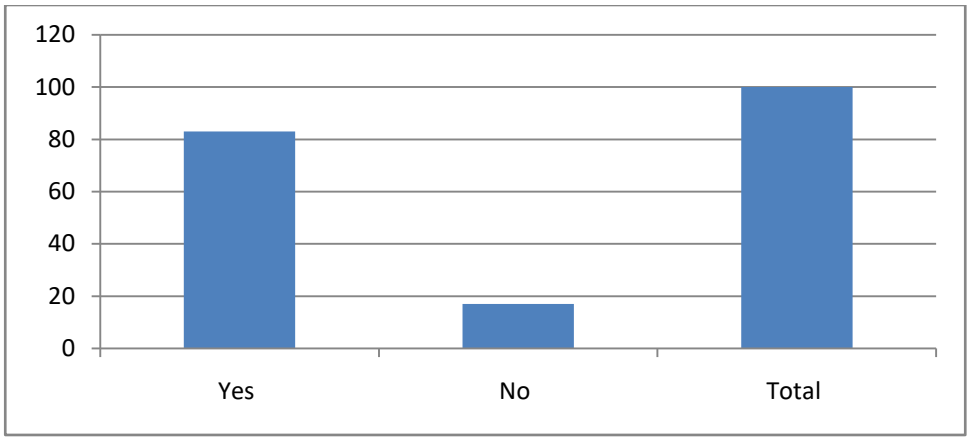
Particular	No of Respondents	% of Respondents
Yes	56	56
No	44	54
Total	100	100



From the above table and graph represent that out of 56%of respondents expressed yes and 44% of respondents expressed that the organization is not flexible to work.

TABLE 4: DO YOU HAVE A GOOD RELATIONSHIP WITH YOUR COLLEAGUES?

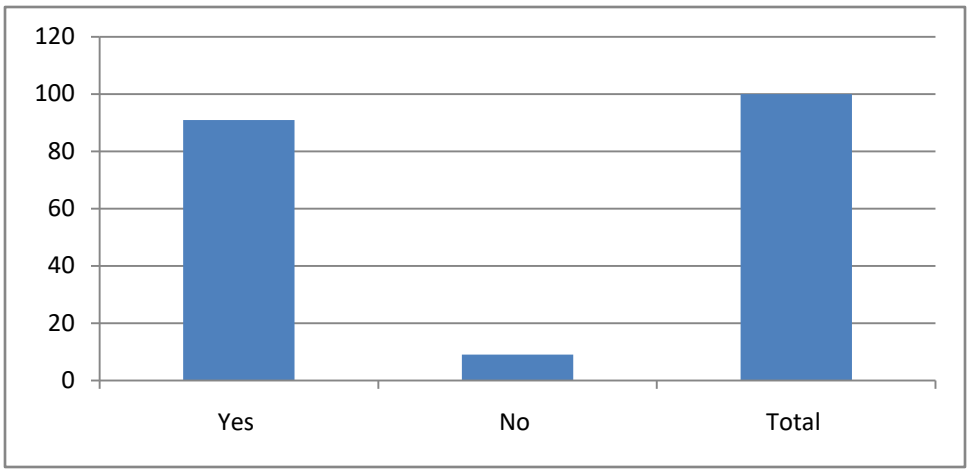
Particular	No of Respondents	% of Respondents
Yes	83	83
No	17	17
Total	100	100



From the above table and graph represent that out of 83%of respondents expressed yes and 17% of respondents expressed that they were not having a good relationship between them.

TABLE 5: DOES THE ORGANIZATION IS HELPFUL TO LEARN NEW THINGS?

Particular	No of Respondents	% of Respondents
Yes	91	91
No	9	9
Total	100	100



From the above table and graph represent that out of 91%of respondents expressed yes and 9% of respondents expressed that the organization is not helpful to learn new things.

VII. STATISTICAL ANALYSIS

VIII. HYPOTHESIS

H0: There is no significant relationship between organizational climate and job satisfaction

H1: There is a significant relationship between organizational climate and job satisfaction

Does the organization is flexible to work?

Particular	No of Respondents	% of Respondents
Yes	56	56
No	44	54
Total	100	100

From the above table it represent that out of 56%of respondents expressed yes and 44% of respondents expressed that the organization is not flexible to work.

Does the organization is easy to adopt?

Particular	No of Respondents	% of respondents
Yes	48	48
No	52	52
Total	100	100

From the above table and graph represent that out of 48%of respondents expressed yes and 52% of respondents expressed that the organization is not easy to adopt.

CHI SQUARE TEST

Observed	**Expected**	**$(O-E)^2$**	**$(O-E)^2/E$**
56	51	9	0.18
44	51	9	0.18
48	49	9	0.18
52	49	9	0.18

CHI SQUARE TEST:

CHI SQUARE TEST: 0.7

BOOK VALUE: 7.815

Interpretation:

Chi square value is 0.7 than is less than the book value7.815, where we can reject the hypothesis and accept the null hypothesis. Hence it is proved that there is a relation between organization climate and job satisfaction.

FINDINGS

1) It is observed that out of 56%of respondents expressed yes and 44% of respondents expressed that the organization is not flexible to work

2) It is observed that out of 48%of respondents expressed yes and 52% of respondents expressed that the organization is not easy to adopt.

SUGGESTIONS

Decide system for information assortment .There are different approaches to gather information, for example, eye to eye talk with, calls and centre gatherings. Here and there representatives might be progressively happy with utilizing a mysterious hierarchical atmosphere evaluation program is to utilize server based online devices to permit respondents to take the overviews behind the security of their own work or home PC

CONCLUSION

A sound climate is a since quite a while ago run suggestion. Chairman need to embrace an advantage system to climate, inferring that they take since quite a while ago run viewpoint of air as a progressive asset. Various feel that legitimate environment is an underhanded determinant of lead in a natural sense. The people impression of what are out there goes about as a coordinating or mediating variable between definitive lifts and resultant lead.

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A STUDY ON PORTFOLIO MANAGEMENT

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ABSTRACT

The investment on shares, debenture, and bonds are both profitable and risk bearing, and it requires analytical skills. If an investor wants to make a profit on any sort of securities, he must concentrate on financial acumen as well as capable of facing risk. In the present scenario, Most of the people started investing on various portfolios such as Shares, Debenture, Bonds. But, they are unable to manage them prudently. Thus the present paper has been prepared with a view to providing suggestion to manage their portfolio in an effective way by using RSI (Relative strength Index) and ROC (Rate of Change).

KEYWORDS: *Portfolio, Shares, Bonds, Debentures Rate Of Change, Relative Strength Index,*

I.INTRODUCTION

The word Portfolio refers to the combination of securities such as shares, bonds, debentures…etc. Portfolio Management refers to diversification of investment with a view to mitigating the risk and maximizing the returns. Portfolio management serves as platform for the investors to diversify their portfolio among various investment avenues. The art and science of making decisions about investment mix and policy, matching investments to objectives, asset allocation for individuals and institutions, and balancing risk against performance.

Portfolio management is the art and science of selecting and overseeing a group of investments that meet the long term financial objective and risk tolerance of a client ,a company ,or investor

Objectives

1. To know the concept of portfolio management.
2. To analyze the risk and return of various investment avenues.
3. To evaluate the performance of portfolio over a period of time.

Scope of the study

1. It helps the investors to make appropriate investment decision.
2. It concentrates on wealth and profit maximization.
3. It even helps in long- term investment decision.
4. It helps an investor to know uncertainty of risk associated with the return.

Need of the study:

1. An Investor can generate highest return at a given level of risk.
2. It helps to identify the non -performing securities in the investment process and for betterment in the related areas.
3. It helps the investors to go with the optimal portfolio by the effective utilization of resources.
4. Diversification of investment leads to minimization of risk.

Tools used in Portfolio Management

Rate of Change:

The Rate of Change (ROC)is an indicator which measures the percentage change of the current price as compared to the price a certain number of periods ago. The ROC indicator can be used to confirm price moves or detect divergences; it can also be used as a guide for determining overbought and oversold conditions.

Close(today) – close(periods ago) *100

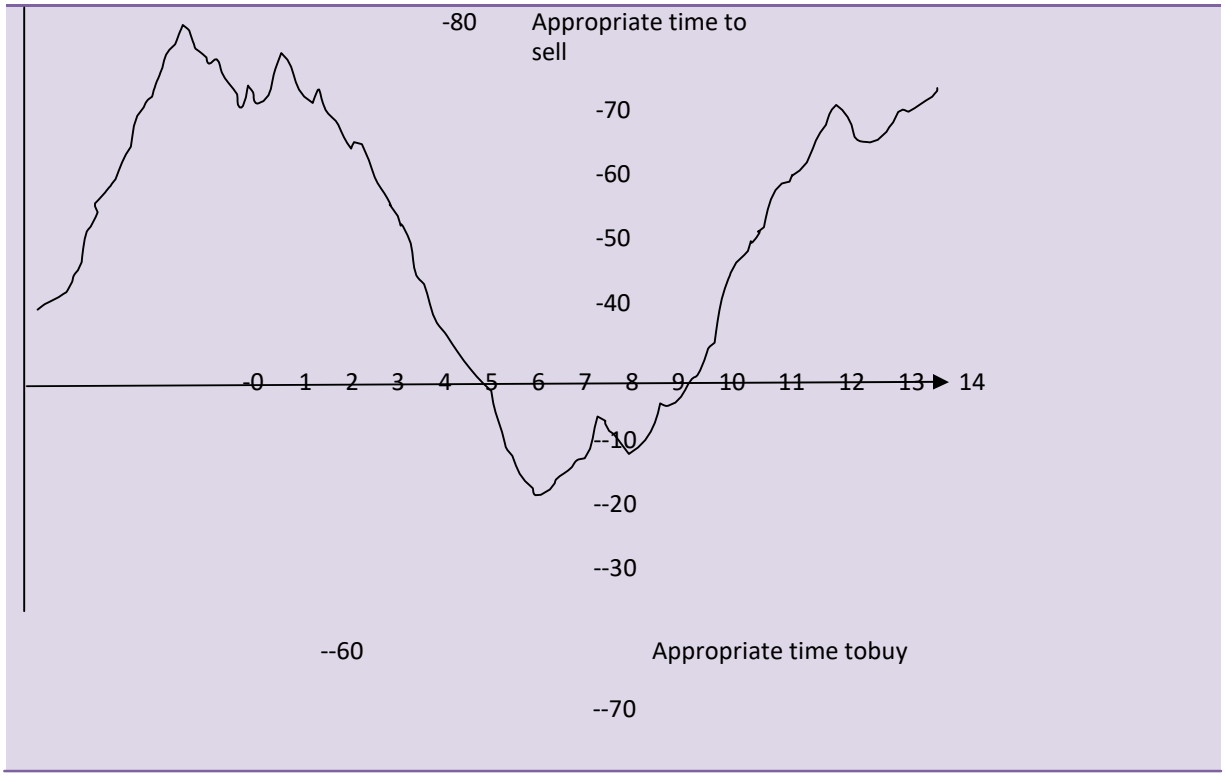
To understand the concept of ROC easily, let us consider the following example. Stock price of Ranbaxy Laboratories. Ltd is given below

Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Price	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	85	87	88	98

Calculation of 7 Day ROC

Days	Closing Price	Closing Price 7 days ago	Price ratio	ROC = Ratio-1
1	80			
2	81			
3	82			
4	83			
5	84			
6	85			

7	86	80	1.075	0.075
8	87	81	1.07	0.07
9	88	82	1.073	0.073
10	89	83	1.072	0.072
11	90	84	1.071	0.071
12	91	85	1.070	0.070
13	92	86	1.069	0.069
14	93	87	1.068	0.068
15	94	88	1.068	0.068
16	85	89	0.955	-0.045
17	87	90	0.966	-0.034
18	88	91	0.967	-0.033
19	98	92	1.065	0.065



The above chart clearly shows that one should buy a share that is oversold and sell the share that is overbought.

In the ROC Chart, overbought zone is above the zero line and the oversold zone is below the zero line

Relative Strength Index:

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To understand the concept of RSI easily, let us consider the following example. Stock price of Ranbaxy Laboratories Ltd is given below

Day	Closing Price	Change over previous day	
		Gain	**Loss**
1	132	---	---
2	130	---	02
3	120	---	10
4	145	25	---
5	156	11	---
6	200	44	---
7	190	---	10
8	200	10	---
9	190	---	10
10	195	05	---
11	190	---	05
12	200	10	---
13	250	50	---
14	280	30	---
15	275	---	05
Total		**14 Day Average = 185 / 14 = 13.21**	**14 Day Average = 42/ 14 = 3**

$$\left(ROC = 100 - 100/\right)(1+RS)$$

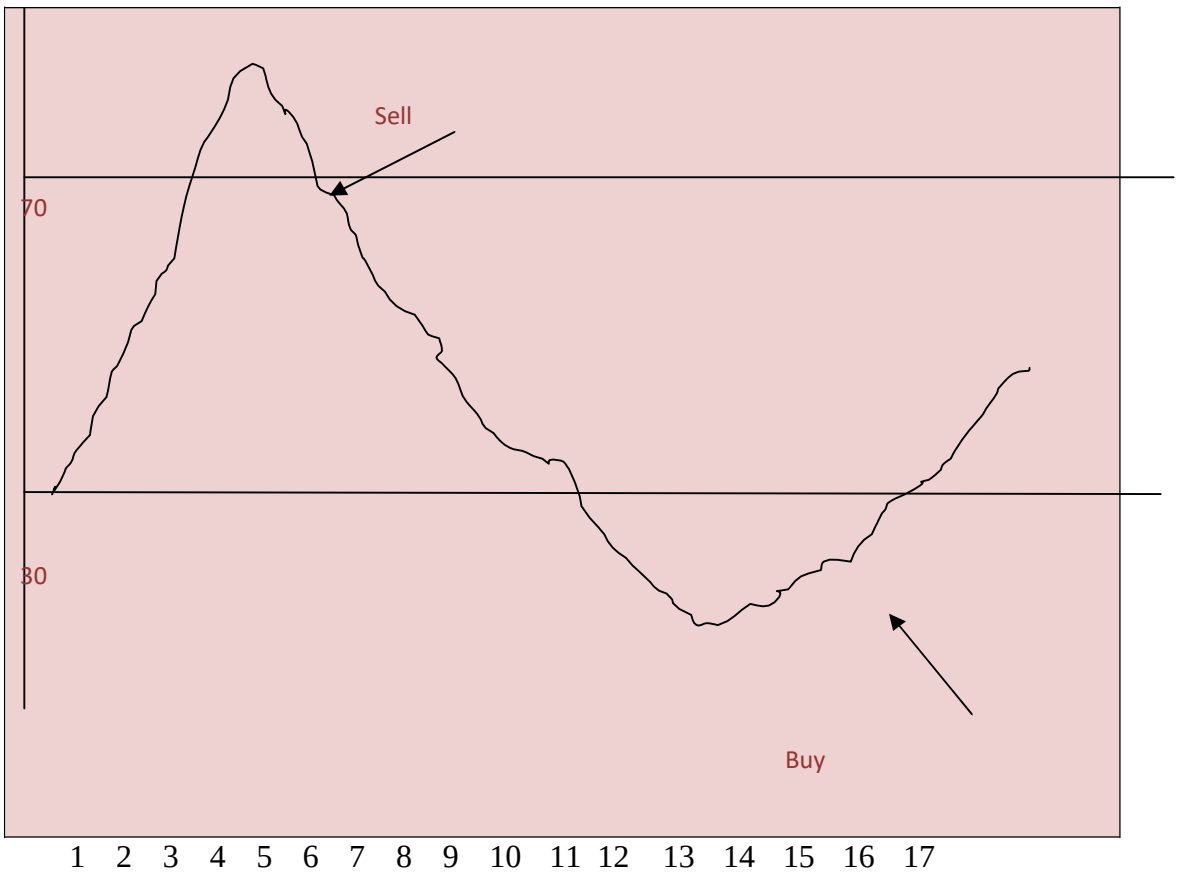
RS= 13.21/3 =4.40

RSI = 100 – (100 /(1+4.40)

= 100 - (100 / 5.40)

= 100 – 18.51

= 81.48



III.CONCLUSION

RSI Values above 70 are considered to denote overbought conditions and values below 30 are considered to denote oversold condition. When the RSI has crossed 30 lines from below to above and is rising, a buying opportunity is indicated. When it has crossed 70 lines from above to below and is falling, selling signal is indicated.

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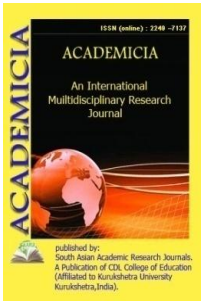

LIQUIDITY MANAGEMENT IN IRON AND STEEL INDUSTRY A SELECT STUDY

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ABSTRACT

The need for liquidity management had been described in this paper. Secondary data had been used for this study and statistical tools like correlation, graphs, and regression tests have been used for analyzing the data. The performance of the company had been compared with performance of global iron and steel industry. The research findings revealed that Sujana Universal Industries Limited had been good with regard to liquidity management. This paper helps finance managers in to gather insights for developing strategies with regard to financial management in organizations.

KEYWORDS: *Liquidity Management, Current Ratio, Quick Ration, Inventory Turnover Ratio, Iron And Steel Industry, Financial Performance.*

INTRODUCTION

The financial performance of an organization is important for sustaining in the market. There are various methods to assess the financial performance of an organization and in this study liquidity ratios have been used for assessing the financial performance of selected company in iron and steel industry. Sujana Universal Industries Limited had been selected for this study. The liquidity position of the company had been analyzed to know the financial position of the company. Liquidity refers to an enterprise's ability to pay short-term obligations; the term also refers to a company's capability to sell assets quickly to raise cash. Liquidity refers to the ability of a concern to meet its obligations in the short run, usually one year and to test its ability to maintain positive cash while satisfying immediate obligations (Khan & Jain, 2007).

About Sujana Universal Industries Limited

Sujana Universal Industries Limited is a holding company. The Company is engaged in manufacturing of iron and steel products. The Company offers Steel and its related products,

appliances, light engineering components (LEC) and international trading of steel and related products, applications include automobile components and general engineering equipment for both equipment manufacturers and the replacement market. The Company's divisions include Appliances division, which offers products, such as fans, fan components and other appliances; Steel Products division, which is engaged in activities, such as casting, processing and trading of steel and aided products; LEC division, which offers bearing and bearing components, and Infrastructure division, which is engaged in the construction and developmental activities, such as integrated residential townships, commercial buildings and specialized design and construction of integrated medical colleges and super specialty hospitals.

Research Objectives

- To study the liquidity position of the selected company.
- To know the association between current ration and quick ratio.
- To study the trend of selected liquidity ratios at the company.
- To understand the impact of current ration and quick ratio on inventory turnover ratio.
- To gather knowledge on liquidity management with regard to iron and steel industry.

LITERATURE REVIEW

Bhunia and Khan (2011) had argued that liquidity management is essential for decision making. Panigrahi (2013) had explained that capability of organization to meet sudden expenses by selling the assets can be stated as liquidity. When assets are sold the company should get fair market value can be regarded as liquidity management. Liquidity can be calculated by using some tests of liquidity. Arab et al 92015) had assessed the financial performance of iron and steel industry using liquidity ratios. Mukherjee and Roy (2015) had created a model for comparing the performance of liquidity position of two giant steel companies in India. Marie and Azhagaiah (20170 had measured the performance of iron and steel industry in India by using the concept of working capital.

The three important ratios for assessing the liquidity position are current ratio, inventory turnover ratio and debtors' turnover ratio. Singh and Asress (2011) had used student t-test for measuring the financial performance of selected firms in manufacturing sector. Pal (2018) had used liquidity ratio while using behavioral financial ratios of select organizations in post recession period. Krishnamoorthi (2016) had conducted a study and found relationship dividend decision and liquidity position of the organization. The dividend decision is more important for an organization because it influences the investors in decision making for continuing with the organization. Banerjee and De (2014) had observed from their study that "financial leverage", "debt service capacity (interest)" and "size of the firm (log assets)" are significant factors influencing the profitability of the firms of the Indian iron and steel industry

Shanthi and Eslavat (2014) had used elements like current assets, current liabilities and net working capital while evaluating the liquidity position of power Generation Company. Arab et al (2015) had considered financial data of approximately ten years to evaluate the liquidity position of steel industry in India. Yameen and Pervez had conducted the impact of liquidity position on profitability at Steel Authority of India Limited and found that there is decline in performance of the company. Maheshwari (2014) had mentioned that efficient working capital management is

necessary for achieving both liquidity and profitability of a company. A poor and inefficient working capital management leads to tie up funds in idle assets and reduces the liquidity and profitability of a company.

RESEARCH METHODOLOGY

In this research study secondary data for the selected parameters had been gathered from financial statements of the company. The study period is nine years from 2011 to 2019 and three parameters considered for this study are current ratio, quick ratio and inventory turnover ratio. The statistical software package had been used with tools like correlation, regression and graphs for analyzing the secondary data. The definitions for each ratio along with benchmark values have been described as follows.

Data Analysis

Secondary data procured from financial statement through online mode have been compiled in Table 1. There are various liquidity ratios but only three major liquidity ratios like current ration, quick ration and inventory turnover ratio have been used for data analysis.

TABLE 1: LIQUIDITY RATIOS

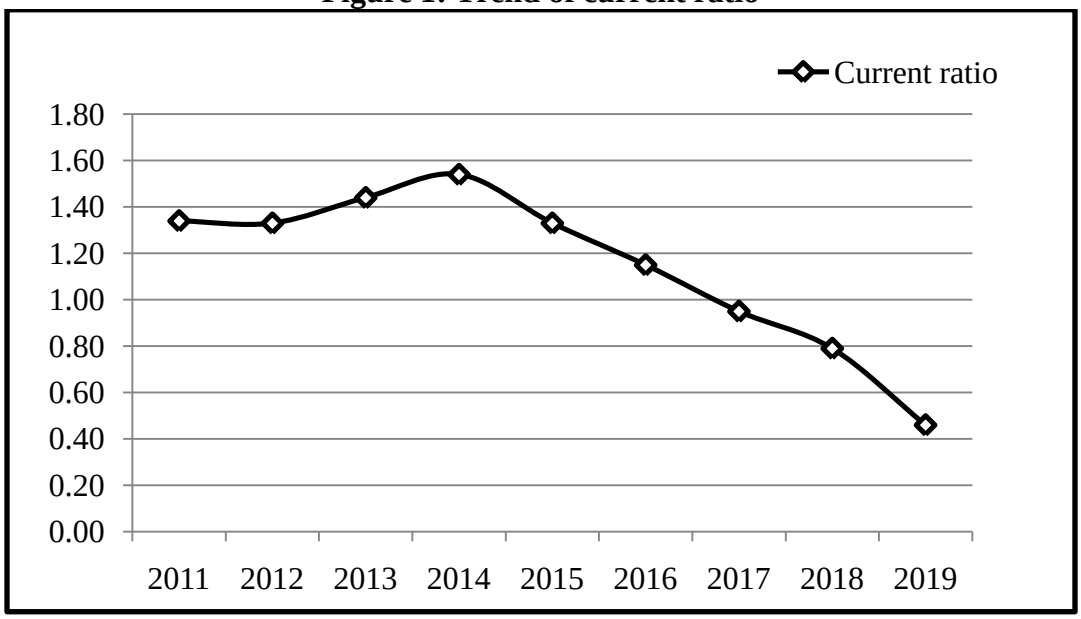
Year	Current ratio	Quick ratio	Inventory turnover ratio
2011	1.34	1.28	82.20
2012	1.33	1.29	79.94
2013	1.44	1.40	77.67
2014	1.54	1.50	81.26
2015	1.33	1.23	25.45
2016	1.15	1.09	49.20
2017	0.95	0.94	111.88
2018	0.79	0.78	5.85
2019	0.46	0.46	0.00

(Source: Secondary data from annual reports and internet)

Interpretation

The data for nine years from 2011 to 2019 have been used for this research work. The liquidity ratios of the selected company Sujana Universal Industries Limited had been shown in above Table1. The formula for current ratio, quick ratio and inventory turnover ratios have been defined in research methodology section of this paper. These three ratios selected in this study are standards for assessing the liquidity position of the organization.

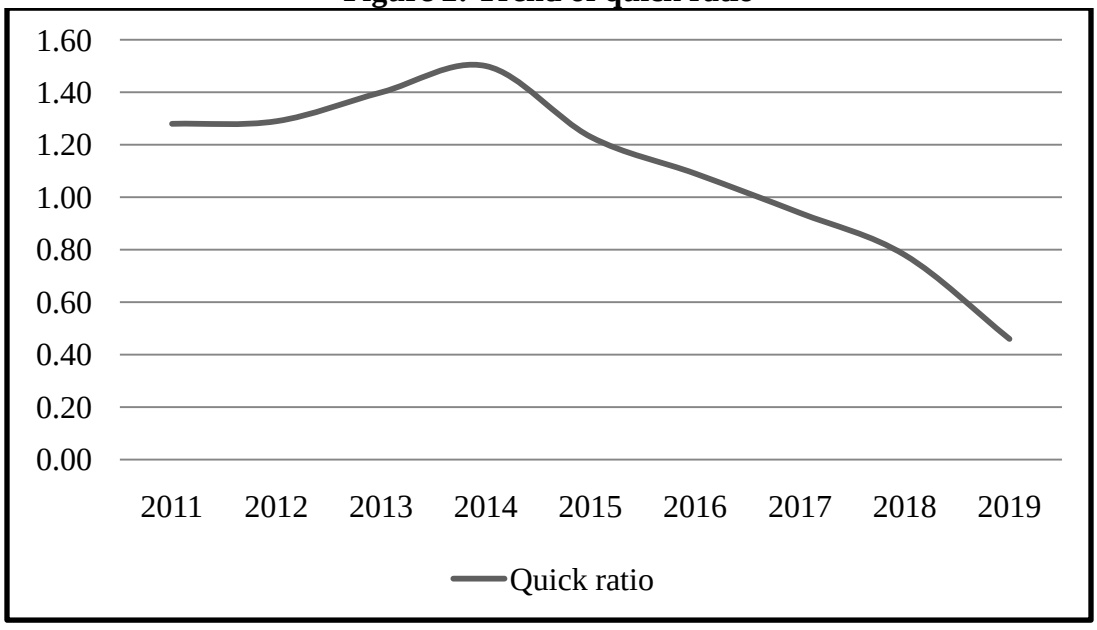
Figure 1: Trend of current ratio



(Source: Created by author)

It is observed that there is decline in current ratio of the selected company. The current ration above 1.0 is satisfaction because it helps the organization to meet the short term financial requirements. But it is common for large organization to experience low current ratio. Due to external market conditions there is opportunity for large companies in iron and steel industry to have low current ratio. However when market conditions becomes positive, then the company gains capability to have better current ratio.

Figure 2: Trend of quick ratio



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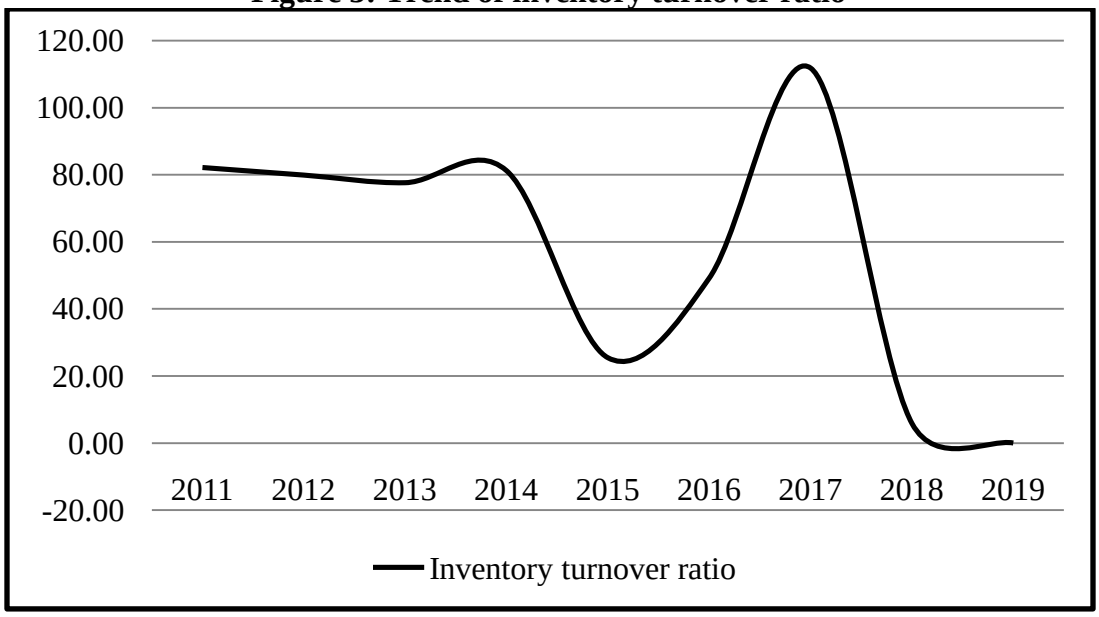
Interpretation

The quick ratio of the company is to meet immediate cash requirements. It means assets which cannot be converted into cash are eliminated while calculating quick ratio. The quick ration with value 1.0 is considered as standard. It is observed from 2011 to 2017 the company had good value of quick ratio. But in the last two years the quick ratio is less than 1.0 but again market conditions helps the company to regain the value of quick ratio above 1.0. The market conditions across the world had drastically changed for iron and steel industry. But at the same time the company has good quick ratio compared to other giants in the iron and steel industry both nationally and globally.

Figure 3: Trend of inventory turnover ratio



(Source: Created by author)

Interpretation

It is observed that there is lot of fluctuation in inventory turnover ratio. The higher inventory turnover ratio shows the healthy position of the company. It is observed that during 2017 the company had high inventory ratio and it is low during 2019. But there is always chance that the company can again gain its inventory ratio. From the viewpoint of inventory it can be stated that company performance is good in iron and steel industry.

Hypothesis H1: There is an association between current ratio and quick ratio at the selected company.

TABLE 2: CORRELATIONS

		CR	QR
Current ratio	Pearson Correlation	1	0.998**
	Sig. (2-tailed)		0.000

Quick ratio	N	9	9
	Pearson Correlation	0.998**	1
	Sig. (2-tailed)	0.000	
	N	9	9

**. Correlation is significant at the 0.01 level (2-tailed).
(Source: SPSS Output)

The 'r' value in table 2 is 0.998 and the p-value is less than 0.05. Therefore it can be stated that positive correlation exists between current ratio and quick ratio.

Hypothesis H2: There is an impact of current ratio and quick ratio on inventory turnover ratio.

TABLE 3: COEFFICIENTS[A]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig. (P-value)
		B	Std. Error	Beta		
1	(Constant)	-41.857	37.723		-1.110	0.310
	Current Ratio	-663.428	424.350	-5.976	-1.563	0.169
	Quick Ratio	776.667	450.350	6.593	1.725	0.135

a. Dependent Variable: Inventory Turnover Ratio
(Source: SPSS Output)

Interpretation

The p-value for current ratio and quick ratio are 0.169 and 0.135 respectively and both these values are more than 0.05. Hence hypothesis H2 is rejected based on the p-value in Table 3.

Findings

It is found from this study that company performance is good in the initial years of study period. But due to external market conditions is had declined. The current ration and quick ratios shows that company had good liquidity position in the beginning but later due to market conditions and economic downturns in the recent years the liquidity position had declined.

Suggestions

The company should increase advertising and market its products for getting more revenue. The marketing department should take active role and production department need to manufacture the products according to the market demand. It is time for the organization to concentrate on just-in-time (JIT) methodology for reducing the production costs.

CONCLUSIONS

It is observed from this study that large corporations develop strategies to become financially stable. The management of liquidity position is important for an organization. The confidence of investors can be gained with maintenance of liquidity position. It is important for every organization to maintain good liquidity position to meet the financial requirements. It would be

tough for an organization if cash is not available for day to day expenses. In manufacturing organization the cycle time between order and amount received should be decreased. The technology should be adopted for maintain quick cash flows and clients need to be reminded for payments continuously.

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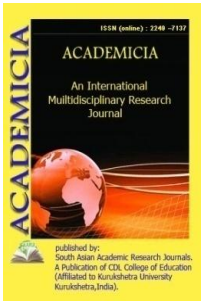

A STUDY ON EMPLOYEE ABSENTEEISM AT SPINCO BIOTECH PVT LTD

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ABSTRACT

Absenteeism is a common problem at every work place. It is applicable for both the employees and employers as well. Attendance is necessary for the employees working in an organization. It allows achieving targets and objectives at adequate level. Absenteeism reduces the interest of the employees and makes him / her insecure about their work in the organization, in order to understand the absenteeism at Spinco Biotech Pvt Ltd we have done a study through questionnaire.

KEYWORDS: *Employee Absenteeism, Demographic Factors,*

I. INTRODUCTION:

The term “absenteeism” is derived from the Latin word “absentia “.Absenteeism is any failure of an employee. As a positive influence, absence can help compel us to action resulting in by motivating them, as a negative influence it can result in feeling of demotivation, no cooperation between the superiors and the subordinates, lack of technology. “Absenteeism” is the total man shifts cost because of the absencesas a percentage of the total number of men shifts scheduled to work. Absenteeism of employees at work place leads to work delay, back logs etc.,

Absenteeism is mainly of two types:

1. **Innocent absenteeism** - where the employees are absent due to some genuine cause or reason, it may be due to illness or family problem.
2. **Culpable absenteeism** - where an employee fails to attend work without a reasonable explanation.

II. OBJECTIVES:

1. To study the various factors contributing to absenteeism in the organisation and employees working conditions.
2. To suggest measures to curtail the increase in the rate of absenteeism.
3. To identify the reasons for absenteeism.
4. To measure the employee absenteeism level.

III. REVIEW OF LITERATURE:

Fred Luthans says" Managers must identify and define the specific behavior. They must measure or count the occurrences of the pinpointed behavior conduct an analysis of the ABC's of the behavior called functionally analyzing the behavior the three steps in an applied behavior modifications program set the stage for the actual modifications. These help the employees change their behavior and decrease the levels of absenteeism

2) Lester Bittel says "An Employer fired an employee for excessive absences the employee filled a grievance stating that there had been no previous warnings or discipline related to excessive absences."

3) According to Hone, Angus "Absenteeism" is related to new values and norms which are developing among the workforce as a result of technological developments. Work and leisure are now cherished by the worker and these wants to infill along with the monetary benefits they get from his services. The economic considerations, therefore, decides whether one would like to be absent from work.

IV. RESEARCH METHODOLOGY: It is a way to systematically solve the research problem. It deals with the objective of a research study and defines the research problem.

DATA COLLECTION METHOD:

a) **Primary Data**: The data collected through primary sources mainly relate to the experiences and opinions of respondents regarding various aspects of absenteeism. Informal interviews were also conducted. These respondents were selected at random.

b) **Secondary Data**: The source of secondary data pertaining to the study was collected from records maintained by personnel department they are:

- Attendance registers of SpinCo biotech pvt ltd
- Books from library and Internet

HYPOTHISIS

H0- There is no significant relationship between employee personal reasons and employee absenteeism

H1- There is a significant relationship between employee personal reasons and employee absenteeism

RESEARCH TOOLS:

A set of questionnaire has been set to get the collective information from the employees. The questionnaire covers of a change of questions obtainable to the employees for their response. The types of questions are used in this survey are of:

1. Multiple choice questions and

2. Closed ended questions

SAMPLE SIZE TAKE IS: 100

RATIO: 1:1

STATSTICAL TOOLS USED:

VARIABLES:

Independent variable: Age, gender, marital status, seniority and residence of employees

Dependent variable: Employee absenteeism

I. DATA ANALYSIS AND INTERPRETATION

TABLE 1: AGE GROUP

Parameters	No: of Respondents	Percentage
20-30	9	15
30-40	18	30
40-50	18	30
More than 50	15	25
Total	60	100

It has been inferred that 30% of the employees who participated in the survey are of age group between 30-40 , 30% again come under the category between 40-50 age group and the rest of them belong to more than 50 (25%) and 20-30(15%) types.

TABLE 2. SEX

Parameters	No: of Respondents	Percentage
Male	42	70
Female	18	30
Total	60	100

It has been inferred that 70% of the employees participated in the survey are male and the remaining come under the female category**.**

TABLE 3. MARITAL STATUS

Parameters	No: of Respondents	Percentage
Single	9	15
Married	42	70
Divorced	3	5
Separated	0	0
Widow(er)	6	10
Total	60	100

It has been inferred that 70% of the employees who participated in the survey are married and 15% of respondents are bachelors. Rest of them are categorized under the category of widow and divorce cases.

TABLE 4. EMPLOYEE SATISFACTION AT WORK

Parameters	**No: of Respondents**	**Percentage**
Highly Satisfied	**4**	**6.67**
Satisfied	**12**	**20**
Neutral	**23**	**38.33**
Dissatisfied	**18**	**30**
Highly Dissatisfied	**3**	**5**
Total	**60**	**100**

It has been inferred that 45% of respondents frequently stand up for their rights, 21% stands for it occasionally. Also we can infer that 20% of the employees always stand up for their rights and 8% of them are rare, but 5% of them ignore such views.

TABLE 5. STRESS PART OF WORK LIFE FOR EMPLOYEES

Parameters	No: of Respondents	Percentage
Strongly Agree	10	16.67
Agree	30	50
Neutral	14	23.33
Disagree	5	8.33
Strongly Disagree	1	1.67
Total	60	100

It has been inferred that 50% of respondents agree that stress is part of their work life, 23% of them view it to be neutral. Also we can infer that, 16% of the employees strongly agree and 8% of them disagree but 2% of them strongly disagree.

TABLE 6. TIME FOR PERSONAL ACTIVITIES

Parameters	No: of Respondents	Percentage
Always	6	10
Frequently	18	30
Sometimes	11	18.33
Rarely	12	20
Never	13	21.67
Total	60	100

It has been inferred that 30% of respondents frequently get time to do things that are really important for them, 22% don't agree with this. Also we can infer that 20% who agree are rare cases and 18% only sometimes. 10% have enough time to deviate for their personal activities.

TABLE 7. SATISFIED WITH THE WELFARE MEASURES

Parameter	No: of Respondents	Percentage
Highly Satisfied	3	5
Satisfied	15	25
Neutral	13	21.67

Dissatisfied	24	40
Highly Dissatisfied	5	8.33
Total	60	100

It has been inferred that 40% of respondents are dissatisfied with the welfare measures adopted by the company, 25% are satisfied and also we can infer that 22% seems to be neutral, 8% are highly dissatisfied and 5% are highly satisfied.

TABLE 8. HEALTH PROBLEMS LEADING TO ABSENTEEISM

Parameter	No: of Respondents	Percentage
Very Often	3	5
Sometimes	18	30
Rarely	31	51.67
No	8	13.33
Total	60	100

It has been inferred that 52% of respondent have the opinion that sickness makes them absent from work rarely, 30% says from time to time and also we can infer that 22% says sickness alone does not make them absent from work. 5% very often are absent due to health problems.

TABLE 9. IMPACT OF POLITICAL OR SOCIAL ENGAGEMENT FORCE THEM TO BE ABSENT FROM WORK

Parameter	No: of Respondents	Percentage
Very Often	3	5
Sometimes	16	26.67
Rarely	17	28.33
No	24	40
Total	60	100

It has been inferred that 40% of respondents have an opinion that the political or social engagement force did not make them absent from work, 28% feel it to be rare and also we can infer that 27% are satisfied and 5% very often keep themselves absent due to political or social engagements.

TABLE 10. HABIT OF ALCOHOL CONSUMPTION MAKES THEM ABSENT

Parameter	No: of Respondents	Percentage
Often	2	3.33
Very Often	6	10
Sometimes	21	35
Rarely	9	15
No	22	36.67
Total	60	100

It has been inferred that 37% of respondents have an opinion that the habit of alcoholism did not make them absent from work. 35% says sometimes they are absent for work and also we can infer that 15 % come under rare cases, 10% are very often and 3% are often absent from work due to this bad habit.

TABLE 11. HELPING HAND FROM THE COLLEAGUES

Parameter	No: of Respondents	Percentage
Yes	6	10
No	36	60
To Some Extent	18	30
Total	60	100

It has been inferred that 60% of respondents have an opinion that their colleagues did not help them in case of personal problems, 30% says to some extent they had received some help and also we can infer that 10% agree that their colleagues help them in case of any personal problems.

TABLE 12. ANY OCCUPATIONAL HAZARDS WHICH PROMPT THE EMPLOYEES TO TAKE LEAVE

Parameter	No: of Respondents	Percentage
Yes	8	13.33
No	52	86.67
Total	60	100

It has been inferred that 87% of respondents have an opinion that they are not afraid of any occupational hazards which prompts them to take leave, 13% show some kind of fear towards occupational hazards which prompt them to take leave.

FINDINGS

1. Onanalysing the response it is found that, 35% of the employees are dissatisfied with their work&50% of the employees have an opinion that stress is part of their work life.
2. 43% agree and 27% strongly agree that their work is heavy. From this, it can be interpreted that the employees are having a hectic work schedule.A total of 70% of the employees feel lonely while working with others.
3. 39% of workers feel bored in their routine work&42% don't have time for their personal activities.
4. 40% of the workers are not satisfied with the welfare measures adopted by the company.
5. Health problems seem to be one of the causes of absenteeism for the work.
6. It is also found that 35% of the employees are satisfied with working condition.
7. It has been found that 40% of the respondents have an opinion that politics have no impact on the employee absenteeism.
8. 60% of the employees feel that their colleagues did not help them in case of personal problems.

SUGGESTIONS

1. The management must intervene in the day to day activities of the employees. They should provide full-fledged support, guidance and encouragement.
2. Overloaded workaholic atmosphere must be avoided, as it may create a lot of stress- related problems.
3. Employees must be encouraged for their creativity and innovative outlook towards their job assigned.
4. Welfare measures of the employees should be improved so as to make the employees feel more satisfied and contended. A satisfied employee will be more committed to the organization.
5. Medi-claim policies, weekly or monthly medical check-ups etc should be provided to the employees' in order to make them physically fit for the job.
6. The employees should either be provided with transportation facility or housing facility so that they would have ample time for recreation in substitute for the time they spend in traveling.

CONCLUSION

SPINCO Biotech PVT LTD is also a victim of absenteeism, as one of the curse their organization is facing at present. The study tries to reveal the factors influencing the absenteeism of employees with some suggestions which will be of immense aid for the employees as well as the organization to reduce the absenteeism level. I earnestly desire that, the study might bring some descend in the number of absentees in the organization, if taken into consideration practically. To conclude, employees' dissatisfaction towards job & welfare measures, hectic work schedule, stress, health problems are some of the major causes of absenteeism. This can be reduced by the management by implementing various employee satisfactory changes in the organization.

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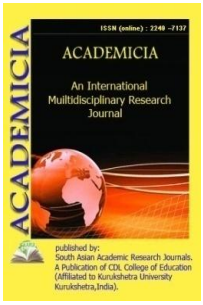

A STUDY OF EMPLOYEE SAFETY AND MEASURES ESSEN INDUSTRIES PVT. LTD

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ABSTRACT

Role of Human Resources in Handling Employee Safety Risks What is the part of human resources in managing employee safety risks? In most organizations, safety and health obligations are within the human resources department to ensure worker health and safety. This branch whether a part of the company or an outsourced segment should know when and how to use current resources to respond to employee concerns. The Workplace (Health, Safety, and Welfare) Regulations 1992 complete a set of six places of health plus safety regulations implementing EC Directives and replace numerous older and frequently excessively comprehensive laws. They protect an assortment of00 health, Construction websites and some mineral extraction sites). This Leaflet gives a brief outline of the requirements of these Rules and contains The Summary of Legislation to create simple advice for little businesses to cover Important regions of risk.

KEYWORDS: *Employee Safety Measure, Employee, Human Resource Management.*

1. INTRODUCTION

An extremely wide selection of workplaces, not merely factories, stores and places of work but also, by the approach of instance, schools, universities, hotels and places regarding entertainment. The expression office also contains the frequent parts of buildings that usually are shared, private roads in addition to avenues on business locations and business parks, in addition to momentary worksites (but not necessarily building sites).

'Domestic Premises' means an individual residence. These kinds of Regulations tend not to apply to be able to domestic Premises and rule out house workers. Yet, they will do apply to accommodations, assisted living facilities and also to be able to parts of workplaces where 'domestic' employees are employed, these kinds of as the kitchens regarding hostels.

2.OBJECTIVE OF THE STUDY

- To analyses the Effect of Safety on worker performance
- To assess the Employee satisfaction about Safety welfare facilities
- To create appropriate Suggestions and recommendations with a view to enhance the present Safety measures.
- To assess the Present security and Health coverage of the company.
- To assess the Safety measures adopted by Essen Industries Pvt. Ltd

3. SCOPE OF THE STUDY

Typically, the scope of the analysis is to know the current safety welfare measures followed in the organization and just how Essen Industries Pvt. Limited can increase the performance regarding personnel by embracing better safety welfare steps. The analysis is extended only to be able to the respondents operating inside the Essen Industries Pvt. Ltd, in Hyderabad. That doesn't cover each of the personnel working in Essen Industrial sectors Pvt. Ltd.. The research covers just some associated with the levels in a business. The welfare steps studied contain both no invasive, non-statutory measures plus mutual welfare steps. This analysis will also help the business to make crucial changes in their safety welfare applications.

4.NEED OF THE STUDY

The liberalization, Privatization and globalization of Indian economy in the past couple of years have introduced unprecedented challenges to the decision makers in government, industry and service industries to compete in the worldwide market with aggressive edge necessitates the industry to boost its productivity and high quality of products.

This objective cannot be achieved unless and until the workers are highly satisfied with the working environment and welfare facilities, which have a significant effect in industrial associations.

Essen Industries Pvt. Ltd Is Quite eager to Learn whether the current welfare Facilities supplied to the worker is satisfactory and is it impacting their Functionality in the organization.

The study will help them to find out if they're Fulfilling the needs of workers and if they're following the legal terms.

5. LIMITATIONS OF THE STUDY

- Information crucial to the analysis was private and hence wasn't revealed to the investigator from the Essen Industries Pvt. Ltd.
- This Analysis was inclusive of the two in-house study work and set of information Through survey. 100 individuals randomly were served using questionnaire

- The Analysis is limited to Essen Industries Pvt. Ltd in Hyderabad
- Inter-firm Comparisons aren't undertaken.

6.RESEARCH METHODOLOGY

NATURE OF DATA

Primary data

The principal data are collected through the Employees of Essen Industrial sectors Pvt. Ltd., via an instant structured questionnaire.

Secondary data

Company Profiles, Business registers, websites, magazines, articles were utilized widely as assistance to main data.

7. REVIEW OF LITERATURE

A Research was conducted on employee welfare Steps by KIRABAKARAN (1983) his findings are as follows Dunlop India Ltd, has undertaken a number of welfare measures along with statutory provision. Majority of the employees and employees are satisfied about the welfare facilities supplied by the concern.

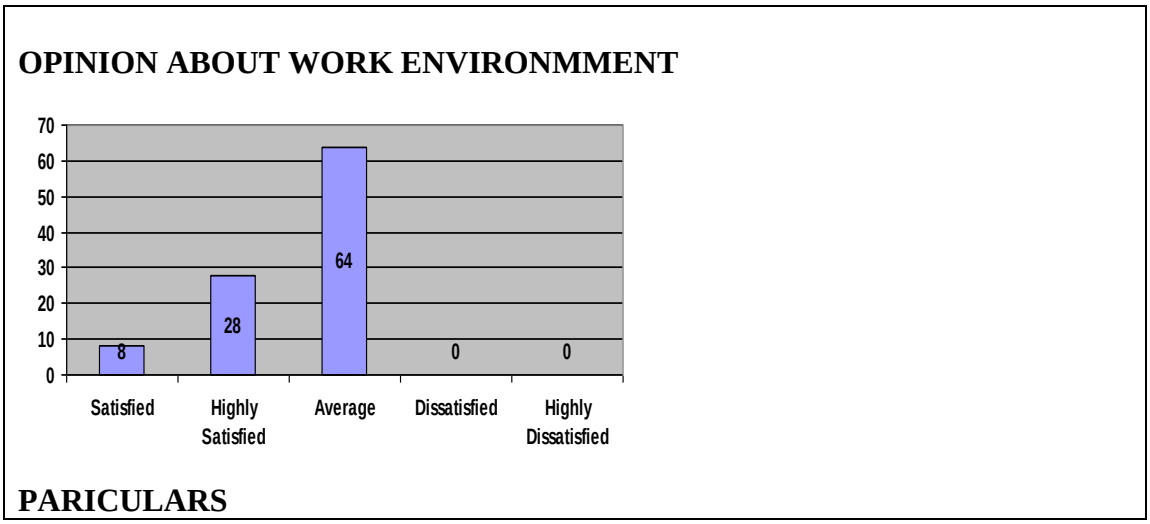
S. KUMAR (1993),"A research on the worker welfare steps in AFT Ltd Pondy". The author reasoned the goal of the study is to find out the welfare facilities provided on the AFT and the worker's proposal and opinion about welfare steps by employing structure questionnaire and by finishing personal simple random sample to get a sample of 100. The study demonstrated the welfare measure supplied by the business was adequate except for a few systems like home scheme and retirement strategy.

8.DATA ANALSYSIS

QUESTION-1

TABLE SHOWING THE THOUGHT ABOUT WORK ENVIRONMENT

Grade	No. of Respondents	Percentage
Satisfied	8	8
Highly Satisfied	28	28
Average	64	64
Dissatisfied	0	0
Highly dissatisfied	0	0
Total	100	100

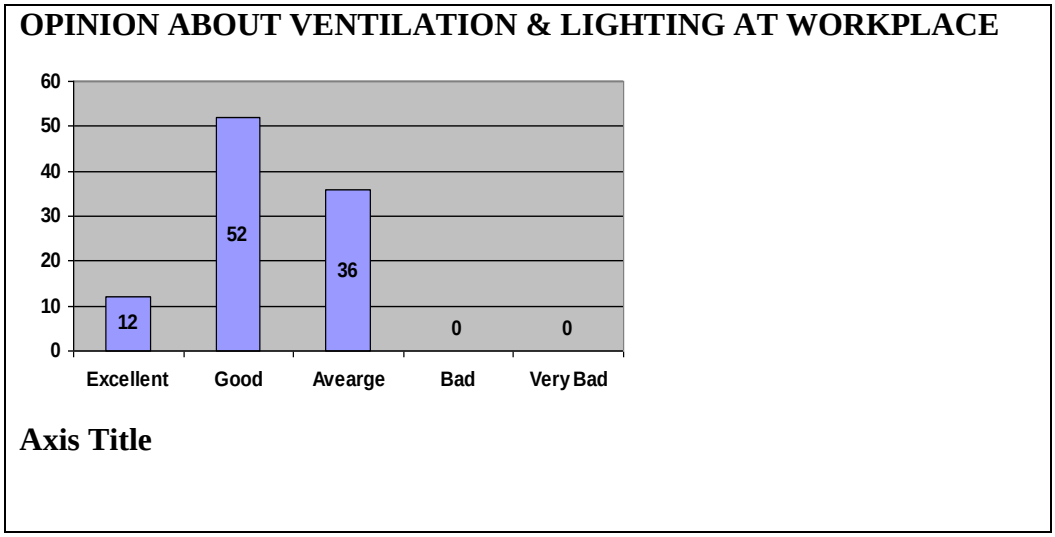


INTERPRETATION:

From the previously mentioned table it really is usually inferred that 8% regarding individuals replied to pleased, 28% of individuals reacted to highly happy, 64% persons to typical, in addition to 0% of people replied to be able to dissatisfy and intensely **dissatisfied**.

DESK DISPLAYING THE OPINION REGARDING VENTILATION and LIGHTING IN THE OFFICE PLACE

Grade	No. of Respondents	Percentage
Excellent	12	12
Good	52	52
Average	36	36
Bad	0	0
Very Bad	0	0
Total	100	100



INTERPRETATION:

Through the above table, it really is inferred that 12% of individuals responded to excellent, 52% of individuals responded to great, 36% persons to regular, and 0% of folks reacted to bad and extremely negative.

9.FINDINGS OF THE STUDY

The analysis indicates that will 75 percent of these types of respondents opined enough protection training programs are carried out in ESSEN INDUSTRIES PVT. LTD., and 25 % of these opined this isn't.

2. The evaluation indicates that 62 % of these respondents possess attended safety training applications and 38 percent associated with them haven't.

3.. The particular analysis indicates that ten percent of these participants have rated the training programs as highly successful, 84 percent have rated it effective, 5 percent don't have any opinion and one% says it's unsuccessful.

10. SUGGESTIONS AND RECOMMENDATIONS

- The Business can ensure that Security training Programs Are conducted for all of the workers, since 38 percent of them opined they haven't undergone any security instruction along with also the statistical analysis demonstrate that there's an association involving the total degree of satisfaction along with that the workers believe that the training that's being supplied isn't sensible. So measures might be adopted to make sure that training is much more practical in character.
- The researcher believes that the consciousness for the security Is very low among the workers. Steps might be undertaken to improve the awareness and demand for security.
- The Standard of mask and shoes supplied may be improved As 59 percent of these respondents have consequently opined.

11.CONCLUSION

A Vast majority of 81 percent of the respondents had been found to be more happy with the security measures at, ESSEN INDUSTRIES PVT. LTD 2 percent were highly satisfied, 1 percent was neutral in their view and just 16% disappointed with all the security steps.

The Few welfare steps that were dissatisfactory were transportation centers, rest The Management may focus on these regions to improve the satisfaction degree of Workers towards the welfare steps.

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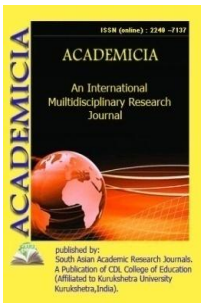

A STUDY ON PERFORMANCE OF MUTUAL FUNDS

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ABSTRACT

In this study the performance of selected mutual schemes of Nippon Mutual Funds had been evaluated. The market returns of the selected mutual funds are compared with market returns of S&P BSE Sensex. The parameters considered for evaluation of mutual funds used in this study are Jemsen's alpha, beta value and market returns. The net asset value (NAV) has been gathered from historical data of the selected mutual funds. This study provides information for better decision making towards investment in mutual funds. The financial experts can use the process described in this paper for evaluating mutual fund schemes.

KEYWORDS: *Mutual Funds, Jensen's Alpha, Market Returns, Growth Funds, Equity Funds, Bonus Option, Yearly Dividend.*

INTRODUCTION

Mutual funds is about pooling funds from large number of small investors and investing it in diversified ways for minimizing the risk. The investors in mutual funds select the schemes offered by mutual fund companies. The mutual fund companies create net asset value (NAV) and use it for investment. The fund manager conducts market research and decides the mode of investment. It is believed by many investors that risk with mutual funds is less compared to stock market. In stock market the investors decides the stock but in mutual funds the investors selects only schemes. The mutual funds can be broadly classified into two types open ended schemes and close ended schemes. In this research the mutual fund schemes of Nippon Mutual Funds have been used for evaluation. Nippon Mutual Funds is earlier known as Reliance Mutual Funds but recently in 2019 it had been renamed.

Research Objectives

- To understand the variation in performance of different schemes of mutual funds.

- To compare the BSE Sensex market returns and mutual funds market returns.
- To provide knowledge for investors and fund advisors for better evaluation of mutual funds.

LITERATURE REVIEW

Mutual funds sold through middlemen display weak performance and alpha value is low but investors purchasing from mutual fund companies can anticipate better performance (Guercio and Reuter, 2014). According Malkiel (2013) the contribution from financial services sector had increased in GDP in the last few decades and it is fueled by growth of mutual funds. The volume of transactions has relationship with cost of transaction which means asset management helps investors to save the transaction costs compared to shares. The diversification of funds reduces the risk for mutual fund investment.

Chuprinin et al (2015) has described the benefits with outsourcing management of in-house funds. The performance of international mutual funds is less risky with an opportunity to diversification. Berzins et al (2013) the performance of mutual funds operated by investment banks and financial institutions is similar with regard to alpha value. Chen et al (2013) had found that managements of large mutual fund are outsourcing the responsibility to outside agencies. The risk taking is low when outsourcing is implemented to professional financial advisory companies. Everyone believes that mutual funds are surrounded by market uncertainty similar to other investment options.

He and Xiong (2013) had explained the role of incentive system in asset management in mutual fund companies. Sialm and Tham (2016) had stated that performance of asset management in mutual fund companies is influenced by spillover effects like stock market indices. Sekhar (2017) had argued that negative impact of market conditions can be minimized thorough Asset Management Company with regard to mutual funds. Cremers et al (2016) had mentioned that mutual funds performance can be enhanced trough indexing.

Ayaluru (2016) had analyzed the performance of ten selected schemes of Reliance Mutual Funds and found that moderate risks exist for investors. Solanki (2016) had selected open ended schemes of Reliance mutual fund. It is observed that performance of Bombay Stock Exchange (BSE) Sensex has an impact on performance of mutual funds. Roopa et al (2017) had evaluated the mutual funds performance of banking sector using Sharpe Ratio and Jenson's Alpha method. Rani and Hooda (2017) had compared schemes of four mutual fund companies and found that Tata Equity P/E Fund is good option for investment.

METHODOLOGY

Secondary data had been used for conducting this research work. Secondary data for the study period of three months (from October 1st, 2019 to December 31st, 2019) had been considered. During the study period there are approximately sixty trading days for both mutual funds and S&P BSE Sensex and Mutual Funds. The data related to net asset value (NAV) of six mutual fund schemes have been procured from Nippon Mutual Fund website. The details of selected mutual fund schemes are listed in the below table. The BSE website had been used for downloading the BSE Sensex data for the selected study period of three months. The closing value of the trading day had been used for this study. The dailymarket returns for the BSE market returns and mutual fund schemes have been calculated. The secondary data had been entered into MS-Excel and inbuilt excel tools like SLOPE, AVERAGE and STDEVP had been

used for calculating Jensen's Alpha. The beta value and Jemsen's alpha are primary parameters used for evaluation of mutual funds.

TABLE 1: DETAILS OF SELECTED MUTUAL FUND SCHEMES

Nippon India Index Fund	• Sensex Plan Direct Growth Plan Bonus Option (SPDGPBO) • Sensex Plan Direct Yearly Dividend Plan (SPDYDP)
Nippon India Growth Fund	• Growth FundDirect Growth Plan Bonus Option (GFDGPBO) • Growth Fund Direct Dividend Plan (GFDDP)
Nippon India Focused Equity Plan	• Focused Equity Plan Direct Growth Plan Growth Option (FEPGBPBO) • Focused Equity Plan Direct Dividend Plan (FEPDDP)

(Source: Prepared by the researcher from Nippon Mutual Funds Website)

Data Analysis

Secondary data had been gathered for S&P Bombay Stock Exchange (S&P BSE) and for six mutual fund schemes of Nippon Mutual Funds. The six selected mutual fund schemes belong to three mutual fund categories. The three mutual fund categories are Sensex Plan, Growth Fund and Focused Equity Plan. The total trading days during three months period are 60 but market rate had been calculated for 59 days because growth rate of the first element not been considered. The risk free return had been 6.45 in the year 2019 and it is 5.45 in the year 2020. An ideal seven percent had been assumed for calculating the Jensen Alpha for this study.

TABLE 2: PERFORMANCE OF SELECTED PLANS

	Sensex Plan		Growth Fund		Focused Equity Plan	
	DGPBO	DYDP	DGPBO	DDP	GPGO	DDP
Number of trading days	59	59	59	59	59	59
Average daily market return	0.127%	0.127%	0.126%	0.126%	0.133%	0.133%
Annual risk free return	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%
Standard Deviation	0.634%	0.634%	0.593%	0.593%	0.765%	0.765%

(Source: Compiled by the researcher using MS-Excel)

Interpretation

The average daily return is high for both the schemes under Focused Equity Plan. The average daily return for S&P BSE Sensex for the study period is 0.120 percent. As per the table 5 in appendix section it is found that there no significant association exists between market performance and mutual funds performance. The average daily market return is low for Growth Fund but in the selected three categories of mutual funds of Nippon Mutual Funds. The standard deviation 8 percent approximately for Focused Equity Fund, but it low with approximately 6 percent for Growth Fund. Hence the risk with Focused Equity Plan is high and its returns are

high. Therefore it is proved that more risk gives more returns for an investor. The annual risk free return had been assumed as seven percent which is taken from the publishing of government financial institutions websites. The risk free rate is used when exchange takes place between the banks and for fixing the interests rate on government bonds.

TABLE 3: JENSEN'S ALPHA FOR SELECTED PLANS

	Sensex Plan		Growth Fund		Focused Equity Plan	
	DGPBO	DYDP	DGPBO	DDP	GPGO	DDP
Average market return	7.49%	7.52%	7.41%	7.41%	7.88%	7.87%
Specific period risk free rate	1.132%	1.132%	1.132%	1.132%	1.132%	1.132%
Beta	-0.02612	-0.025701	-0.07583	-0.07584	-0.02741	-0.02764
Jensen Expected Return	0.966%	0.967%	0.655%	0.655%	0.947%	0.945%

(From: Compiled by researcher using MS-Excel)

Jensen Alpha expected return gives the idea on performance of mutual funds through net assets values (NAV). The average market returns if high for Focused Equity Plan with approximately 6 percent. It is observed that average market return for all the six schemes is more than risk free rate. Hence investment in mutual funds is profitable compared to investment in government bonds or treasury bills. The risk free interest for trading days during three months study period is 1.32 percent. The beta value is positive only for Sensex Plan Direct Yearly Dividend Plan (SP DYDP). For all other schemes the beta value is negative during the study period. The Jensen's Alpha value is positive for all the selected schemes it means there exists good return for investors in the selected mutual schemes of Nippon Mutual Funds. The SensenPlan and Focused Equity Plans are having almost 1 percent Jensens' Alpha. The performance of Growth Fund schemes is little lower compared to other two mutual fund schemes.

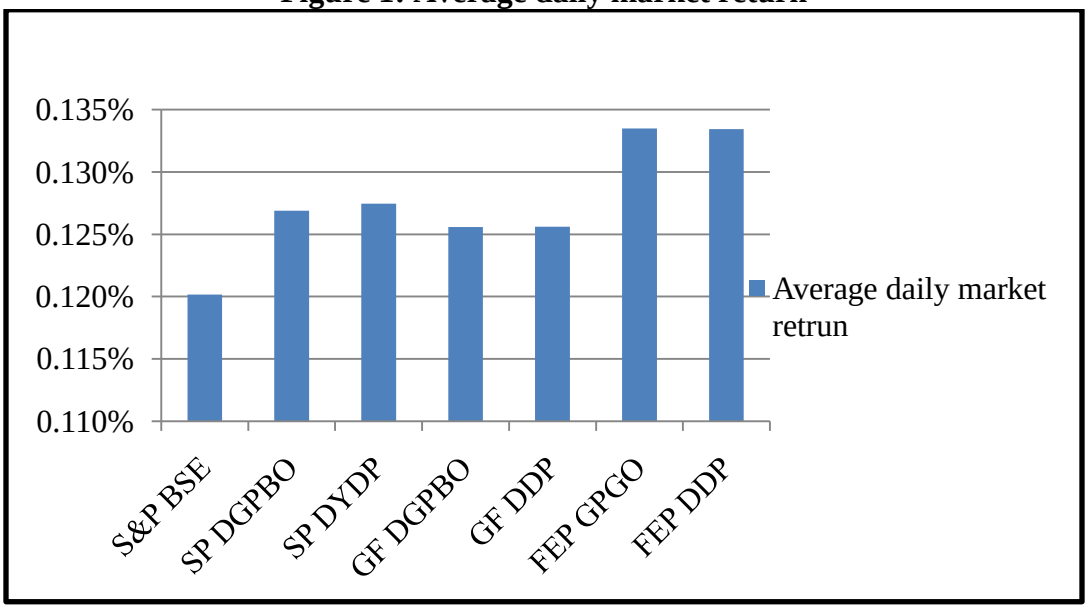
TABLE 4: TREND OF MARKET RETURN AND STANDARD DEVIATION

Index	**Average daily market return**	**Standard deviation**
S&P BSE	0.120%	0.675%
SP DGPBO	0.127%	0.634%
SP DYDP	0.127%	0.634%
GF DGPBO	0.126%	0.593%
GF DDP	0.126%	0.593%
FEP GPGO	0.133%	0.765%
FEP DDP	0.133%	0.765%

(Source: Compiled by the researcher)

The average daily market return and standard deviation helps in selection of best plans for mutual fund investment. However the performance of different schemes is almost similar and the standard deviation is also similar.

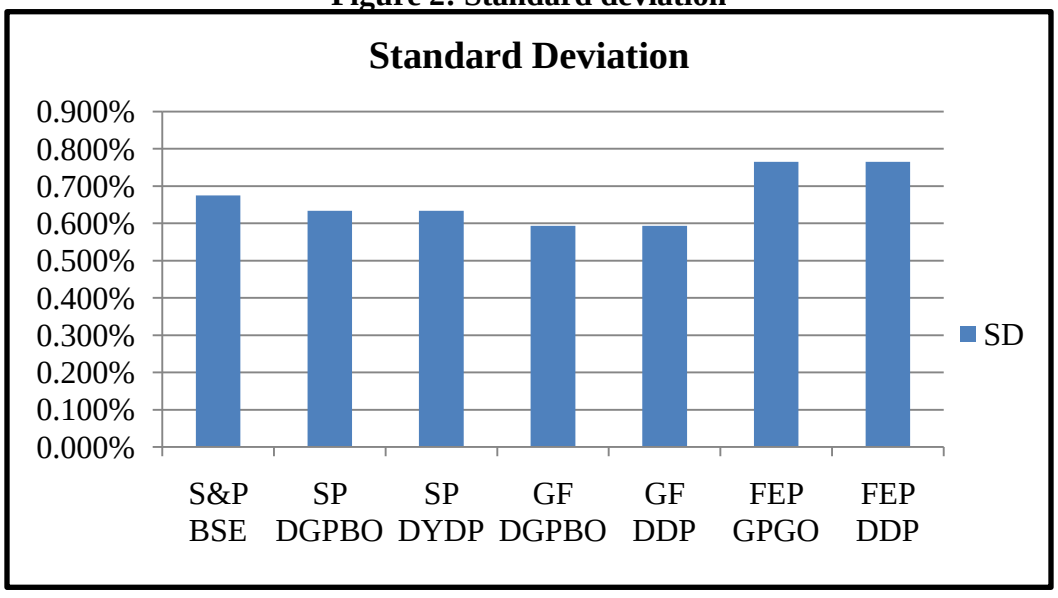
Figure 1: Average daily market return



(Source: Developed using MS-Excel)

The Focused Equity Plan schemes are having daily high market returns compared to other two schemes and S&P BSE. The daily market return of BSE Sensex is low compared to all the selected mutual fund schemes.

Figure 2: Standard deviation



(Source: Developed using MS-Excel)

The standard deviation with low value is favorable for investment decision. In the selected three mutual fund categories the performance of Growth Fund is better. There is more consistency in market returns of Growth Fund schemes. The risk is less with Growth Fund plans but the market return is also less compared to other plans.

H1: There is significant difference in performance of mutual schemes at the selected mutual fund company.

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Sensex Plan DGPBO	1.550	58	0.126	0.001288	-0.00037	0.00295
Sensex Plan DYDP	1.550	58	0.126	0.001288	-0.00037	0.00295
Growth Fund DGPBO	1.551	58	0.126	0.001203	-0.00035	0.00276
Growth Fund DDP	1.551	58	0.126	0.001203	-0.00035	0.00276
Focused Equity Plan GDGO	1.290	58	0.202	0.001288	-0.00071	0.00329
Focused Equity Plan DDP	1.290	58	0.202	0.001288	-0.00071	0.00329

(Source: Output from SPSS)

The p-value (significant value) for the six schemes in the above table is more than threshold value 0.05. Hence there is no variation in performance of mutual funds during the study period. The upper market return and lower market return for all the selected plans is almost similar. It can be stated that mutual fund scheme of same company have same performance.

DISCUSSION

There performance of all the six mutual funds is above the market return. The average market rate of return is 7 percent but the market of mutual funds is more than 7 percent. There is not significant correlation between the market return of BSE Sensex and market returns of mutual funds. There is variation in market returns of the selected six mutual funds schemes of three categories.

CONCLUSION

Mutual funds provide wide opportunity for small investors to enter into the capital market indirectly. The closed ended funds and open ended funds have unique advantage. Long term investors prefer close ended schemes and investors' need profits in short term prefer closed ended funds. It is observed that market returns on mutual funds is more compared to the market returns in BSE Sensex. The growth rate is negative to some mutual funds but overall performance is excellent. The Jensen's alpha value indicated that there is a positive return on investment in mutual funds. At the same time the each kind of mutual fund has its unique market rate of return even though they belong to same mutual fund company. It is suggested that investors need to concentrate more on selection of mutual fund organization rather than schemes. The performance of mutual fund organization is more important rather than a particular scheme. It is also suggested that closed ended schemes are better for small investors.

Future Research

In this research only data for few schemes with S&P BSE Sensex but future researchers can select some other schemes. The performance of mutual funds with other BSE Smallcap and BSE Largecap need to be conducted. The support of artificial intelligence for effective investment decision related to mutual funds need to be analyzed. The study for longer period can be conducted for more than a year. The net asset value (NAV) had been used as key factor but other factor of mutual funds can be considered by future researchers.

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Appendix

TABLE 5: CORRELATIONS

		S&P BSE	Sensex Plan DGPBO	Sensex Plan DYDP	Growth Fund DGPBO	Growth Fund DDP	Focused Equity Plan GDGO	Focused Equity Plan DDP
S&P BSE	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	59						
Sensex Plan DGPBO	Pearson Correlation	-.028	1					
	Sig. (2-tailed)	.836						
	N	59	59					
Sensex Plan DYDP	Pearson Correlation	-.028	1.000**	1				
	Sig. (2-tailed)	.836	.000					
	N	59	59	59				
Growth Fund DGPBO	Pearson Correlation	-.088	.765**	.765**	1			
	Sig. (2-tailed)	.508	.000	.000				
	N	59	59	59	59			
Growth Fund DDP	Pearson Correlation	-.088	.765**	.765**	1.000**	1		
	Sig. (2-tailed)	.508	.000	.000	.000			
	N	59	59	59	59	59		
Focused Equity Plan GDGO	Pearson Correlation	-.026	.863**	.863**	.850**	.850**	1	
	Sig. (2-tailed)	.845	.000	.000	.000	.000		
	N	59	59	59	59	59	59	
Focused Equity Plan DDP	Pearson Correlation	-.026	.863**	.863**	.850**	.850**	1.000**	1
	Sig. (2-tailed)	.845	.000	.000	.000	.000	.000	
	N	59	59	59	59	59	59	59

**. Correlation is significant at the 0.01 level (2-tailed).

(Source: Output from SPSS)

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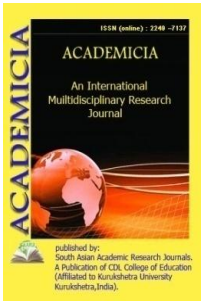

FIXED ASSET MANAGEMENT WITH REFERENCE TO ULTRA TECH CEMENT

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ABSTRACT

Real property is a concept used for the valuation of land and assets that cannot be turned quickly into cash and is often defined as a non-current asset or as house, plant and equipment (PP&E). The current assets like currency or bank accounts may be contrasted to those defined as capital. Throughout certain instances, it is referred to as defined just measurable properties. Fixed asset are most important as the capital has been fixed for a period of long duration and also required to utilize at optimum level is one more factor in any organisation while in increasing the profit level. This studyfocusses on the management level of fixed assets with reference to Ultra tech cement Ltd.

KEYWORDS: *Fixed Assets, Current Assets, Statement Analysis, Capital, Properties*

I. INTRODUCTION

The accounts include financial statements that take into consideration the present function of the company entity. Throughout the present contexts, the corporate entity is believed to have realistic hopes that the enterprise can operate for an unspecified amount of time. This presumption offers a substantial proportion of the rationale for tracking and consistently depreciating capital assets at initial expense irrespective of their present viable value.

II. NEED AND IMPORTANCE OF THESTUDY

Inorder to accomplish the goals of businesses, capital assets play an significant part. The set ones can not be transformed or liquidated for a certain era. Net investments are used to accumulate owner capital and long term liabilities. Financial investments have now controlled the business and the corporation utilizes capital assets. The ratio therefore helps to measure and assess the business ' results.

III. OBJECTIVES OF THE STUDY

1.To analyze the capital investments produced during the five years span by UltraTech Cement Limited.

2. To determine UltraTech Cement Ltd's fixed asset results and turnov

3. To assess the sum of funding for fixed assets supported by long-term obligations and owners funds and to determine how fixed assets provide the business with sufficient returns

4. To assess how much capital assets can add against the recovery of shareholders ' funds and long-term obligations until liquidated.

The UltraTech Cement Restricted fixed assets are included in the scheme. Depending on the company's financial accounts. The focus is restricted to capital assets, their study and their results, but not to any other company, marketing and financial sec IV V

IV. METHODOLOGY

The required data for this project was obtained from secondary sources only. Purely out of popular texts and citations are abstract materials and the company's tax reports contain financial statements.

PERIOD OF STUDY:

Made a study for the period of 5 years . 2013-14 to 2017-18.

V. LIMITATIONS:

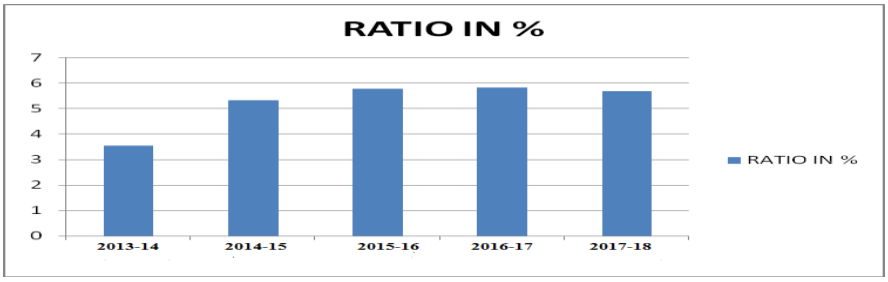
1. The research is restricted to details and annual reports issued by Ultra Tech Cement only.

DATA ANALYSIS

Real property is a concept used for the valuation of land and assets that can not be turned quickly into cash and is often defined as a non-asset or as house, plant and equipment (PP&E). The current assets like currency or bank accounts may be contrasted to those defined as capital

YEAR	NETFIXED ASSETS	CAPITAL EMPLOYED	RATIO IN %
2013-14	10890.33	3063.83	3.554482
2014-17	12166.13	2286.16	5.321644
2017-16	14025.19	2421.52	5.791895
2016-17	17521.42	2663.59	5.827255
2017-18	18384.46	3230.93	5.690144

FIXED ASSET RATIO:



INTERPRETATION

The table indicates the effective role of firm investments in the business in view of the increase of real assets. There is little improvement in the top percent in 2014/2017, as the long-term funding indicates less variations. This year, i.e. 2017-2018, shows that 5.69 shows satisfactory the company'srole.

VI. FINDINGS

- Long term funds show an increase in fixed assets.•
- The total turnover ratio of investment has shown that sales were up in the 2014-2018period.
- Sales increased with respect to the fixed asset turnoverratio.
- With regard to the return on the total asset ratio, profit was noted. This reflects the company's advantageous position.
- The analysis above indicates that the overall financial condition for fixed assets of UltraTech Cement Limited is adequate.

VII. CONCLUSION

Ultra Tech Cement Limited's Fixed Asset Management is with a rational mix of debt and equity. The general review of the financial statement ensures that production, financing and developments are utilized effectively. As assessed by improved capital and surplus, the productivity of the company seems remarkable.

Discussions on management and review in compliance with business law and accounting principles by Director's Report and by opinions expressed in the Report of the Auditor in a fixed asset management statement are accurate and rational.The company's total wealth control is more than adequate.

VIII. SUGGESTION

- Strengthening the company's role by utilizing capital assets wisely is proposed.
- Fixed asset development rates may be improved by the utilization of additional spending.
- Revenue efficiency should be increased overall.
- An independent disclosure is more important than disclosure of consolidated debtors ' and loan transactions as exchange declines / increases and otherstatements.
- The globalization of markets and expectations for institutional holders, a broad and challenging

corporate market, include a straightforward, in-depth detail on the financial position of the business in the AnnualReport.

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PROBLEMS OF FARMERS OF VEGETABLES AT PRE CULTIVATION AND ITS IMPACT ON FUNCTIONAL PERFORMANCE IN NELLORE DIST, A.P, INDIA

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ABSTRACT

Vegetables provide vital protective nutrients like vitamins and minerals in the balanced diet of human beings. It is not an exaggeration to say that there is no human being in the world who does not consume vegetables. Besides, vegetable cultivation is more labour intensive and remunerative for small and marginal farmers. Despite its utility, vegetable cultivation, consumption and marketing- in India remain a relatively neglected aspect. This study considered the problems faced by the farmers of vegetables in pre cultivation.

KEYWORDS: *Farmers, Vegetables, Pre Cultivation, Marketing*

1. INTRODUCTION

Though India is the second largest country in terms of production of vegetables in the world, the average per capita intake of vegetables is much below the requirements of a balanced diet. This is mainly due to severe handicaps associated with production and marketing of vegetables. The production problems include low productivity, traditional cultivation practices. The agricultural marketing system in India is very often viewed as exploitative. The difference in prices received by the growers and the prices paid by the ultimate consumers is too wide, almost four times or even more. As a result, Indian vegetable growers are considered to be the bad marketers not only because of their ignorance towards modern methods of marketing but also due to the peculiar structure of marketing over which they have no control under this situation, they are forced to accept the prices offered by the traders. In view of vital importance attached to vegetable marketing there is a need to investigate the economic as well as managerial aspects of vegetable marketing in order to identify the problems and improve the production and marketing methods of the vegetables.

2. STATEMENT OF THE PROBLEM

The major players in agricultural marketing are farmers, middlemen and the ultimate consumers. More specifically, the study of vegetable cultivation and its practices is the need of the hour. Hence this study raises various research issues from viewpoints of farmers of vegetable in pre cultivation. As far as the producer is concerned, what are the various functions performed by him? How is he financed? What are the various problems faced by him in Nellore District.

3. OBJECTIVES OF THE STUDY

i. To study the various pre cultivation functions performed and problems faced by the farmers.

ii. To offer suitable suggestions to overcome the problems faced by the producers.

4. METHODOLOGY

It is a sample survey to evaluate the functions of farmer in Nellore District.

Sources of Data

This study has primary as well as secondary data. But the study relies more on primary data. However, to clarify certain points and to know the general details relating to vegetable cultivating system and practices in Nellore district statistical officials, Government of India, Ministry of water resources, Ground water information.

Sampling Framework

The researcher adopted purposive sampling method to select the sample observation and the sample size is 103 Producers.

Collection of Data

A structured questionnaire was prepared to scrutinize the functional areas of producers in vegetable markets. The questionnaire was prepared in the regional language of the farmers.

Analysis of Data

After the final data collection was over, Multiple Regression analysis was used to scrutinize the impact of problems on their performance.

5. FUNCTIONS AND PROBLEMS OF FARMERS

This study deals with the functional analysis of farmers. The analysis was done at financing and pre-cultivating functions to the functional performance of the farmers. Multiple regression analysis was utilized to scrutinize the impact of various problems which existed in the functional area on this functional performance.

6. DATA ANALYSIS AND DISCUSSION

Age, Gender and Education

The age was classified as below 18 years, 18 to 25 years, 25 to 40 years, 40 to 60 years and above 60 years. It is seen that out of 103 farmers, 46.6 percent were in the age group between 25 to 40 years followed by 29.1 percent and 17.5 percent who were in the age group between 40 to 60 years and 18. to 25 years respectively. Hence, a maximum of 46.6 percent of the farmers were

in the age group between 25 to 40 years in the research study. It is seen that out of 103 samples of farmers, 89.3 percent of them are male and the remaining 10.7 percent were female farmers in the study. Hence, a maximum of 89.3 percent of the farmers belong to the male category.

The educational qualifications were classified as illiteracy, schooling, college, technical and professional education. It was inferred from the above table that out of 103 samples, 64.1 percent of the farmers had school education, 20.4 percent of them had college education followed by 9.7 percent and 5.8 percent of farmers were illiterates and technically professionally qualified lot respectively. Hence, a maximum of 64.1 percent of the farmers were in the category of school education.

TABLE NO 1.1 LANDHOLDING SIZE OF FARMERS

Acres	Number of Respondents	Percent
Below 1	6	5.8
1-2	27	26.2
2-3	17	16.5
3-4	38	36.9
Above 4	15	14.6
Total	103	100.0

Source: Primary Data

Table 1.1 illustrates the landholding size of the farmers. The landholding size was classified as below 1 acre, 1 to 2 acres, 2 to 3 acres, 3 to 4 acres and above 4 acres. It is seen from the table that out of 103 sample farmers, 36.9 percent of the farmers hold 3 to 4 acres, 26.2 percent possess 1 to 2 acres, 16.5 percent of farmers have 2 to 3 acres and 14.6 percent of farmers hold above 4 acres. Hence, it is inferred that a maximum of 36.9 percent of the farmers hold 3 to 4 acres.

TABLE 1.2 NATURE OF OWNERSHIP OF THE FARMERS

Ownership	Number of Respondents	Percent
Owned	73	70.9
Leased	7	6.8
Both	23	22.3
Total	103	100.0

Source: Primary Data

Table 1.2 visualizes the nature of ownership of the farmers, which is classified as owned, leased and both. From the total 103 sample farmers, 70.9 percent have their own land, 6.8 percent of the sample farmers have leased lands and the remaining 22.3 percent of the farmers have both owned and leased lands. Hence, a maximum of 70.9 percent of the farmers possess their own lands for cultivation.

TABLE 1.3 NATURE OF LAND FERTILITY OF THE FARMERS

Nature	Number of Respondents	Percent
Wetland	2	1.9
Garden	94	91.3

Dry Land	7	6.8
Total	103	100.0

Source: Primary Data

Table 1.3 brings out the nature of land fertility possessed by the farmers. The nature of fertility was classified as wet land, garden and y land. In which, out of 103 samples 91.3 percent of land are in the nature of garden, 6.8 percent of land fertility is dry and the remaining 1.9 percent of the land is wet. Hence, a maximum of 91.3 percent of the land is in the form of garden.

Thus, a maximum of 36.6 percent of the cultivable land of the fanners range in the group with a profession of 2 to 3 acres.

TABLE 1.4 CROPS CULTIVATED BY THE FARMERS

Crops	**Number of Respondents**	**Percent**
Paddy	43	41.7
Sugarcane	5	4.9
Fruits	33	32.0
Banana	6	5.8
Vegetables	12	11.7
All	4	3.9
Total	103	100.0

Source: Primary Data

Table 1.4 explains the crops cultivated by the farmers. The cultivated crops are classified as paddy, sugarcane, fruits, banana, vegetables and all. It is seen from the table, that among the 103 samples, 41.7 percent of the crop cultivated by the farmers was paddy, 32 percent of crop cultivated were fruits and 11.7 percent of the crop cultivated was vegetable. Thus, a maximum of 32 percent of the farmers cultivated crops are paddy.

TABLE 1.5 RATE OF INTEREST CHARGED ON DEBT

Rate (in %)	**Number of Respondents**	**Percent**
Below 10	53	51.5
10-15	17	16.5
15-20	22	21.4
20-25	9	8.7
Above 25	2	1.9
Total	103	100.0

Source: Primary Data

Table 1.5 portrays the rate of interest charged on debt. The rate of interest was classified as below 10 percent, 10 to 15 percent, to 20 percent, 20 to 25 percent and above 25 percent. It was inferred from the table that among the 103 sample farmers, 51.5 percent of them procure the finance below 10 percent interest, 21.4 and 6.5 percent fall between 15 to 20 percent and 10 to 15 percent Interest category respectively. 8.7 and 1.9 percent of the sample farmers belong to 20 to 25 percent and above 25 percent interest Category respectively. Hence, the majority of 51.5 percent of the farmers were charged below 10 percent interest on their debt.

TABLE 1.6 COST OF PREPARING THE LAND BY THE FARMERS

Amount (in Rupees)	Number of Respondents	Percent
Below 500	1	1.0
500-750	23	22.3
750-1000	13	12.6
1000-1250	48	46.6
Above 1250	18	17.5
Total	103	100.0

Source: Primary Data

Table 1.6 shows the cost of preparing the land for vegetable production. The cost of preparing the land was categorized as below 500 rupees 500 to 750 rupees, 750 to 1000 rupees, 1000 to 1250 i1pees and above 1250 Rupees It was inferred from the table that out of 103 sample respondents, 46.6 percent of the farmers spent between 1000 to 1250 rupees for preparing the land 22.3 and 17.5 percent of them spent between 500 to 750 rupees and above 1250 rupees respectively for preparing the land for cultivation. Hence, it is observed that a majority of 46.6 percent of the farmers spent between 1000 to 1250 rupees for preparing the land for Vegetable production.

TABLE 1.7 SOURCES OF VEGETABLES SEEDS OF THE FARMERS

Source	Number of Respondents	Percent
Own produce	17	16.5
From commission agents	22	21.4
Seed Shops	51	49.5
Agricultural department	13	12.6
Total	103	100.0

Source: Primary Data

Table 1.7 explains the source of getting seeds for sowing. The source was categorized as own produce, from commission agents. seed ops and agriculture department. It is seen from the above table that t of 103 respondents, 49.5 and 21.4 percent of the sample farmers purchase the seeds from the seed shops and commission agents respectively. 16.5 and 12.6 percent get the seeds from their own produce and agriculture department respectively. Thus, a majority of 49.5 percent of the farmers purchased the seeds from the seed shops.

TABLE 1.8 COST OF SEEDS INCURRED BY THE FARMERS

Amount (in Rupees)	Number of Respondents	Percent
Below 500	7	6.8
500-750	59	57.3
750-1000	24	23.3
1000-1250	9	8.7
Above 1250	4	3.9
Total	103	100.0

Source: Primary Data

Table 1.8 shows the cost of seeds The cost of the seeds was classified as below 500 rupees, 500 to 750 rupees, 750 to 1000 rupees,1000 to 1250 rupees and above 1250 rupees per acre. It is clear from the above table that out of 103 respondents 57 3 and 23.3 percent of them spent between 500 to 750 and 750 to 1000 rupees respectively towards seeds. 6.8 and 8.7 percent of the sample farmers Spent below 500 rupees and between 1000 to 1250 rupees respectively for purchase of seeds. Hence a majority of 57.3 percent of the farmers spent between 500 to 750 rupees per acre for the purchase of the seeds.

TABLE 1.9 COST OF MANURE INCURRED BY THE FARMERS

Amount (in Rupees)	Number of Respondents	Percent
Below 250	10	9.7
250-500	53	51.5
500-750	24	23.3
750-1000	13	12.6
Above 1000	3	2.9
Total	103	100.0

Source: Primary Data

Table 1.9 visualizes the cost of manure incurred by the farmers per acre. The cost of the manure was classified as below 250 rupees, 250 to 500 rupees. 500 to 750 rupees, 750 to 1000 rupees and above 1000 rupees. It is seen from the table that among the 103 respondents, 51.5 and 23:3 percent of the sample farmers incurred expense between 250 to 500 rupees and 500 to 750 rupees respectively for manure. 12.6 percent and 9.7 percent of the sample respondents incurred an expense below 250 and between 750 to 1000 rupees respectively for manure. Hence, a majority of 51.5 percent of the farmers incurred the cost of manure between 250 to 500 rupees per acre

TABLE 1.11 SOURCES OF IRRIGATION OF THE FARMERS

Source	Number of Respondents	Percent
Canal	5	4.9
River	39	37.9
Well	48	46.6
Bore	8	7.8
Rain water	3	2.8
Total	103	100.0

Source: Primary Data

Table 1.11 shows the source of irrigation. The source of irrigation was classified as canal, river, well, bore and rain water. It was inferred from the above table that out of 103 samples, 46.6 percent of the sample farmers irrigated the field by using well, 37.9 percent of them using river water, 7.8 percent of the sample respondents using bore water and 4.9 percent were using canal water for Irrigating the lands. Thus, a maximum of 46.6 percent of the farmers irrigate their lands by using the source of well water.

TABLE 3.22 COST OF FERTILIZER INCURRED BY THE FARMERS

Amount (in Rupees)	Number of Respondents	Percent
Below 250	3	2.9
250-500	17	16.5

500-750	18	1.5
750-1000	35	34.0
Above 1000	30	29.1
Total	103	100.0

Source: Primary Data

Table 1.12 explains the cost of fertilizer per acre. The fertilizer cost was categorized as below 250 rupees, 250 to 500 rupees, 500 to 750 rupees, 750 to 1000 rupees and above 1000 rupees. It was inferred from the table that out of 103 sample respondents 34 and 29.1 percent of them spent between 750 to 1000 rupees and above rupees respectively for purchase of fertilizers. 16.5 and 17.5 percent of sample respondents incur an expense between 250 to 500 and 500 to 750 rupees respectively towards fertilizer cost. Hence, a majority of 34 percent of the farmers incurred a cost between 750 to 500 rupees per acre for the purchase of fertilizers.

TABLE 1.13 PERFORMANCE OF PRE-CULTIVATING AND FINACIAL FUNCTION OF THE FARMERS

Response	**Number of Respondents**	**Percent**
Excellent	8	7.8
Good	31	30.1
Fair	46	44.6
Bad	12	11.7
Worst	6	5.8
Total	103	100.0

Source: Primary Data

Table 1.13 exhibits the overall performance of pre-cultivating and financing functions of the farmers. The response of the farmers was categorized as excellent, good, fair, bad and worst. It is seen from the above table that out of 103 sample respondents, 44.6 and 30.1 percent of the farmers brief out the overall performance of pre-cultivating and financing function was moderate and good respectively. 7.8 and 5.8 percent of the sample respondents viewed that the performance was excellent and worst respectively. Hence, it is concluded that 44.6 percent of the respondents viewed that the overall performance of pre-cultivating and financing functin was moderate.

TABLE 1.14 CONTRIBUTION OF VARIOUS FACTORS LEADING TO THE PERFORMANCE OF FINANCIAL AND PRE-CULTIVATING FUNCTION
Dependent Variables: Performance of financing and pre-cultivation function

Independent variables	**Normalized Importance**	**Rank**
Sources of finance	100.0	1
Cost of preparing the land	56.7	2
Rate of interest on debt	49.5	3
Mode of irrigation	43.4	4
Cost of manure	31.8	5
Cost of fertilizer	29.6	6
Sources of seeds	29.5	7

Cost of seeds	9.1	8

Estimation method: Classification and Regression Tree

Estimate of residual = 0.656

Table 1.14 shows the contribution of various factors to the performance of financing and pre-cultivating function of the farmers. In order to evaluate the performance, the researcher identified 8 different factors in the performance of financing and pre-cultivating function of the sample farmers. The result of classification and regression tree shows that the factors such as sources of finance [100%], cost of preparing the land [56.7%], rate of interest on debt [49.5%], mode of irrigation [43.4%], and cost of manure [31.8%] were the dominant factors which influenced the level of performance of the Overall performance of financing and pre-cultivating function. Finally, the Standard deviation of the residual [Error in performance] of 0.656 which was close to 0 confirms that the factors which predicted the overall performance of pre-cultivating and financing function of sample farmers was a better one.

TABLE 1.15 RATE OF INTEREST PAID BY THE FARMERS

Response	Number of Respondents	Percent
Very high	8	7.8
High	41	39.8
Moderate	39	37.9
Low	10	9.7
Very low	6	4.8
Total	103	100.0

Source: Primary Data

Table 1.15 enumerates the opinion of the farmers regarding the rate of interest paid by them. Their opinion was categorized as very high, high, moderate, low and very low. It was inferred from the above table that out of 103 sample farmers, 39.8 percent of them viewed that the rate of interest on debt was high and 37.9 percent opined that it was moderate. 9.7 and 7.8 percent of them expressed that the rate of interest on debt was low and very high respectively. Hence, a majority of 39.8 percent of the farmers viewed that the rate of interest on debt was high.

TABLE 1.16 OPINION OF THE FARMERS ON RETURN ON INVESTMENT

Response	Number of Respondents	Percent
Very high	18	17.5
High	48	46.6
Moderate	13	12.6
Low	23	22.3
Very low	1	1.0
Total	103	100.0

Source: Primary Data

Table 1.16 shows the opinion of the farmers regarding the return on investment in the vegetable business Their opinion was categorized as very high, high moderate low and very low From the 103 sample farmers, 46.6 percent of the respondents viewed that the return on investment in this business was high but 22.3 percent of the sample farmers revealed that it was low. 17.5 and 12.6

per of the Sample farmers opined that the return on investment was very high and moderate respectively. Hence, a majority of 46.6 percent of the farmers viewed that the return on investment was high in this vegetable business.

TABLE 1.17 OPINION OF THE FARMERS ON COST OF PREPARING THE LAND

Response	Number of Respondents	Percent
Very high	--	--
High	5	4.9
Moderate	23	22.3
Low	66	64.1
Very low	9	8.7
Total	103	100.0

Source: Primary Data

Table 1.18 brings out the opinion of the farmers regarding the cost of preparing the land. Their opinion was classified as very high, high, moderate, low and very low. It is seen from the table that out of 103 samples, 64.1 percent of the sample farmers expressed that the cost of preparing the land was low 22.3 and 8.7 percent of the Sample respondents felt that the cost of preparing the land was moderate and very low respectively. Hence, a maximum of 64.1 percent of the farmers felt that the cost of preparing the land was low.

TABLE 1.19 OPINION OF THE FARMERS ON COST OF SEEDS

Response	Number of Respondents	Percent
Very high	17	16.5
High	26	25.2
Moderate	36	35.0
Low	15	14.6
Very low	9	8.7
Total	103	100.0

Source: Primary Data

Table 1.19 shows the opinion of the farmers regarding the cost of seeds. It is clear from the table that out of 103 sample respondents, 35 percent of the sample farmers viewed that the cost of seeds in the vegetable business was moderate. 25.2 and 16.5 percent of them opined that the cost of the seeds in this business was high and very high respectively. 14.6 and 8.7 percent of the sample farmers felt that the cost was low and very low respectively.

TABLE 1.20 OPINION OF THE FARMERS ON COST OF MANURE

Response	Number of Respondents	Percent
Very high	17	16.5
High	44	42.7
Moderate	24	23.3
Low	14	13.6
Very low	4	3.9
Total	103	100.0

Source: Primary Data

It was inferred from the table that out of 103 samples 42. 7 of the sample farmers opined that the cost of manure was high 23.3 percent felt that the cost was moderate, followed by 16.5 and 13.6 percent of them, who revealed that the cost of manure was very high and low respectively. So, a maximum of 42.7 percent the farmers viewed that the cost of manure was high.

TABLE 1.21 OPINION OF THE FARMERS ON COST OF IRIGATION

Response	Number of Respondents	Percent
Very high	--	--
High	4	3.9
Moderate	25	24.3
Low	73	70.9
Very low	1	1.0
Total	103	100.0

Source: Primary Data

The above table reveals that out of 103 samples, 70.9 percent of the respondents revealed that the cost of irrigation was low, 24.3 percent of them felt that the cost was moderate followed by 3 9 percent who viewed that the cost was high. Hence, a minimum of 70.9 percent of the farmers viewed that the cost of irrigation was low.

TABLE 1.22 OPINION OF THE FARMERS ON COST OF FERTILIZER

Response	Number of Respondents	Percent
Very high	5	4.9
High	30	29.1
Moderate	43	41.7
Low	20	19.4
Very low	5	4.9
Total	103	100.0

Source: Primary Data

Table 1.22 demonstrates the opinion of the farmers relating to cost of fertilizers. Their view was classified as very high, high, moderate, low and very low. Out of 103 sample respondents, 41.7 per of the sample farmers viewed that the cost of fertilizers was moderate, 29.1 percent opined that it was high, 19.4 percent were felt that it was low, and 4.9 percent revealed that it was very high and very low respectively. Thus, a maximum of 41.7 percent the farmers viewed that the cost of fertilizer was moderate.

TABLE 1.23 MULTIPLE REGRESSION ANALYSIS IMPACT OF VARIOUS PROBLEMS ON THE PERFORMANCE OF FINANCIAL AND PRE-CULTIVATING FUNCTION

Dependent Variables : Performance of financing and pre-cultivation function (Y)

Independent variables	Unstandardised co-efficient	Standard Error	Standardised co-effcient	t-value	p-value
Constant	3.185	1.0062	-	2.998	0.003

Expenses involved in procurement of finance (X_1)	30.041	0.091	0.042	0.449	0.654
Rate of interest paid (X_2)	-0.056	0.098	-0.055	-0.567	0.572
Return on investment (X_3)	-0.060	0.115	-0.066	-0.527	0.600
Cost of land preparation (X_4)	0.279	0.153	0.196	1.831	0.070
Cost of seeds (X_5)	-0.001	0.090	-0.001	-0.013	0.990
Cost of manure (X_6)	-0.259	0.097	-0.282	-2.680	0.009
Cost of irrigation (X_7)	0.007	0.167	0.004	0.041	0.968
Cost of fertilizer (X_8)	-0.084	0.099	-0.082	-0.857	0.394

Multiple R2 = 0.435 F-value = 2.741 d.f (8,94) $p<0.01$

R Square = 0.189

$Y=3.185+0.041\ X_1-0.056\ X_2-0.060\ X_3+0.279\ X_4-0.001\ X_5-0.259\ X_6+0.007\ X_7-0.084\ X_8$

When Y is the estimated performance of financial and pre-cultivating function.

The above equation clearly describes on an average if the response score for the expenses involved in procurement of finance changes by one unit there will be 0.041 unit decrease in the, performance of financing and pre-cultivating function of the farmers, when the problems such as rate of interest, return on investment, cost of preparing the land, cost of seeds, cost of manure and cost of irrigation were kept constant and vice versa.

The result of T-test confirms that the estimated partial regression co-efficients [0.279] and [-0.259] are significant at 5 percent and 1 percent level. Similarly the multiple R of 0.435 suggests that there exists a relationship of 43.5 percent between the performance and the problems existed in the performance of financing and pre-cultivating function of the sample farmers.

7. CONCLUSION

The study concluded that maximum number of farmers in the study perceived the functional performance of pre-cultivating and financing function and found it to the moderate. Similarly the performance of their function was influenced by certain important factors such as sources of finance, cost of preparing the land, rate of interest on debt and mode of irrigation and these contributed to the performance of this function. Moreover, the performance was also influenced by the problems that existed in the functional area such as rate of interest, return on investment, cost of the seeds, cost of the manure and cost of the fertilizers. The researcher also identified some general problems like non-availability of fertilizers, shortage of storage facilities, shortage of transport facilities, insufficient rain and inadequate pesticide.

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ACADEMICIA
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A STUDY ON DERIVATIVES (OPTIONS AND FUTURES)

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ABSTARCT

The emergence of the market for derivatives products, most notably forwards, futures and options, can be traced back to the willingness of risk-averse economic agents to guard themselves against uncertainties arising out of fluctuations in asset prices. Derivatives are risk management instruments, which derive their value from an underlying asset. The following are three broad categories of participants in the derivatives market Hedgers, Speculators and Arbitragers. Prices in an organized derivatives market reflect the perception of market participants about the future and lead the price of underlying to the perceived future level.

KEYWORDS: *Underlying Asset, Emergence, Perception*

INTRODUCTION

DEFINITION OF DERIVATIVES

Derivative is a product whose value is derived from the value of an underlying asset in a contractual manner. The underlying asset can be equity, forex, commodity or any other asset.

DERIVATIVE PRODUCTS (TYPES)

The following are the various types of derivatives:

1. **Forwards:** A forward contract is a customized contract between two entities, where settlement takes place on a specific date in the future at today's pre-agreed price.
2. **Futures:** A futures contract is an agreement between two parties to buy or sell an asset at a certain time in the future at a certain price. Futures contracts are special types of forward contracts in the sense that the former are standardized exchange-traded contracts.
3. **Options:** Options are of two types- calls and puts. Calls give the buyer the right but not the obligation to buy a given quantity of the underlying asset, at a given price on or before a given future date. Puts give the buyer the right, but not the obligation to sell a given quantity

of the underlying asset at a given price on or before a given date.

4. **Warrants:** Options generally have lives up to one year; the majority of options traded on options exchanges having a maximum maturity of nine months. Longer-dated options are called warrants and are generally traded over the country.

REVIEW OF LITERATURE

BARUA ET AL (1994) Undertakes a comprehensive assessment of the private corporate debt market, the public sector bond market, the government securities market, the housing finance and other debt markets in India. This provides a diagnostic study of the state of the Indian debt market with the free debt market, the necessity for market making for financing and helping options and interest rate derivatives, and tax reforms.

ABHYANKAR (1995) compared the FTSE 100 stock index with the stock index futures market. He found support for the hypothesis that lower transaction costs is the primary reason for traders with market wide information to use the futures market.

OBJECTIVES OF THE STUDY

1. To find the profit/loss position of futures buyer and seller on an asset.
2. To study and analyse the purpose of hedging in future in derivatives market.
3. To make suggestions to the investors regarding the effective usage of derivatives.

RESEARCH METHODOLOGY

Research Methodology is a systematic procedure of collecting information in order to analyse and verify a phenomenon. The collection of information is done in two principle sources they are primary data and secondary data. Primary data is known as the information which is collected from the members of the organization in the form of interview, direct mail or having the conversation. Secondary data is the information which is collected from different sources like journals, books, BSE and NSE websites. This study is totally based on the information related to secondary data.

DATA ANALYSIS AND INTERPRETATION

FUTURES OF TCS:

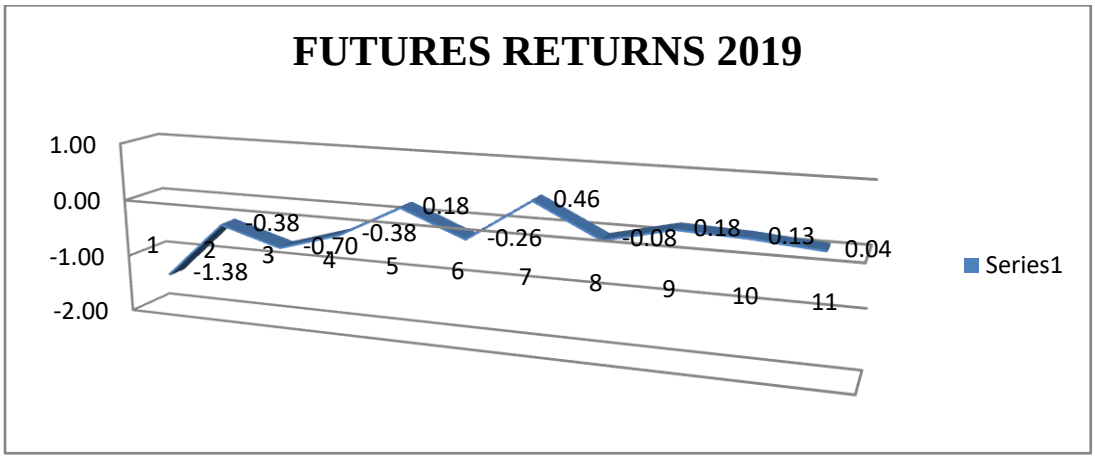
TIMESTAMP	SPOT PRICE	FUTURE PRICE	RETURNS(X)
MAY	I	I	I
15-May-19	1322.9	1304.6	-1.38
16-May-19	1347	1341.85	-0.38
20-May-19	1351	1341.6	-0.70
21-May-19	1350	1344.9	-0.38
22-May-19	1365.15	1367.55	0.18
23-May-19	1352.75	1349.2	-0.26
24-May-19	1306.15	1312.15	0.46
27-May-19	1301.1	1300	-0.08
28-May-19	1268.9	1271.15	0.18
29-May-19	1273.85	1275.55	0.13
30-May-19	1300.15	1300.65	0.04

- Return (%) = {[current price (P1) – previous price (P0)] / previous price}*100
- Average Return (μ) = ΣX/N
- Variance (σ^2) = Σ(X – iμ) ^{2} / N-1

Where X = Return; μ = Average Return

- Standard Deviation (σ) = sqrt (σ^2)

DESCRIPTIVE ISTATISTICS	
Mean	-0.20
Standard Deviation	0.51
Sample Variance	0.26



Interpretation: The trading week showed a high and low strike prices or exercising prices for the TCS futures. There always exist an impact of price movements on open interest and contracts traded.

FUTURES PRICES OFiTCS:

JUNE	SPOT PRICE	FUTURE PRICE	EXPIRY_DT	RETURNS(X)
31-May-19	1308.35	1305.5	27-Jun-19	-0.22
3-Jun-19	1308.45	1304	27-Jun-19	-0.34
4-Jun-19	1298.4	1297.8	27-Jun-19	-0.05
5-Jun-19	1282.8	1281.5	27-Jun-19	-0.10
6-Jun-19	1261	1260.7	27-Jun-19	-0.02
7-Jun-19	1190.2	1193.45	27-Jun-19	0.27
10-Jun-19	1176.7	1174.8	27-Jun-19	-0.16
11-Jun-19	1158.05	1158.1	27-Jun-19	0.00
12-Jun-19	1218	1213.65	27-Jun-19	-0.36
13-Jun-19	1236.7	1223.75	27-Jun-19	-1.05
14-Jun-19	1182.4	1173.25	27-Jun-19	-0.77
17-Jun-19	1178.85	1170.1	27-Jun-19	-0.74
18-Jun-19	1199.55	1195.8	27-Jun-19	-0.31

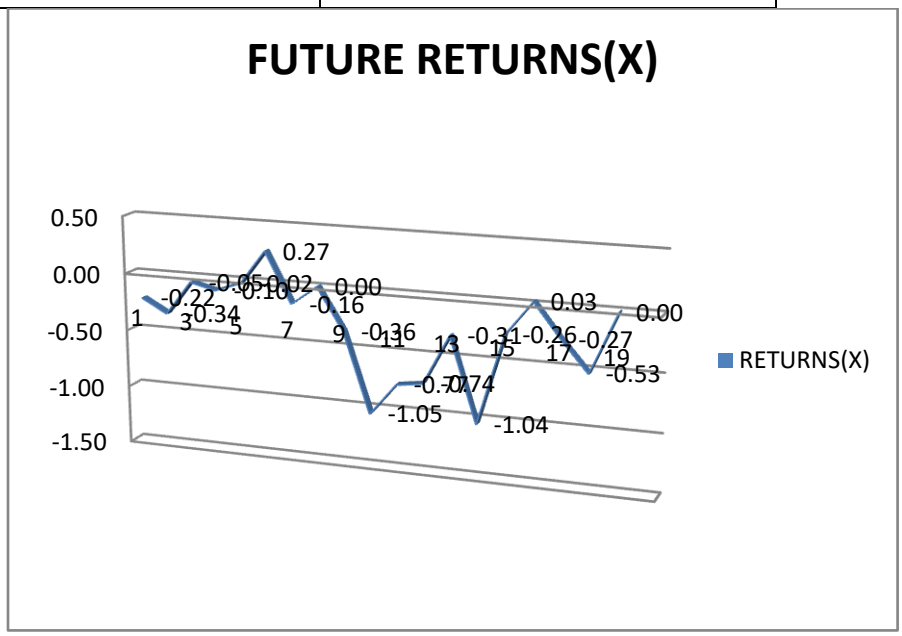
19-Jun-19	1192.75	1180.3	27-Jun-19	-1.04
20-Jun-19	1194.7	1191.55	27-Jun-19	-0.26
21-Jun-19	1187.4	1187.7	27-Jun-19	0.03
24-Jun-19	1188.3	1185.15	27-Jun-19	-0.27
25-Jun-19	1166	1159.85	27-Jun-19	-0.53
27-Jun-19	1195.85	1195.8	27-Jun-19	0.00

- Return (%) = {[current price (P1) – previous price (P0)] / previous price}*100
- Average Return (μ) = ΣX/N
- Variance (σ^2) = Σ(X – iμ) ^{2} / N-1

Where X = Return; μ = Average Return

- Standard Deviation (σ) = sqrt (σ^2)

DESCRIPTIVE STATISTICS	
Mean	-0.31
Standard Deviation	0.37
Sample Variance	0.13



Interpretation: The closing price of TCS at the end of the contract period is 23124/- and this is considered as settlement price.

FINDINGS

1. Derivatives are mostly used for hedging purpose.
2. In derivative segment the profit/loss of the option writer purely depends on the fluctuations of the underlying asset.

3. In cash market the investor has to pay the total money, but in derivatives the investor has to pay premiums or margins, which are some percentage of total contracts.

CONCLUSION

Stock futures are derivative contracts that give you the power to buy or sell a set of stocks at a fixed price by a certain date. Once you buy the contract, you are obligated to uphold the terms of the agreement. It allows hedgers to shift risks to speculators. It gives traders an effective idea of what the futures price of a stock of an index is likely to be. Based on the current future price, it helps determining the future demand and supply of shares.

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ACADEMICIA
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(Double Blind Refereed & Peer Reviewed Journal)

A STUDY ON INVESTMENT PATTERN AND PREFERENCE RETAILER INVESTOR AT INDIA BULLS

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ABSTRACT

India is experiencing an appearance of accumulation and investment, abnormally with its alive chic advance spurt. The ambition of the abstraction is to ascertain the investment trend of retail investors with accurate accent on the industry of alternate funds. It is absorbing to see that while investment in concrete assets is still the lot of attractive, investment in disinterestedness and alternate funds is on the rise. The abstraction allegation announces that the age of investors plays a basic role in the accident appetence difference. In addition, while both males and females are appropriately put on their factors for alternate armamentarium choice, males position the cast angel as atomic important, while females abode investment animation in the class. Furthermore, an allegory of the age of investors with the factors affecting investment accommodation reveals that those beneath the age of 40 attach the greatest accent to a top acknowledgment on investment, while those over the age of 60 adopt investments with a lower accident category, even if that agency a lower return.

KEYWORDS: *Investment, Stock Market, Returns, NSE, BSE.*

I. INTRODUCTION

Investment is the application of funds with the aim of accomplishing added incomes or advance in value. The capital superior of an investment is that it involves 'waiting' for reward. It involves the charge of assets which accept been adored or put abroad from accepted burning in the achievement that some allowances will accumulate in future. An investment is a cede of

accepted money or added assets for approaching allowances to be uncertain. In some investments (like government bonds) the time aspect is the ascendant attribute. In added investments (like disinterestedness shares) both time and accident are important.

II. OBJECTIVES OF THE STUDY

To acquisition out the present Investments of retail investors.

To analyze the purpose of investments of retail investors.

To appraise the ability akin on investment bazaar by the retail investors.

To appraise the time border of investment of retail investors.

To analyze the assorted factors advised afore advance by the retail investors.

To acquisition out the admeasurement of investment fabricated from the assets of the retail investors

To analyze the accepted amount of acknowledgment on investment of the retail investors. To appraise the akin of accident taken by the retail investors.

To acquisition out the antecedent of advice on investment by the investors.

III. NEED AND IMPORTENCE OF STUDY:

The absolute amount of banking instruments in the bazaar is so ample that it needs a lot of assets to assay all of them. Handling and allegory such a assorted and adapted abstracts needs a lot of time and resources. This assay on Investors' behavior is an attack to apperceive the contour of the broker and as well apperceive the characteristics of the investors so as to apperceive their alternative with account to their investments. The abstraction as well tries to analyze the access of demographicAgencylikeageon accidental truismakinoftheinvestor.

IV. SCOPE OF STUDY

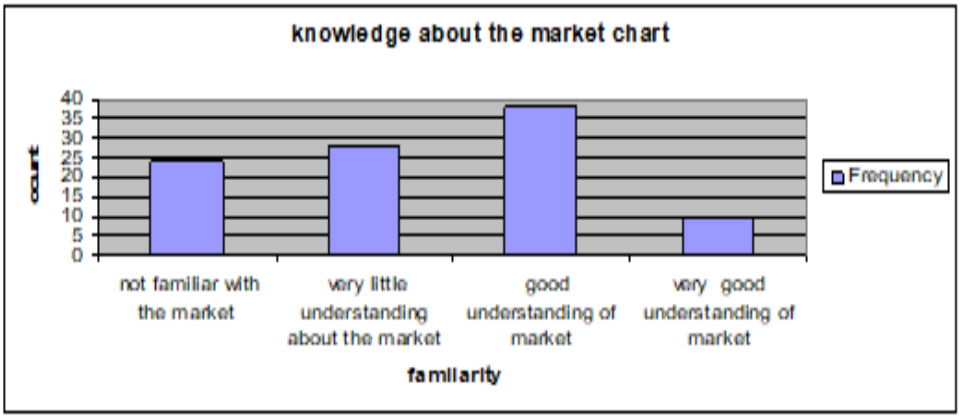
Different investors behave abnormally in altered bazaar bearings afore advance like return, adaptability etc. but the markets will face a catechism mark in alive the beating of an investor. This assay will as well bandy ablaze on assorted investment avenues accessible in India that will advise in abounding means like the expectations of altered types of investors apropos accurate account requirements can be identified.

V. REVIEW OF LITERATURE

Abhijeet Chandra (2009) in his commodity "Individual Investors' Trading Behavior and the Adequacy Effect" has analyzed the pulse of adequacy of abandoned investors on their trading behavior in the banal market. Abandoned investors yield trading decisions based on their self-perceived adequacy that is afflicted by several factors. The abstraction advised the factors that actuate the adequacy akin of abandoned investors. Age, education, and assets were begun to be a lot of influencing factors of the abandoned investors' adequacy in the banal bazaar activities and trading behavior. The after-effects of the abstraction acknowledge that a being invests as per his/her own judgments already he/she perceives himself/herself added abreast about investing. It finds that investors accepting high, top to abstinent assets and able accomplishment are declared to be added assured about their adequacy if it comes to trading in banal markets. Thus, it can be said that adequacy aftereffect rules the trading behavior of abandoned investors.

VI. DATA ANALYSIS AND INTERPRETATION

	No. Women Investors	Percent	Cumulative Percent
not familiar with the market	24	24	24
very little understanding about the market	28	28	52
good understanding of market	38	38	90
very good understanding of market	10	10	100
Total	100	100	



INTERPRETATION: -the following research, I observed that out of the 89% investing female investors, the maximum sample i.e. 38% of female investors have good understanding of investment market and 1o% have very good understanding of investment market

VII. FINDINGS

48% of the respondent's accordance to the age accession of 30- 40 years

67% of the respondents are blowing investors.

74% of the respondents are married.

48% of the respondents are able with bachelor's degree

36% of the respondents are accepting added action which includes home maker and retired people.

49% of investor's assets accession is 20000-30000 per month

76% of the respondents apperceive them as common investors the respondents

36% of investor's acquire invested in Stock market.

52% of the respondents are accepting 3-6 years of associate in investment.

45% of the respondents are accepting adequate adeptness on investment market

47% of the respondents are assured 16-20 percent of acceptance on their investment

42% of the respondents are captivation investment for 1-3 years of time horizon.

47% of the respondents crop low blow on their investment

47% of the respondents' purpose of investment is to accommodate the abutting expenses.

53% of the respondents acquire blow altruism to be the important bureau to be brash afore investing.

VIII. SUGGESTIONS

Investors should achieve the investment with able planning befitting in apperception their Investment objectives.

Proper admonition should be provided to the investors to adapt their investment to get optimal bulk of acceptance with basal risk.

Regular hunt up and abandoned annual arise investor's portfolio can admonition in developing reputation, affirmation and connected appellation relationship.

Management shall achieve the investors to get alter about the latest Investment opportunities attainable in the exchange through annual edition, emails about exchange trends, factsheets etc.

IX. CONCLUSION

Training is a anchor of acquirements allowance the researcher in compassionate the industry and the alignment with a adapted emphasis on the development of abilities in analysing and interpreting activated insights. Here the researcher underwent training in India bulls Stock Broking abutting which helped in adorning the adeptness on investment market.

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INVESTMENT STRATEGY IN MUTUAL FUNDS

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ABSTRACT

This pool of money will be devoted based on a stated aim. The combined ownership of this finance is therefore - allowable, i.e. the finance belongs to-all investors. The sum of money so collected is subsequently committed to capital market tools like such as stocks, debentures and other securities. The income earned through these investments and also the administrative center appreciations realized are shared by its unit holders as opposed the number of units possessed by these. Funds that the ideal option investment to the normal person as it provides a chance toinvest in a diversified, professionally managed basket of securities in a relativelylow price. Eachshareholder participates from the profit or deficiency of this finance. Components are issued and can need. The finance's Internet Asset value (NAV) is place daily.

KEYWORDS: *Investment, Strategies, Mutual Funds, Stockmarket, Investing*

1. INTRODUCTION

Investments in securities have been distributed over a extensive crosssection of businesses andsectors and so the chance is paid down. Diversification lowers the danger because all stocks may perhaps not go in precisely the exact same way at precisely the exact same percentage simultaneously. Mutual Fund problems units to the shareholders comparative to quantum money invested from these. Investors of Monetary Funds are Known as component holders.

Mutual Funds are regarded as one of the greatest available investments because compare to others

they're extremely inexpensive and also an easy task to shell out dollars on, ergo by pooling money together at a Mutual Fund, investors can find bonds or stocks using substantially lower trading costs than indeed they tried to reach it independently. Nevertheless, the largest advantage to Mutual Money is money, by reducing danger & optimizing yields.

2. OBJECTIVES OF THE STUDY

- To discover the preferences of the investors for Investment Options.
- To learn the preferences for the Portfolios.
- To learn the knowing of investors about Mutual Funds.
- To discover the most favored channel of investment.
- To discover why investors mostly prefer to purchase Systematic Investment Plan rather than in Lumpsum.
- To recognize the investor perception about SIPs.

3. SCOPE OF THE STUDY

Mutual Fund Industry has witnessed a phenomenal growth recently. Many new players have entered the marketplace and trying to get marketshare in this rapidly growing market. The study was carried at Ambala. I have been delivered to Your Financial Friend, A respected Investing Company at Ambala, where I completed my Project work. I surveyed on my Project Topic- by firmly taking help of the investors and brokers associated withthe Firm "Investor Perception Towards SIP (With Special MENTION OF Your Financial Friend").

The study will know the preferences of the clients, which kind of Mutual Funds, portfolio, mode of investment, and mainly why investors prefer to purchase mutual fund through SIPs rather in lump sum. This project report can help the Firm to create further planning and technique for packaging various modes of investment.

4. RESEARCH METHODOLOGY

Introduction

This report is founded on primary aswell secondary data, however primary data collection was presented with more importance because it is overbearing element in attitude studies. Among the most crucial uses of research methodology is that it can help in identifying the problem, collecting, analyzing the mandatory information data and providing another solution to the problem. In addition, it helps in collecting the essential information that's needed is by the very best management to aid them for better decision making both for daily decisions as well as critical ones.

Research is divided into two parts

1. **Research Design**.

(a) Type of research.

(b) Research method.

(c) Collection of data.

2. **Sample Design**.

Type of Research

It really is a descriptive kind of research, as information was collected predicated on existing circumstances and market conditions presently. It offers survey and fact-finding enquiries of different types.

Research Method

Research methods are understood as those methods and techniques that are used for conduction of research. Research methods or techniques reference methods the researchers use in performing research operation. Simply, those methods which are utilized by the researchers during studying his research problems are referred to as research methods. As the thing of research, specifically the applied research, is to realize at a fix for a given problem, the available data and the unknown parts of the problem have to relate to one another to create a solution possible. Keeping this because I took another two methods:

1. Analysis of documents.

2. Interview.

Collection of Data

1.Primary data- This technique was adopted since it helps in procuring data and detail information from the respondents. Here I collected data by filling questionnaires, directly getting together with the respondents.

2.Secondary data - I've also used the secondary data such as various written documents and other related information regarding the Mutual Fund Industry in India.

Duration of THE ANALYSIS

The analysis was completed for an interval of 8 weeks, from 30th May to 30thJuly2019.

5.LIMITATIONS

1.A few of the individuals weren't so responsive.

2.Chance for error in data collection because a lot of investors might not have

given actual answers to my questionnaire.

3.Sample size is bound to 110 investors out which

80 had committed to mutual fund. The sample size might not adequately represent the complete investing community.

4.Some respondents were reluctant to divulge private information which

make a difference the validity of responses.

5.The study is confined 10% of investors that have invested with the Firm.

6. REVIEW OF LITERATURE

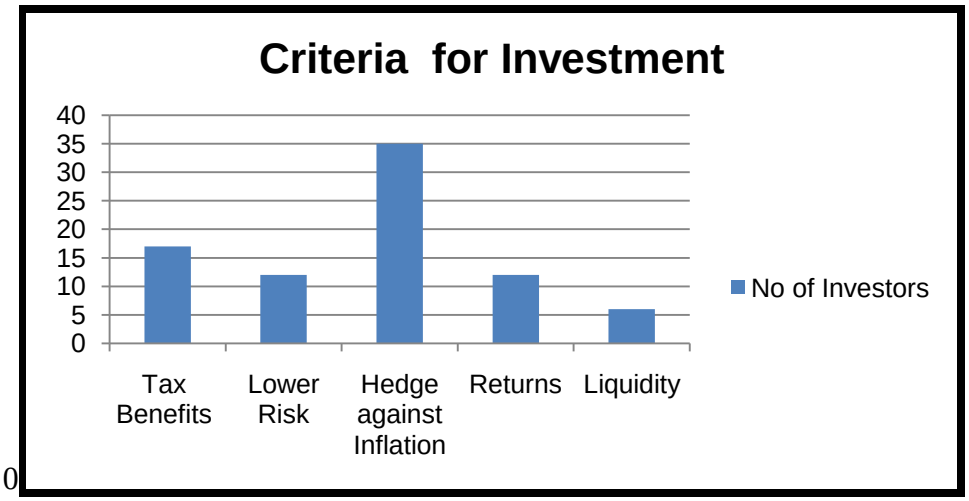
The formation of Unit Trust of India marked the evolution of the Indian MutualFund industry in the year 1963. The primary objective at that time was to attract thesmall investors and it was made possible through the collective efforts of theGovernment of India and the Reserve Bank of India. The history of Mutual Fundindustry in India can be better understood divided into following phases:

The mutual fund industry witnessed robust growth and stricter regulation from theSEBI following a year 1996. The mobilization of funds and the quantity of playersoperating on the

market reached new heights as investors started showing moreinterest in mutual funds. Investors' interests were safeguarded by SEBI and theGovernment offered tax benefits to the investors in order to motivate them. SEBI(Mutual Funds) Regulations, 1996 was introduced by SEBI that set uniformstandards for all Mutual Funds in India. The Union Budget in 1999 exempted alldividend incomes in the hands of investors from tax. Various InvestorAwareness Programme were launched in this phase, both by SEBI andAMFI, with a target to instruct investors and get them to informed about theMutual Fund industry.

7. DATA ANALYSIS

Criteria for Investment	Tax Benefits	Lower Risk	Hedge against Inflation	Returns	Liquidity
No. of Investors	17	12	35	10	6



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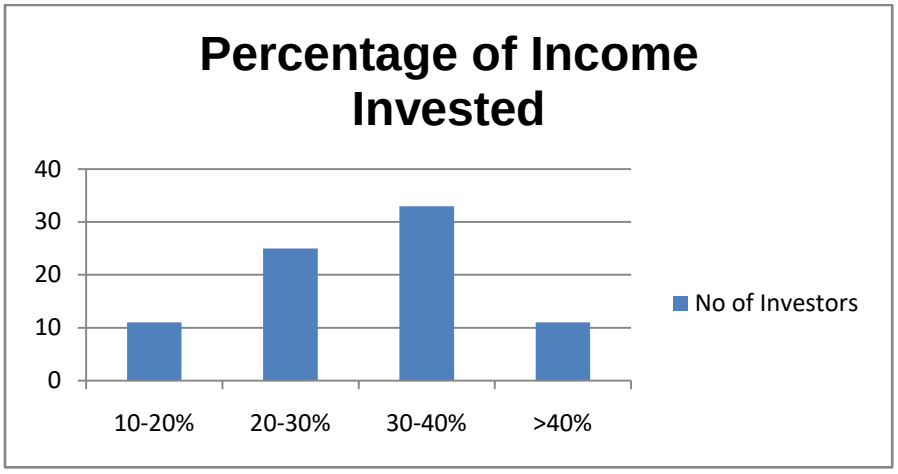
INTERPRETATION

Out of 80 investors committed to Mutual Funds21% prefer to get where there is leaner Risk,15% prefer to get where there is Tax Benefits, 12% prefer High Returns, 8% want easy liquidity and 44% wished to Hedge against Inflation.

PERCENTAGE OF INCOME INVESTED IN MUTUAL FUNDS

% of Income in Mutual Fund	10-20%	20-30%	30-40%	More than 40%
No. of Investors	11	25	33	11



INTERPRETATION

Out of 80 investors committed to Mutual Funds 41% invest 30-40% of their earnings in Mutual Funds accompanied by 31% investing 20-30% of their earnings. While 14% investors each were investing 10-20% and a lot more than 40% of their earnings.

8.FINDINGS

1. Out of 1 10 Investors investment with “Your Financial Buddy" the majority are in this group of 40-50 decades. I.e. 50%, the next most investors come in this band of 30-40 year i.e. 24 percent and nominal investors are below 25 years in 6 percent. While both age brackets of 25 to 30 and over 50 being approximately 10%.

2. Out of 110 Mutual Fund investors 70% of the investors are Graduate, accompanied by postgraduates being 20 percent and 6% being 10+2 and the ones below class 10thwere 4%.

3. Out of 110 Mutual Fund investors 45 percent were in Govt Service accompanied by 18% Businessman and 13 percent being house-wife or being at Private Service each and lowest being Pros at 11 percent.

20. Right out of the 1 10 Investors, 56% always invested based on The tips given, 26% regularly spent based on the hints given, 13% sometimes spent based on the tips given, 5% rarely invested According to the suggestions given no investor spent without recommendation.

9.RECOMMENDATIONS

Market Development:

My study has revealed the actual Actuality that the marketplace for SIPS at Mutual Fund continues to be in its expansion stage especially in Course B towns in comparison to class-a towns. Hence the firms need to produce a large number of aggressive methods of catch the marketplace in those cities that are smaller. Market development means doing what for the growthoftheSIP’sinMutualFund market. Hence at the next manners the marketplace of SIPs inMutualFundcanbedeveloped increased significantly:

10.CONCLUSION

We can infer in the study centered on the knowledge collected that the notion of investment through SIP in Fundis catching-up on the list of IndianInvestors. With the expanding demand for investment in SIPs inMutual Fund in smaller towns such as Ambala, there is certainly a enormous chance for your currency market to rise exponentially. Apartfrom these details recorded below are many other significant details which can easilybe inferred from this evaluation:

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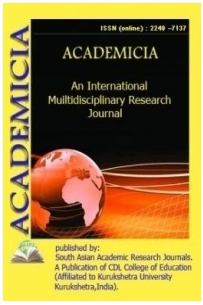

A STUDY ON EMPLOYEE RETENTION AT WIPRO LIMITED

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ABSTRACT

Today employee commitment and retention has become an important strategic aspect for the organisation. It is not only important to have the best and the most talented employees but it is equally necessary to be able to retain them for long term benefits to both the organisation and its people. Employee Retention has gained importance in recent years, particularly as part of talent management programs, and its relevance can be seen so much that the HR practitioner who integrates it into a talent program may grow bewildered by the huge volume of research about it. Employee retention is more than just keeping employees on the job. It is also about sustaining employees, primarily by enhancing their job satisfaction. The purpose of this paper is to review the various factors that impact employee commitment and retention in a work environment. Retaining talented people is very critical and critical to the fulfillment of any agency. The characteristic of a leader needs to have the quality and capacity to the motivation of human beings around the company in addition to the price of turnover is generally regarded to be enormous, now not simplest in terms of out-of-pocket expenses associated with severance, recruitment and selection, however additionally in lost opportunity and productivity. Employee Retention involves taking measures to encourage employees to remain in the organization for the maximum period of time.

KEYWORDS: *Employee, Management, Retention, Human Resource, Compensation, Growth, Support, Employee Relationship, Work Environment.*

INTRODUCTION

In today's environment it becomes very important for organizations to retain their employees. The top organizations are on the top because they value their employees and they know how to keep them glued to the organization. Employees stay and leave organizations for some reasons. The reason may be personal or professional. These reasons should be understood by the

employer and should be taken care of. The organizations are becoming aware of these reasons and adopting many strategies for employee retention. Its described as "Employee retention program is a systematic effort to create and foster surrounding that encourages personnel to remain employed by having practiced in the vicinity that copes with their numerous needs." Employee retention takes attempt, energy and resource and the end result is really worth it. The participant prepares venture file and mentions recommendations and provide recommendation where ever vital. Employee retention is an effort by a business to maintain a working environment which supports current staff in remaining with the company. Many employee retention policies are aimed at addressing the various needs of employees to enhance their job satisfaction and reduce the substantial costs involved in hiring and training new staff. It is a process in which the employees are encouraged to remain with the organization for the maximum period of time or until the completion of the project. Retention Strategies helps organizations provide effective employee communication to improve commitment and enhance workforce support for key corporate initiatives.

NEED FOR THE STUDY

The hiring is not a smooth process. In general, employees resign to their activity and would possibly be a part of in a few another agencies. Since employees running for a long time and are familiar with the company's policies, hints and therefore they modify better.

OBJECTIVES OF THE STUDY

- To study retention strategies used by Wipro to retain Employee Talent.
- To study the compensation/reward structure of the organization provided to the employees.
- To observe the retention techniques at Wipro.
- To study the development practices adopted the organization.
- To observe major factors influencing worker retention in thecompany.

SCOPE OF THE STUDY

The present study was conducted to understand the current employee retention measures and the relevant improvements to be made in the process. The focus is on software professionals and also to test the framework for enhancing the engagement and retention of these professionals. The study will help the organization to know the present levels of engagement of their employees, and will allow them to take necessary actions to motivate them to perform better and enhance their satisfaction and intention to stay in the organization.

LITERATURE REVIEW

Over the past decade, the way in which people are managed and developed at work has come to be recognised as one of the primary factors in achieving improvement in organizational performance (Marchington and Wilkinson 1997; Phillips 1997). (Anand, 1997 and Maguire, 1995) acknowledged that successful organizations share a fundamental philosophy of valuing and investing in their employees. In fact several research studies have described human resource management as a means of achieving competitive advantage. (Huselid 1995 and Walker 2001). Consistent with this perspective, the retention of their employees is an equally important issue for

organizations. This chapter explains various research studies related to human resource practices and the retention of employees. It also presents literature review on the causes of poor employee retention. Keeping in mind the topic of present research the following related literature is presented under the following headings:

Mathur, Atul and Agarwal, P. K. (2013), aimed to understand the impact of retention strategies on employee turnover in sugar industry in India. The focus of this study was on dysfunctional turnover. Other variables such as welfare benefits, personal satisfaction and organization culture, which are associated with the employee turnover, were also investigated as a part of this Chapter 3: Review of Literature 65 study. It was found that the main reason leaving the organization by employees were compensation and working environment. Results of the study revealed that retention strategies have direct impact on employee turnover. Researcher suggested that by using different HR practices like effective compensation policy, performance appraisal, training and development programme, feedback and assigning competitive work the condition of employee retention can been increased.



RESEARCH METHODOLOGY

Data for these studies became accrued both from primary and secondary sources. There are two kinds of data sources:

Primary source

This includes original records accrued from a specific purpose. The regular system is to interview human beings in my view and / or groups, to get the required statistics. Here the

statistics being sought is diverse techniques and techniques of recruitment accompanied in this agency.

Secondary source

It is the facts that had already been collected and made to be had within the public reports, private facts and other resources. For the recent observe the secondary data resources are organization magazines.

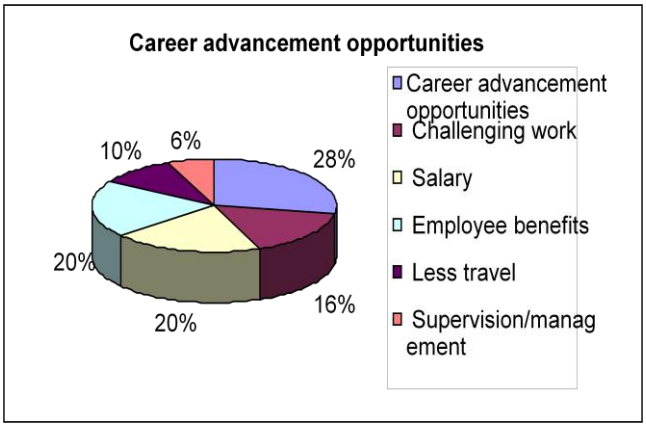
LIMITATIONS

- The assignment of this nature, one can't declare 100% accurate and authenticity. However, every viable attempt has been made to make it actual and authentic.
- The answers given by using the respondents can be biased or may not be true.
- Time is the major constraint.

DATA ANALYSIS AND INTERPRETATION

1. Why have you chosen to remain employed with the **WIPRO**?

S. No	OPTIONS	RESPONSES	PERCENTAGE
A	Career advancement opportunities	28	28%
B	Challenging work	16	16%
C	Salary	20	20%
D	Employee benefits	20	20%
E	Less travel	10	10%
F	Supervision	6	6%
	TOTAL	**100**	**100**

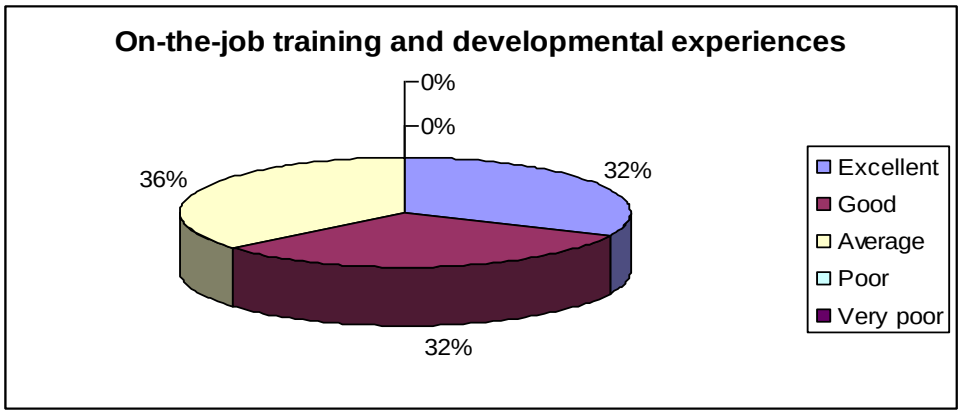


INTERPRETATION:

From the above table it is interpreted that 28% of the employees responded that they have been provided with career advancement opportunities, 16% respondents said that they have been provided with challenging work, 40% of the employees said that are fairly and equal justice was given in the remuneration provided. Less travel is preferred by 10% employees and supervision is the reason given by 6% members.

2. How are the job training and developmental experiences?

S. No	OPTIONS	RESPONSES	PERCENTAGE
A	Excellent	32	32%
B	Good	32	32%
C	Average	36	36%
D	Poor	0	0%
E	Very poor	0	0%
	TOTAL	**100**	**100**

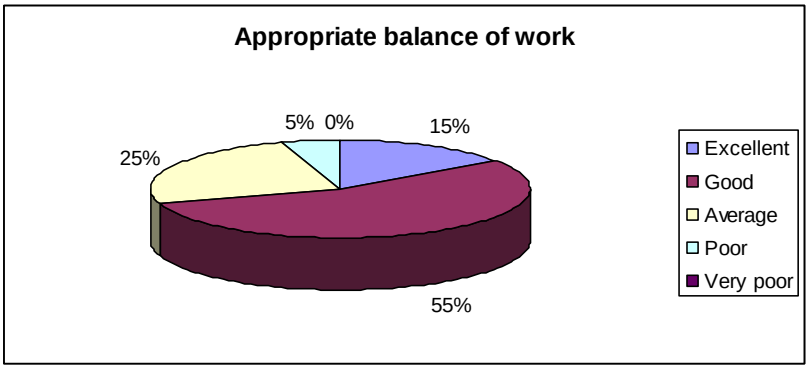


INTERPRETATION:

From the above table, 32% of respondents said that excellent, 32% of respondents said that good, 36% of respondents said that average on On-the-job training and development. So finally, all of the respondents satisfied with their On-the-job training and development.

3. How appropriate balances of work/life issues are?

S. No	OPTIONS	RESPONSES	PERCENTAGE
A	Excellent	15	15%
B	Good	55	55%
C	Average	25	25%
D	Poor	5	5%
E	Very poor	0	0%
	TOTAL	**100**	**100**

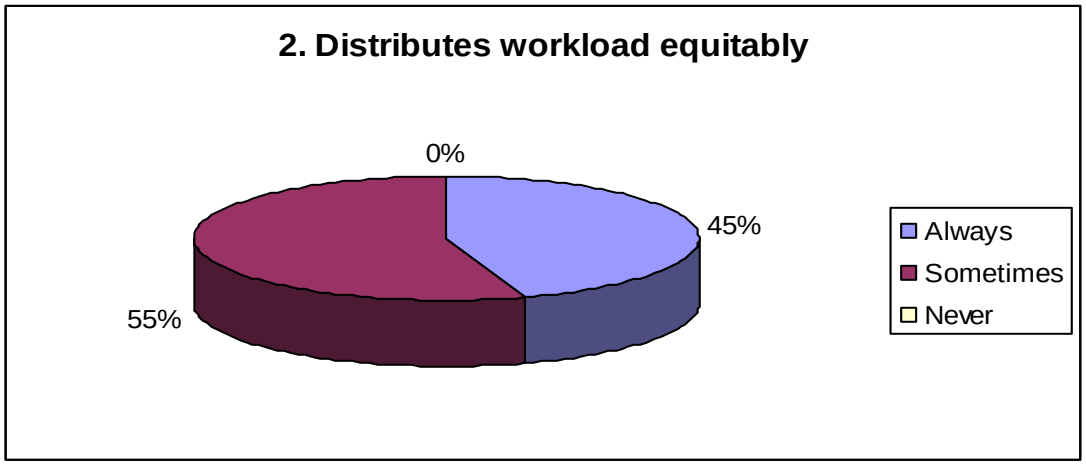


INTERPRETATION:

From the above table, it is confined that 15% of respondents said that Excellent, 55% respondents said that good, 25% of respondents said that average in balance of work/life issues. 5% of respondents hadn't satisfied. So that organization needs to provide appropriate balance of work.

4. Is Wipro Distributes workload equitably?

S. No	OPTIONS	RESPONSES	PERCENTAGE
1	Always	45	45%
2	Sometimes	55	55%
3	Never	0	0%
TOTAL		**100**	**100**

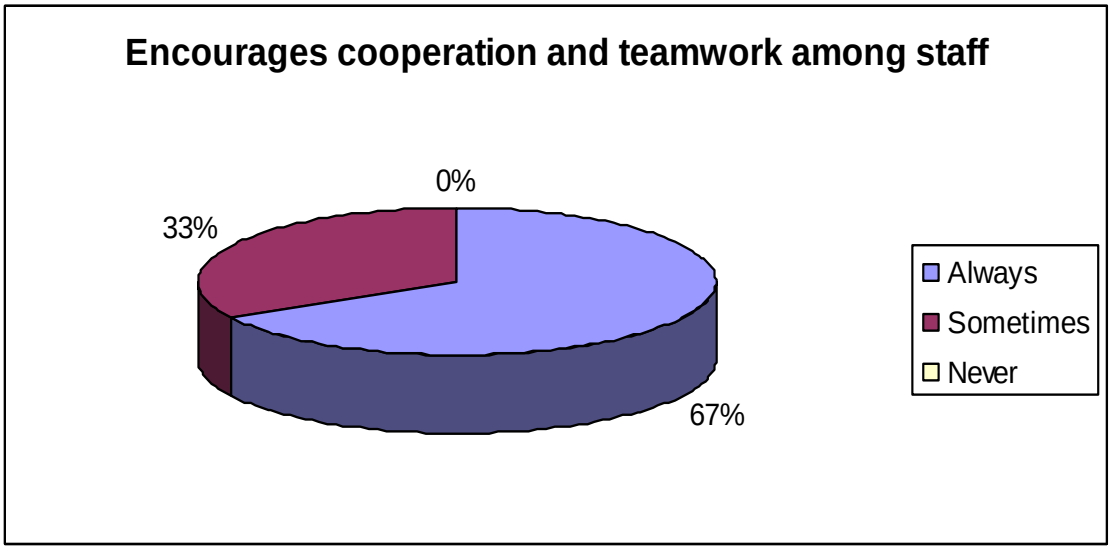


INTERPRETATION:

from the above table, 45% of responded always, 55% of responded sometimes on distribution of workload.

5. How Wipro Encourages cooperation and teamwork among staff?

S. No	OPTIONS	RESPONSES	PERCENTAGE
1	Always	67	67%
2	Sometimes	33	33%
3	Never	0	0%
TOTAL		**100**	**100**



INTERPRETATION: From the above table, 67% of responded always, 33% of responded sometimes on cooperation and teamwork among staff.

FINDINGS

- 40% of the employees said that are fairly and equal justice was given in the remuneration provided.
- 36% of respondents said that average on On-the-job training and development.
- 55% respondents said that the balance in work/life issues is good
- 55% of responded sometimes on equitable distribution of workload.
- 67% of responded always encourages at Wipro on cooperation and teamwork among staff.

SUGGESTIONS

- Compensation methods have to be developed to match with their capabilities and skill set to retain employees
- On the job training methods need to be improved with the organization
- Fair workload practices to be encouraged
- Reward system has to be done in periodic manner in an impartial way

CONCLUSION

From the observe "Employee Retention" at Wipro Limited" it's far obscene that the personnel inside the business enterprise have positive trouble with the control in the same difficulty like policies, structure etc. The control may additionally renew these issues so that proper employee relations are maintained in the company. It is also found that there are sure drawbacks within the present retention strategies adapted with the aid of the control to retain the excellent priory's personnel. Certain pointers are collected and right tips are positioned to the control for the attention of their regard. This examine is a hit in carrying out the grievances of the employees in

all aspects to the management so that it'd assist them to maintain right retention strategies inside the future.

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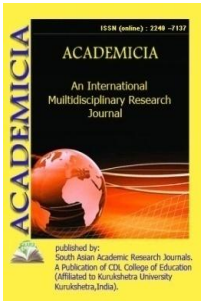

A STUDY ON KNOWLEDGE MANAGEMENT AT PENFO SYSYTEM PVT LTD

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ABSTRACT

Across the business world companies focus much on the performance of their employees. Since, it is the efforts of their employees that help the companies produce what they need. The department that deals with the activities of the employees is called Human Resource Management (HRM). Aswathappa (2005) points out that the human resource management (HRM) department in an organization deals exclusively with the activities of the employees that helps to maximize the performance of the employee and organizational effectiveness. TheHRM department is responsible towards the motivation, satisfaction and performance levels of the employees as well apart from dealing with the recruitment and selection, the payrolls, leaves and other factors involving the employees. Neslin (2008) points out that the human resource department views knowledge managementas the human capital issue to the HRM department.

KEYWORDS: *Human Resource Management,Hr,Strategies, Knowledge Management.*

01. INTRODUCTION

Knowledge management can enhance the effectiveness of HRM practices. The application of knowledge management has resulted inimproving worker skills and the workers productivity and effectiveness (OECD, 2004). These results found in studies determine that knowledge management is able to assist the HRM department to improve organizational productivity. Knowledge management can help the HRM department in creating a client-oriented organization. Executing knowledge management within the HRM department will allow the company to increase its competitive edge as the practice will improve the skills and expertise level of the employees. Hence, the HRM department would need to implement knowledge management so that it can help improve the productivity level of the company.

2.NEED FOR THE STUDY

As mentioned above that employees play a key role in the quality of an organisation's products or service. Hence, the need to have a good productive employee base is critical to the success of any organisation. Companies all over the world are looking for a workforce that will perform at the highest level and will be highly productive so that they can produce the best products and services, which can sell in the market.

3.RESEARCH OBJECTIVES

To evaluate the HRM practices and its application of knowledge management in its practices in PenfosSystemsPvt. Ltd.

To understand the effects of different types of knowledge management practices

To measure the positive impact that knowledge management will have on a company

To measure the relationship between human resource management and knowledge management in Penfos system Pvt. Ltd. In details.

4.SCOPE OF THE STUDY

The study will only focus on this relationship between knowledge management and human resource management and its impact on the productivity level and performance level of the company. The study will try to measure the impact that the concerned phenomena would have on the impact on the employees as a team and as an individual and their performance level, satisfaction level and productivity level.

5.LIMITATIONS OF THE STUDY

The limitations of this study during the research were quite a few, which challenged the researcher throughout the research process. The main limitations were time, the researcher had less time in hand to complete the project and getting appointments with the employees and management of PensofSystmePvt. Ltd made the limitation of time more critical.

6.RESEARCH METHODOLOGY

Data Collection

Data for a research is basically collected through two sources the primary data source and the secondary data source. For some research work both the sources are applied in order to produce a more valid and reliable work.

Primary Data Source

The primary data source is a source from where the researcher gathers data directly from the respondents through surveys, telephonic interviews, face to face interviews etc.

Secondary Data Source

The secondary data source is a source from the researcher can gather information through newspapers, journals, online articles, news, TV etc. The secondary data source is also known as second-hand data. However, the researcher will use both the primary data source and the secondary data source in order to conduct this research project.

7.LITERATURE REVIEW

According to Hibbard, 1997, "Knowledge management is the method of collecting a firm's communal know-how wherever it resides- in the file, on paper, or in people's heads-and spreading it to where it can help build the bigger recompense."

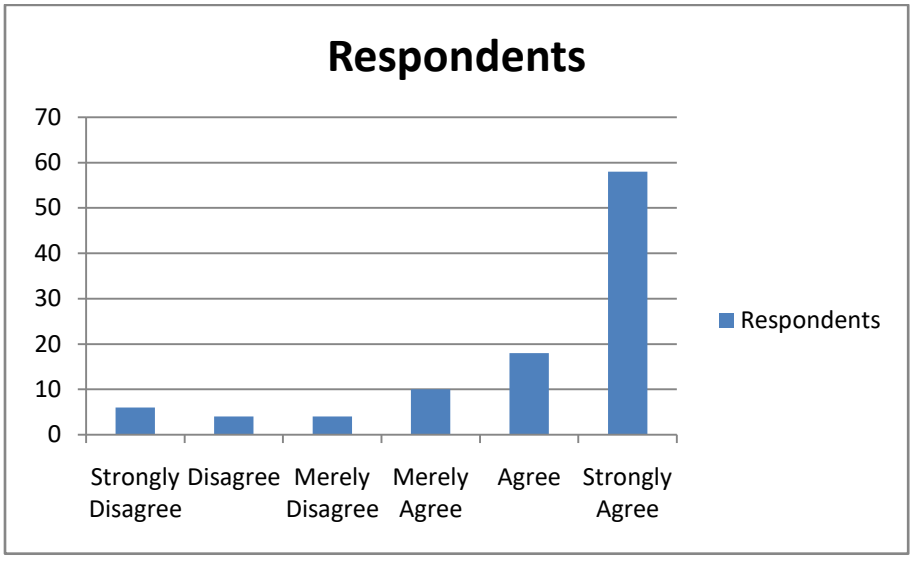
In the words of Bair (2001), "Knowledge management is a follower of identifying, recording, retrieving, giving, and evaluating an enterprise's in order possessions."

Consistent with David Delong and Patrica Seemann, "KM is the expansion of tools, processes, scheme, structures, and cultures openly to get better the building, sharing and utilizing of knowledge critical for decision making."

8.DATA ANALYSIS

1. **Experience is highly valued.**

Responses	Respondents	Percentage
Strongly Disagree	6	6
Disagree	4	4
Merely Disagree	4	4
Merely Agree	10	10
Agree	18	18
Strongly Agree	58	58
	100	100



The survey of respondents reveals the following:18% of the workers agree with the question, while 58% of the respondents powerfully agree.

From the study, we can analyse that most workers strongly agree that experience is exceedingly valued.

9.FINDINGS

- The process in Penfos System Pvt Ltd is an active generation of innovative ideas and application of knowledge management practices that helps in encouraging and motivating the workforce. The process is implemented, recorded and maintained for the future. Penfos system pvt ltd. Also encourages brainstorming within its operations.
- The company has implemented an electronic knowledge base in its newly opened stores to help the teams to solve and maintain the best performance and productivity levels.

10. SUGGESTIONS

1. Knowledge Management Programmes should become handled properly.
2. It ought to focus more on controlling understanding of past plus existing employees.
3. It ought to provide proper knowledge plus coaching towards the individuals who are usually managing understanding.

11.CONCLUSION

Employees and the success of a company go together, satisfied employees bring about success to the company and a successful company allows high level satisfaction within the company thus facilitating more opportunities to satisfy and motivate their employees.

The human resource department is the department that deals with all the activities of the employees right from the start of recruiting and selecting the employees. The role of the human resource department is with the employees evenwhen they are retiring or leaving the job, until then the role of the employee in a company is equally important as the customers and the mangers of the company.

This research finds that the employees in the concerned company have strong desire to gain knowledge and are in support of combing in the knowledge management process with the available human resource management techniques. The company by combining the two practices through sophisticated technology within the company can help map the competency that is critical to be carried out regularly and then the application of knowledge management will influence the growth of the company in due time when necessary.

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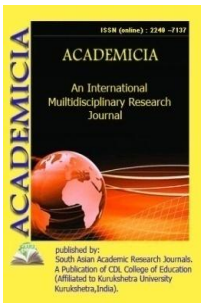

A STUDY OF EMPLOYEE SATISFACTION AT INDIA BULLS

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ABSTRACT

Employee satisfaction is Vital to The achievement of almost any company. The essential aspects which should be thought about at the work satisfaction of employees have been benefits for example wages, working state, pro motion. The Aim of the research to locate the Employees of their company is content with their benefits or maybe not also to identify the way that employee opinion concerning work benefits and place and understand about the type of benefits company provides with their employees. The analysis was completed as a Member of Descriptive research advantage sampling procedure has been used by selecting the sample. The main data was collected by way of questionnaire. The secondary data was accumulated from the organization records and also websites. A structure questionnaire has been fond of 50 employees and also the data had been examined with percent system and Likert scale procedure. The study contributes up into this end. The restriction of my analysis while I am Taking the meeting of employees for survey, they don't really have enough time for fulfilling questionnaire and likewise maybe not curious and perhaps not giving suitable answer because of this I confronted a problem once I had been assessing my poll.

KEYWORDS: *Job, Satisfaction, Employee Feedback, Human Resource Management.*

INTRODUCTION

Individuals are the most significant and Valuable resource every company has in the shape of its employees. Effective folks may lead to the efficacy of the corporation motivated and competent men and women may create matters happens and empower organization to realize its targets.

Individual resource is regarded as the most effective asset in any company. It could be noted here that individual resource needs to be utilized to the utmost possible degree so as to achieve

organizational and individual targets. It's hence the employee's operation that eventually determines and success of aims.

Employee's satisfaction may be that the terminology used to characterize if employees are happy and fulfilled and fulfilling their wants and requires in the office. Many measures emphasize that employee's satisfaction can be one element in employee's motivation, so employees goal success and positive employee morale at work.

OBJECTIVES OF THIS ANALYSIS

- To comprehend that the working conditions of employees in agency.
- To evaluate the satisfaction level of employees towards health advantages supplied by agency.
- To study about the job satisfaction factors in the Indiabulls financial services

SCOPE OF THE STUDY

Employee would be the Pair of almost any company It's throughout the employees. The company accomplishes its own purpose. It's quite crucial from the company Point of opinion to keep them fulfilled. The objective of study will be to know the satisfaction on the list of employees to agency of Karvy. And indicate the region for advancement should any.

RESEARCH METHODOLOGY

The research was centered on survey procedure. The intention of the analysis is to locate satisfaction levels of employees.

A sample layout is a definite strategy for obtaining a sample out of the given populace. Convenience sampling procedure employed in trials that were chosen.

Sample-size

Samplesize is a Component of goal People, carefully selected to represent the populace. Here within this study that the sampling size is 50.

Data-collection

The information gathered for the analysis contains both secondary and primary statistics.

Inside This study chief information were accumulated through employee's interview utilizing survey. The survey was administered for employees of bureau of Karvy.

Secondary information for the research was collected from.

• Previously published documents, study reports.

• Novels, internet sites.

QUESTIONNAIRE

In this research I had been used a questionnaire Comprising twenty five four choice-based questions

Graphical Representation instrument for example Bar Graphs and Pie Charts are useful for its data analysis.

LIMITATION OF THE STUDY

- Since My analysis sample were that the Employees of the provider, so that it had been quite difficult and hard to capture their time to get appointment which I had left a questionnaire and also have question from these since these certainly were never having time and energy to fulfill it.
- The Span of analysis has been short. Therefore, it wasn't feasible to get the appropriate advice with because period.
- Respondents weren't prepared to present certain information.
- Respondents have been somewhat anxious in fulfilling The questionnaire since they emphasized their termed will likely have been shown.
- Some older executives weren't eager to Share their real views since they termed it confidential.
- The Findings have been based mostly on the responses written by the employees, therefore any mistake or prejudice May be influencing the validity of this finding.

REVIEW OF LITERATURE

The Objective of this Employee satisfaction would be always to acquire an comprehension of employee demands and also a crystal clear notion of just how to enhance the answer to all those demands it demonstrates that you're enthusiastic about employee feedback. It really is 1 method to follow your employees.

·No successful Business Is conducted by keeping people at silos. People today work well in teams, and also to improve the operation of your own teams, you need to collect the info required to help them operate most economically. Our polls assist you to make sure your teams are still operating at peak efficiency.Improve satisfaction and endurance.

Employee satisfaction Estimates are a great Vehicle for discovering how employees view their tasks and also the company altogether. Do employees have the tools required to complete their tasks, a job place that's forcing high degrees of earnings, and therefore are they pleased with chances for progress? All these and several other questions might be answered using a questionnaire.

Assess employees' Long-term responsibilities:

One Of the greatest"costs"related to conducting a provider may be that the increased loss of employees, a lot of whom require institutional knowledge to lead competitors. Employee turnover wreaks havoc in your enterprise. Assessing this hidden price is important to the managing of almost any successful firm.

Identify series preparation demands:

Who is Are the prospective leaders? Are you currently arming them with the expertise and skills they should become prosperous? A specialist, detailed way of succession planning might be directed by employee satisfaction questionnaire outcomes.

Enhance the job lives of employees:

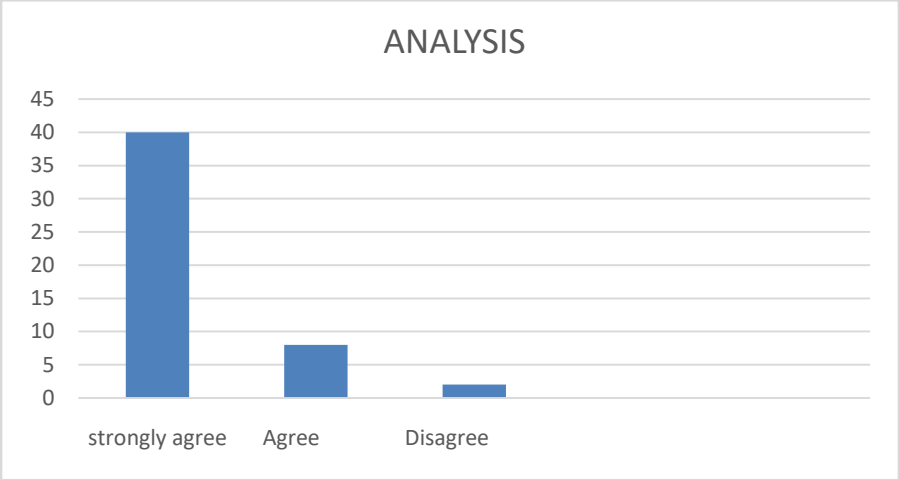
Joyful employees get more work, plus so they do it more effortlessly. Joyful and productive employees typically possess a fantastic balance between their personal and work lifestyles; they

hope and respect their own peers, managers, and upper direction. They enjoy coming into work and are pleased with these team and individual your employees display accomplishments traits? Information may be the trick to unlocking the entire potential of your employees, maintain happier, more fulfilled employees.

DATA ANALYSIS

Question1: Do you think medical benefits provided by BIS are helpful to you?

OPINION	NO OF RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0%
Disagree	2	4%
Do not know	0	0%
Agree	8	16%
Strongly agree	40	80%
TOTAL	**50**	**100**



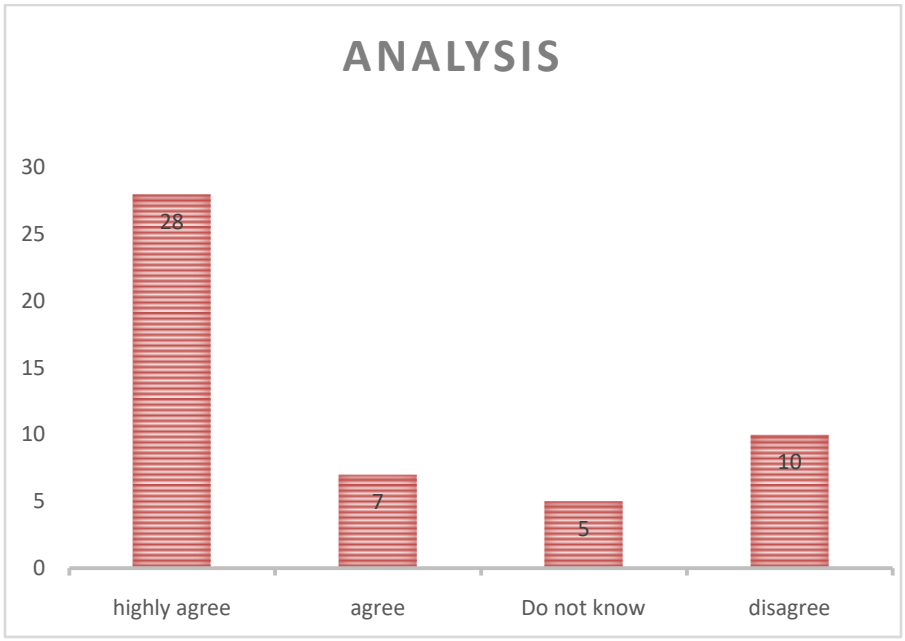
Interpretation:

Majority of employees satisfied with their medical benefits offered by bis i.e., 80% of employees strongly agree, 16% of employees agree

And only 4% of employees not satisfied with their medical benefits.

Question2: Does your medical policy meet up your expectations?

OPINION	NO OF RESPONDENTS	PERCENTAGE
Strongly agree	28	56%
Agree	7	14%
Do not know	5	10%
Disagree	10	20%
Strongly disagree	0	0%
TOTAL	**50**	**100**



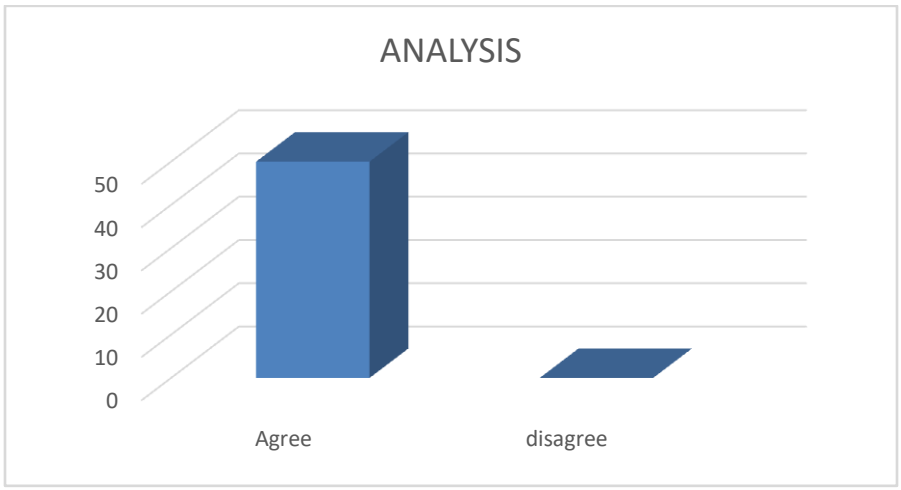
Interpretation:

56% of employees strongly agree ,14% of employees agree with their medical policy.

And 10% and 20% of employees do not know and disagree because some of the employees are not permanent in the company, they are on contract basis so they don't have any medical policy in their contract.

Question3: Are you comfortable with your working hours?

OPINION	NO OF RESPONDENTS	PERCENTAGE
Agree	50	100%
Disagree	0	0%
TOTAL	**50**	**100**



Interpretation:

According to the survey, maximum number of employees are satisfied with their working hours because its government office and the timing of working hours is fixed that's why 100% of employees are satisfied.

FINDINGS

- Out of 50 employees, most of employees were consented that provider provides benefits in their mind.
- They presume company permits them to do most useful every single day.
- Employees believe that they have adequate resources & infrastructure you want todo work nicely.
- Vast majority of employees believes that the benefits supplied by the business is vital.
- Nearly all of employees fulfilled (100 percent) the timing of this project.
- Vast majority of the employees are content with the healthcare facilities supplied by the business.

SUGGESTIONS

- In these times employee satisfaction is quite significant in the company. Company must provide benefits to employees depending on their wants and wants.
- Good guidance and counseling ought to be given to the employees in order that their emotional satisfaction may be made better.
- Company should simply take precautionary steps to improve overall working state of the business thereby employees will probably be fulfilled within their own job.

CONCLUSION

It's necessary for any company to Know the requirement of these employees and meet them until they leave the company. If nothing is carried out by the company then you will find opportunities to shed talented employees from some other company to its own competitors. Ergo it Is Essential for almost any Company to make certain employees satisfaction. Organization may determine the root causes of occupation difficulties and make solution for advancement using a precise view of employee perspectives. Satisfaction amounts increases when Employees realize that their problems have been addressed. Satisfaction of these employees is crucial from the company.

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A STUDY ON HUMAN RESOURCE INFORMATION SYSTEM

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ABSTRACT

Human being Resources Info Systems (HRIS) is usually an integration of HRM and Info Systems (IS). HRIS or Human being source Details program assists Human resources managers perform Human resources features in a even more effective and organized method using technology. It is normally the program utilized to acquire, shop, adjust, evaluate, obtain, and share appropriate details relating to an organization's individual assets. A individual reference details program (HRIS) is normally a program utilized to acquire, shop, adjust, evaluate, obtain, and share appropriate information regarding an organization's individual assets. The HRIS program is normally a component of the organization's bigger administration details program (MIS) which would consist of accounting, creation, and advertising features, to name simply a few. Individual reference and series managers need great individual reference details to facilitate decision-making. An comprehensive research by Podiums Perrin research uncovered the pursuing benefits of hris.

KEYWORDS: *Human Resources, Information System, Technology, Managers*

1. INTRODUCTION

Information system that support the sales & marketing function by facilitating the movementof goods and services from suppliers to customer point of sale (POS), telemarketing, sales force automation (SFA).Information system should help the sales & marketing for product planning, pricing decision, devising ad & other promotional mix, forecasting market potential for new and existing products, & determining channels of distribution. Information system should help the HR for recruitment, placement, training, efficiency, advancement, evaluation, settlement, and career.

2. OBJECTIVES OF THE STUDY

- To provide human resource solutions and deliver highest possible standard of quality.
- To develop an insight of the HR services using information system
- To understand and to offer sufficient ,comprehensive and ongoing information about people and job
- To offer data security and personal privacy.

3. SCOPE OF THE STUDY

Human being Source of Info system is usually an built-in system designed to provide information used in HR decision making it is usually a tool through which an HR division can take the information of the employees when company requires any personal or any established information.

HRIS is actually a new technique which can be used in these different areas where Human resources may produce there function even more easy by making use of Individual Reference details program they may gather the details by providing them a kind of the equal structure which includes there firm information and personal information also.

4. NEED OF THE STUDY

It can be wished that a even more comprehensive research may make use of a study device created from the outcomes discovered right here. Understanding how to instruct. HRIS can be even more essential, as agencies require their employee's information for different reasons. If a provided HRIS can be to possess any worth in all to Human resources then info should end up being centered about two elements how many decisions will end up being improved by the HRIS and how very much ideals will each improved decision make.

Understanding these two elements can be comparative to any HRIS

5. RESEARCH METHODOLOGY

Research Methodology

To obtain the purposeful of analysis, a prepared and proper detailed analysis is certainly transported out. Descriptive research is certainly useful to understand the percentage of individuals in the provided inhabitants who possess socialized in a particular way producing projection of specific factors or identifying the romantic relationship between two or even more

factors. Descriptive research is inclined to end up being stiff and its strategy cannot end up being transformed every today treatment should end up being used just in the preliminary levels of preparing and analysis usually data gathered with the research a training applications executed for the workers in the firm.

Data resources:

Data is certainly gathered from main and secondary sources. Collection of the data is usually main element in the study process. Data which is definitely accumulated for the purpose regarding study helps in appropriate analysis to develop findings which are help full to conduct

study efficiently. The data resource which is definitely very important in the collection of data is definitely both main and secondary.

Primary data:

The data that is normally gathered through administrating the customer survey by immediate get in touch with and also included in personal conversations to get the edges of the details.

Secondary data:

This data gathered from information, guides and broachers, preserved by the personal section.

RESEARCH DESIGN:

Survey method:

The customer survey was administrated through immediate get in touch with the participants of Sumega Technology, Hyderabad.

Sampling decisions:

Sample size : 100 employees

Total population : 250 employees

Sampling technique : Convenience sampling

Sample unit : Staff, Supervisors, Assistant officers and Managers

6. LITERATURE REVIEW

Hewitt associates, February "(2002) - The recent yeas have witnessed the H.R function in the organization to reinvest itself with the help of technology and Web based applications ,the basic principle of web based H.R sounds relatively simple as it make personal data readily accessible for review and revision. This empowers employees and managers to assume greater control over employee details. This informative article focuses on the modification of the H.R strategy of the company to one that is more technology driven. The need was for an driven, multi-faceted approach to the E -HR that would result in advanced H.R.

Sandeep K Krishna, September 7, 2006)

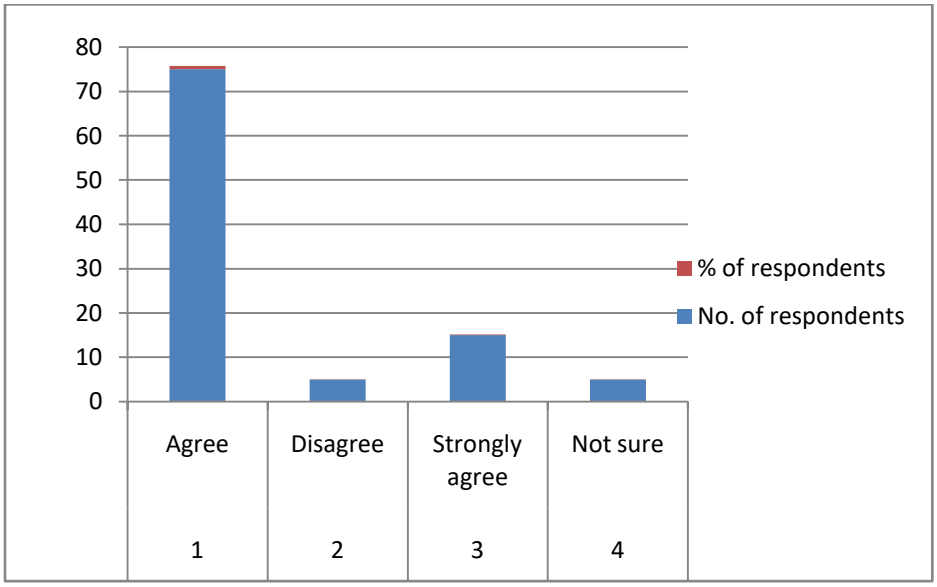
As both large and small companies are busy in transforming long held processes into web based solution to streamline operations and to provide better services .Its now common for senior management to motivate to reinvent itself either the help of technology and Internet based applications ,seeing that many of the agencies are breakthrough discovery the procedure of developing ,implementing and maintaining a successful E-H.U framework is more impossible then simply tracking and many facing complications in implementing HRIS

7. DATA ANALYSIS

Do you feel that the work burden of HR manager reduced utilizing the HRIS?

S. no	Options	No. of respondents	% of respondents
1	Agree	75	75%
2	Disagree	5	5%
3	Strongly agree	15	15%

4	Not sure	5	5%
Total		100	100%

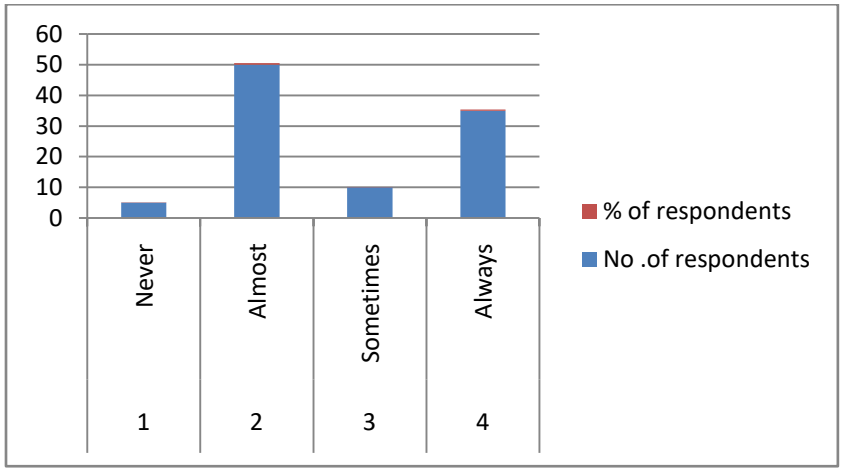


INTERPRETATION

From the above it is inferred that 75% are satisfied with agree, 5% are satisfied with disagree, 15% are satisfied with strongly agree and 5% are satisfied with not sure.

What's your opinion regarding organizational factors affecting by HRIS?

S. no	Options	No .of respondents	% of respondents
1	Never	5	5%
2	Almost	50	50%
3	Sometimes	10	10%
4	Always	35	35%
Total		100	100%



INTERPRETATION

From the above it is inferred that 5% are satisfied with never, 50% are satisfied with almost, 10% are satisfied with sometimes and 35% are satisfied with always.

8. FINDINGS & SUGGESTIONS

1) The business should put into action ERP program for better decision building regarding for protection.

2) They should install Login program, Consumer id & security password for protection factors.

3) There should install protection software program like antivirus for maintaining protection.

4) They should provide a organized & correct training to the consumer of the program.

9. CONCLUSION

HRIS is very important application for the expansion of the company. The system helps keeping the records of employee's attendance, payroll manager & all functioning of HR. this existing system is usually needful but some employees requires to change as per requirement. By proper training to employees it can help to reduce all the paper work. The need for the human resource function & HRIS is usually increasing day by day and it seems to benefit in future

I have been lucky enough to be given multiple assignments of varied nature and complexities, which gave me an opportunity to try out new avenues of marketing and also to analyze their effectiveness for procuring customers and maintaining long term bonds with them. The training has provided me sufficient knowledge of the HRIS software program, its information and several quests supplied. Aside from all this, I possess discovered to utilize several technology for advertising and building consumer romantic relationships in the Internship Plan.

I actually am grateful to my firm instruction, for generally getting supportive and encouraging me from period to period. No job acquired been designated to me, without correct training and understanding of the subject matter.

I actually would like to conclude by telling that the summer months internship plan has given me knowledge, functioning knowledge in corporate and also the skill of completing the given focus on in the allotted period.

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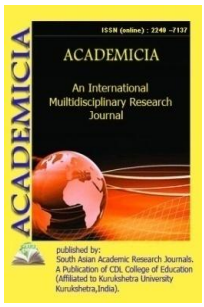

CONSUMER BUYING BEHAVIOUR WITH REFERENCE TO PHILIPS BULBS AT BIG BAZAAR

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ABSTRACT

The main aim of marketing is to meet and satisfy target customers needs and wants by understanding their ever changing behaviour. As we all know that whatever we like today, we may dislike it in due course of time and exact reason cannot be generally attributed for it. The buyer behaviour refers to the people's way of buying, using, developing attitudes towards products and organizations. Various influences act upon them towards making decision on purchase of product and service in a market. The field of consumer behaviour studies how individuals, groups and organization select, buy, use and dispose off goods, service, ideas, or experience to satisfy their needs and desires. Understanding consumer behaviour and knowing customer are never simple. The wealth of products and service produced in a country make our economy strong. The behaviour of human being during the purchase is being termed as "Buyer Behaviour". Customer says one thing but does another. They may not be in touch with their deeper motivations. They are responding to influences that change their mind at the last minute. A buyer's decision making behaviour in selecting a bulb is discussed in the study.

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KEYWORDS: *Consumer Behaviour, Marketing, Consumer Decision Making, Influences*

1. INTRODUCTION

The study was carried out for Philips Electronic India Ltd., which is among the leading electronic firms. The job undertaken was to accomplish market analysis and noticing consumer behaviour regarding LED. The entitled paper laid its focus on identifying the lighting requirements of the households and knows the inclinations of the targets towards Philips bulbs sold at Big Bazaar. Any individual who purchases goods and services from the market for his/her

end-use is called a consumer. In simpler words a consumer is one who consumes goods and services available in the market. There are many factors that will influence the buying behaviour of individuals which could be price, quality, service, safety, brand image etc,. In buying a bulb, people generally look into power consumption, lifetime, light intensity and the maker which we will be discussing.

2. NEED OF THE STUDY

Today's customers are demanding more from any maker as they are greatly aware of the products and services offered by different players. This behaviour of the customers poses challenges to any company. The current study emphasizes on the factors that customers will look into while purchasing bulbs especially the Philips bulbs which hasthe largest market share in India.

3. OBJECTIVES OF THE STUDY

1. To comprehend the awareness degree of Philips and Philips LED.

2. To understand how satisfied are customers and retailers with the products they purchase and the services supplied by the company.

3. To discover what the client and the retailer wants from Philips LED.

4. To learn the perception of customer regarding the grade of Philips LED.

5. To know the factors that influences the customer behaviour towards Philips LED.

4. RESEARCH METHODOLOGY

a) Data Sources

Two types of data were taken into account i.e. Primary data and Secondary data. My major emphasis was on gathering the principal data. The secondary data has been used to create things more clear.

i. Primary Data: Direct assortment of data from the foundation of information, including personal interviewing, mail survey.

ii. Secondary Data: Indirect assortment of data from sources containing past or recent information like, Annual Publications, Books, Magazines and Newspaper etc.

b) Data Collection Tool

Structured questionnaire

5. REVIEW OF LITERATURE

Consumer behaviour research enables better understanding and forecasting not only of the subject of purchases but also of purchasing motives and purchasing frequency (Schiffman, Kanuk 2004). One of the present fundamental presumptions for the consumer behaviour research is the fact, that people often buy products not because of their main function but for their subjectively perceived value. It does not mean that products' basic function is not important, but that the today's role of product exceeds its service limits(Salomon 2004).

Even more often consumers do not rate products according to their cores (it means the main the main utility provided) but above all according to so-called real product (it means the particular products' qualities) and the extended product, which represents the set of intangible factors bringing the demanded perceived advantage to consumer – image, consultancy, after-sale service and other (Foret, Procházka 2007).

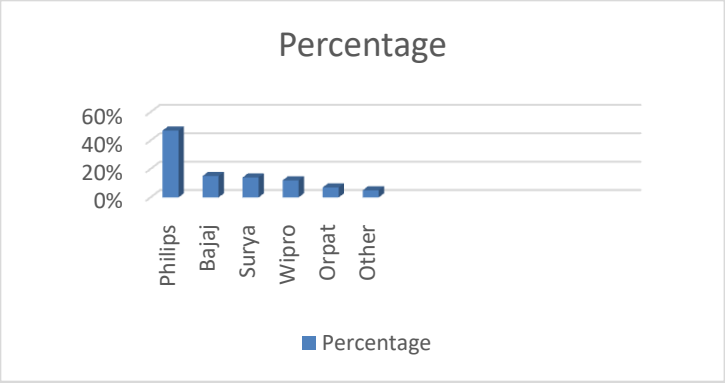
There are a lot of factors influencing consumer by decision-making process. The literature classifies and structures these factors in various ways. For example division into inner and outer factors (Koudelka 1997), distinguishing three basic categories: personal, psychological and social factors (Brown 2006), to which Kotler (2001) adds the cultural factors as the independent category. The next group of factors can be labelled as situational factors; it means factors forming the environment of the concrete decision making situation.

Because the subject of the analysed inquiry are factors belonging to groups of personal, psychological and situation factors, it is a difficult task to blend them and conclude on the attributes that exactly result in the behaviours of the individuals in the hereafter text the attention is devoted only to them.

6. DATA ANALYSIS

Which brand led bulb you prefer?

Brands	Percentage
Philips	47%
Bajaj	15%
Surya	14%
Wipro	12%
Orpat	7%
Other	5%



Interpretation:

Philips is highly preferred by the respondens followed by Bajaj, Surya and Wipro.

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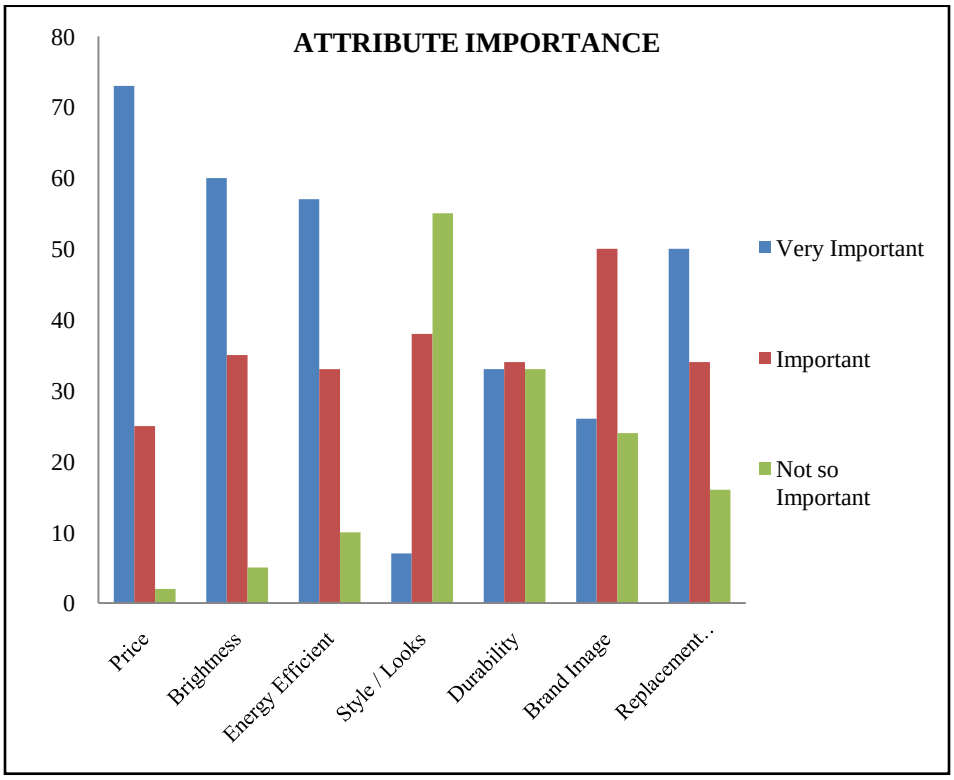
Which attribute is important to you before decide to buy led?

SR. No.	Attributes	Very Important	Important	Not so important
a)	Price	73	25	2
b)	Brightness	60	35	5
c)	Energy efficiency	57	33	10
d)	Style / looks	7	38	55
e)	Durability	33	34	33
f)	Brand image	26	50	24
g)	Replacement Policy	50	34	16



Interpretation: Energy efficiency, brightness and the price are the most important factors which is taken into consideration before buying the LED.

7. FINDINGS

1. The client is first of all unaware regarding the effectiveness of LED's.
2. Philips has high brand recognition because of its LED's.
3. Price may be the very important factor followed by the product quality lighting for the choice of the LED's.
4. The buyer had several expectations and acquired a perceived picture for LED's and the many brands offering LED's.

8. SUGGESTIONS

- There is more want in improvement of quality of Philips LED in order that it decreases the price of replacement.
- If firm backs out any scheme, then it will give time to the retailer.
- Provide updated info and understanding to the merchants about the product.
- Company should offer LED in more appealing and Design / Look should improve.
- Company should raise the more energy effectiveness of the LED.

9. CONCLUSION

From the above findings and analysis thereby, the business has definitely an excellent market share and the client base is in growing. It faces a stiff competition from reputed brands like Bajaj, Wipro, Surya, Orpat etc. The business has its own group of customer base. If the business directs some more attempts towards the marketing and changing pricing plan of its LED's, the business can definitely catch a larger market share.

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A STUDY ON DIGITAL MARKETING IN INDIAN HOSTINGS

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ABSTRACT

Right now, the digital economy leads decisively into an boost in validity, notably because an electronic digital transformation entails turning to new technological models where digital marketing can be really a crucial part of growth and user loyalty plans. Online and Digital Marketing are very crucial factors in campaigns, which bring and retain internet surfers. This study aims to spot the main ways that users could be received and kept by using Digital Marketing. The Delphi procedure with comprehensive interviews has been that the methodology employed in this study. The outcome of the investigation reveal the most important actions for attaining consumer recruiting and dedication using Digital Marketing in the remarks of educated pros.

KEYWORDS: *Digital Marketing, Online Marketing, Marketing, Strategies*

1. INTRODUCTION

The constraints of this study are those related to the range of professionals included in the study, and the amount of study papers consulted in the literature review. The literature review and also the consequences with the analysis are used to propose new solid research with a consolidated vital methodology. This exploration relates to a fresh method which may optimize internet technologies to its evolution of user trends, and for that reason, will be of academic and professional use for marketing supervisors and web solution programmers. The conclusions of the research reveal the important factors, shedding others that do not affect the optimization of

conversions in B2-C companies like the length of the session and the rebound percentage. Like wise , the link between the exploration discover the particular activities that must be carried outside to attract and retain users in B2-C companies that utilize the Digital Marketing eco-system on the Internet. The specifications for businesses which wish to employ a model to maximize conversions using the existing digital market are also displayed.

2. OBJECTIVES OF THE STUDY

- To learn more about Digital advertisements procedure in Indian Web Hosting firm
- To study customer opinions concerning Digital advertising
- To find pride in electronic Marketing and Advertising agency Given by Indian hosting
- To discover the ideal online advertising tactics to strengthen clients sales.
- To Discover the motive behind choosing Digital advertising
- To Build New promotion Strategies on the Web and net marketing using Digital-marketing solutions

3. SCOPE OF THE STUDY

Today, digital marketing approaches are Becoming an important part of the marketing plans of companies. These plans are much like the usual marketing strategies that are adopted by organizations when it comes to goals and assignment. That is only because both techniques aim at creating brand awareness and also help businesses to contact customers on line.Digital marketing strategies are valuable to Every type of business and specifically little businesses. Small enterprises that aren't implementing digital marketing strategies with their company should want to recognize its importance. The main reason is that digital marketing plans help their organization to develop well in such a competitive market. Digital marketing covers most aspects of online promotion from material production to get of items or services.Listed below are the main Regions of digital marketing That every business needs to adopt in their own marketing strategies. A few of These are strategies are effective for internet businesses and others to internet Businesses.

4. RESEARCH METHODOLOGY:

METHOD OF COLLECTION OF DATA:

Primary Data

Primary data is collected through Questionnaire.

Secondary Data

Considerable data has also been taped from previous research papers, articles and newspapers were also referred.

5. REVIEW OF LITERATURE

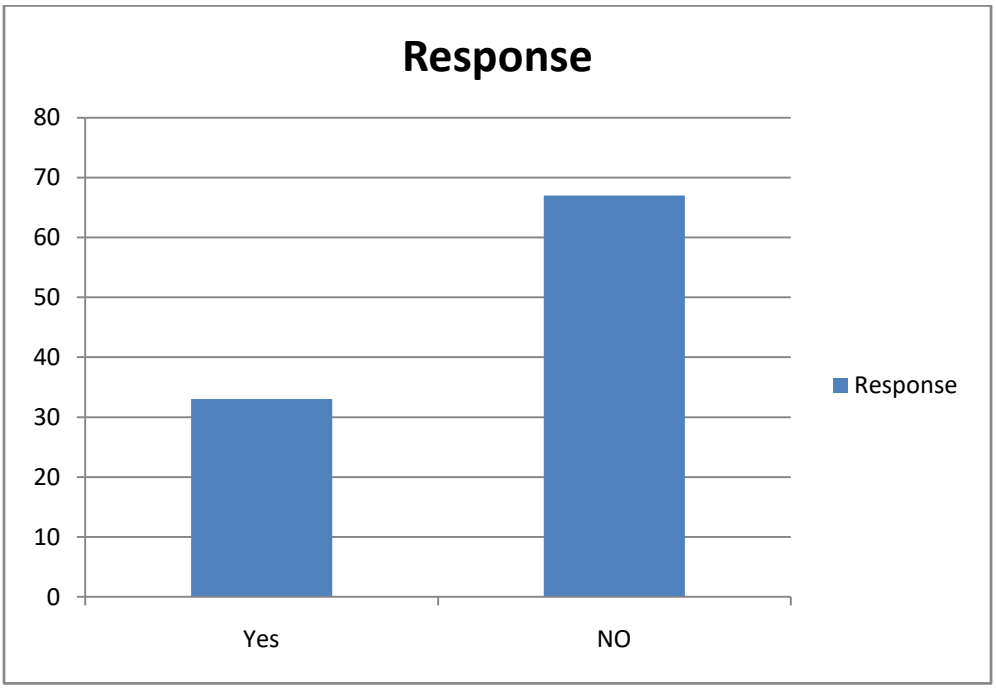
As per Forrester, organizations will contribute more than $140 billion on digital marketing, otherwise called internet marketing, in a couple of years. That is on the grounds that digital marketing offers a ground-breaking and practical approach to elevate your business to its intended interest group. Become familiar with the rudiments of digital marketing now right now manage! Digital marketing is characterized as a marketing approach that basically depends on

the web to associate with the intended interest group through different digital media channels and stages. Digital marketing is the marketing of items or administrations utilizing digital innovations on the Internet, through cell phone Apps, show publicizing, and some other digital mediums. Digital marketing is a widely inclusive term that comprises of digital channels, for example, content marketing, SEO, email marketing, web based life marketing, versatile marketing, etc, to make expound techniques to reach and interface with possibilities and clients.A normal client devours content by means of the TV, PC, tablet, cell phone, radio, and other conventional media. This steady presentation to different sorts of media has prompted data over-burden, further entangling the purchaser's excursion. Digital marketing has permitted brands to remain pertinent by making themselves noticeable through various channels and touchpoints.

6. DATA ANALYSIS

Do you feel that Google only source of digital marketing

Respondents	Response	Percentage
Yes	33	33%
NO	67	67%
Total	100	100%

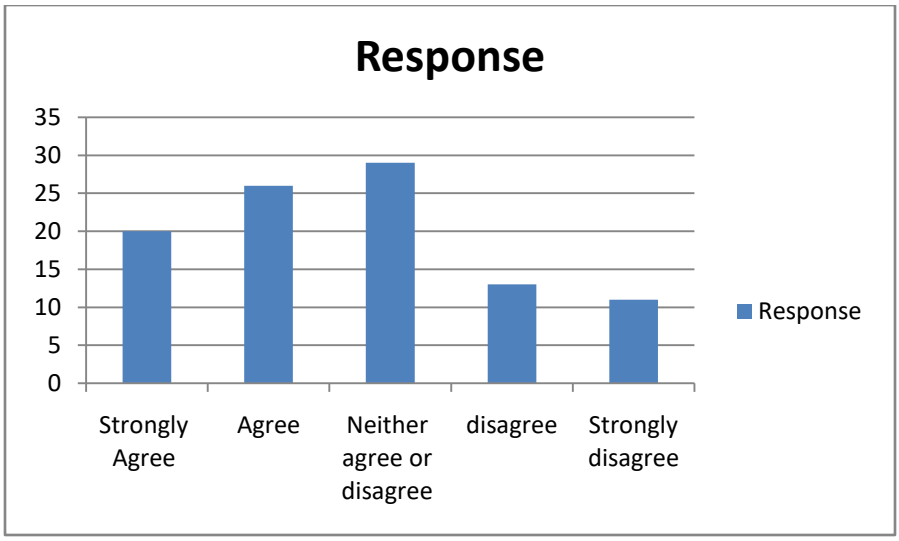


INTERPREATION:-

From the above analysis about digital marketing 33% said yes and 67% said no

Do you know that following digital marketing because of competitor strategy?

Respondents	Response	Percentage
Strongly Agree	20	20%
Agree	26	26%
Neither agree or disagree	29	29%
disagree	13	13%
Strongly disagree	11	11%
Total	100	100%

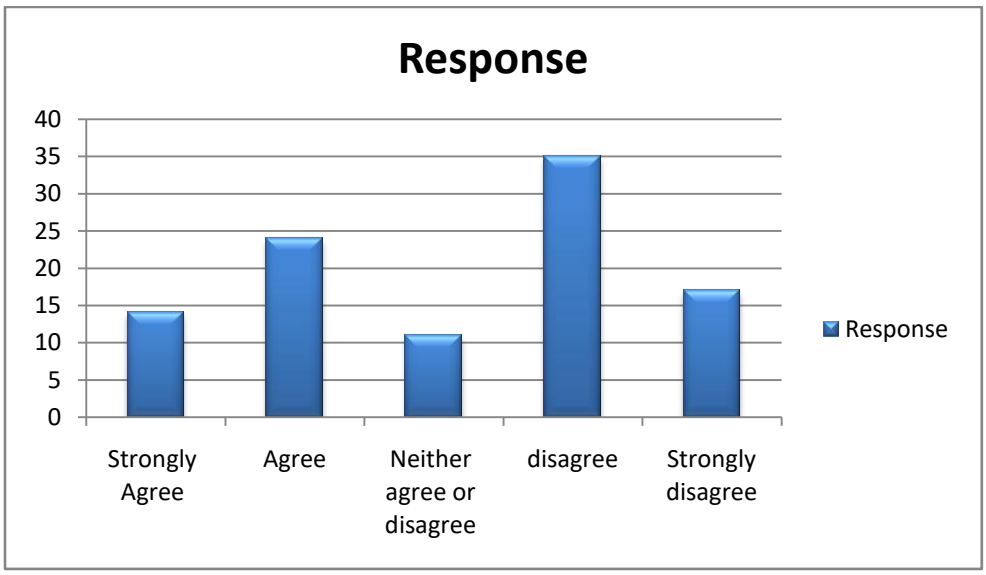


INTERPREATION:-

From the above analysis about digital marketing 20% are responded Strongly Agree , 26% are responded Agree , 29% are responded Neither agree or disagree , 13% are responded disagree , 11% are responded Strongly disagree digital marketing Because of competitor strategy.

Allocating of budget increasing spending time on Social Media advertising?

Respondents	Response	Percentage
Strongly Agree	14	14%
Agree	24	24%
Neither agree or disagree	11	11%
disagree	35	35%
Strongly disagree	17	17%
Total	100	100%



INTERPREATION:-

From the above analysis about digital marketing 14% are responded Strongly Agree , 24% are responded Agree , 11% are responded Neither agree or disagree , 35% are responded disagree, 17% are responded Strongly disagree budget increasing spending time on Social Media advertising,

7. FINDINGS

The study started with the aim to analyza the different issues related to the digital marketing.Based on above interpretation the digital marketing is the most important aspect to connect with the users.The study has also revealed that inorder to utilise the digital marketing in an effective way .Thee current trends and competitor strategy and marketing advertising are also discussed in the study

8. SUGGESTIONS

Digital mediums never drain businessmen. There Is no expensive customer research in website marketing because digital marketing is an effortless observation of customer response, recording the response to advertising objectives and feedback on to plan out another Digital Marketing Campaign.Before taking the plunge to internet Marketing, business companies must create a framework to keep pace with the fast evolving Digital Marketing methods. Instruction on greatest digital marketing techniques can be important in making timely movements to ensure a business grows together with ease and efficacy. Digital Marketing professionals on branding in Different channels of companies are legion.

9. CONCLUSION

As we've discussed in the preceding post the digital advertising field keeps growing everyday. People are working with a smart phone the internet and a lot of other designs of internet. If you want to grow your small business online then you will need to get in touch with any digital advertising agency.

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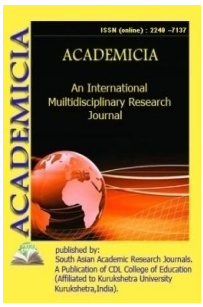

A STUDY ON POST IPO PERFORMANCE OF INDIAN COMPANIES

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ABSTRACT

The robust economic growth achieved by the Indian Economy in the post reform period attracted lot of interest from foreign institutions which stimulated strong performance of the Indian Capital market. This has led to large influx of primary issues, as promoters wanted to take advantage of booming market. With Indian economy is slowing down for last three years and the surge in gold prices, it is imperative to know the performance of Indian IPOs which came in market during this period. The paper deals with the analysis of performance of Initial public offers which were offered to public through Bombay Stock Exchange, in- between July 2016 to June 2019 are studied. Sector wise performance of these IPOs that is appreciation in price over and above issue price in secondary market over a period from six to thirty-six months is studied.

KEYWORDS: *Initial Public Offerings, Performance, Listing Gain.*

INTRODUCTION

Initial public offers are considered as one of the safe investments compared to secondary market as investor need not do much evaluation of offer as offers comes with rating allotted by the rating agencies. Many investors invest in IPO with an intention of booking post listing appreciation. Promoters also normally float IPOs when equity markets are trading at highest price earnings multiples to take the advantage of gaining highest return on their stake sale.

When private company in converted in to public company for want of funds they make public offer, normally companies goes to public when indices are trading at highest Price earnings multiples. Earlier years researchers have proved that IPO are under-priced to attract the investors, especially the retail investors to attract maximum participation and these issues is to get oversubscribed and shares is to list at hefty premium to issue price on listing day. But now

trend has been changed, companies try to enter capital market when indices are trading at highest price earnings multiples. Post 2008 collapses of equity markets investors have learn many lessons. IPO of Reliance power, one of the issue were retail investor had invested in large number and post listing they had lost their 80 percent of the wealth and till date reliance power share are trading below 80 percent of issueprice.

Post-recession of 2008 world-wide stock markets underperformed for almost 2 years and from2016marketsstartedrecoveringandthatwasthetimewhenmanypromotesstartedtoenter primary market. Indian stock market started showing upward trend and Sensex moved from 10,000 to 20,000 over a period of three years and during this period many companies came with IPO, it is interesting to know how they have performed post listing for last three years.Present study deals with Initial Public Offers of by companies which were issued through Bombay Stock Exchange during the period from July 2016 till June 2019, and their performance post listing in secondary market based on market price appreciation over period of different time frames ranging from 6 months to 36 months. Also an attempt is made to see if there is a significance difference in post listing appreciation based on different industry sectors.

LITERATURE REVIEW

There are lot of studies have been done on IPO performance in India and abroad. Still growing literature on the topic motivate researcher and give scope for further studies. Interesting empirical findings on IPO return shows majority of the studies are concentrated on under pricing or over pricing of IPOs. if there is appreciation in market price of IPO post listing it is considered as issue was underpriced and similarly if there is a negative return post listing it is considered as underpricing.

OBJECTIVES OF THESTUDY

Purpose of this study is to evaluate the sector wise market price performance of IPOs offered through BSE from July 2016 to June 2019 for a period ranging from six months to thirty six months

- To study IPO price appreciation postlisting
- To study if there is any significancedifference in IPO performance based on different industrysectors

SCOPE OF THE STUDY

Scope of the study is restricted to evaluation of post listing performance e of IPOs for period ranging from six to 36 months, which listed on BSE during a period of July 2016 June to 2019

SIGNIFICANCE OF STUDY

Study is mainly important from the point of view of small / retail investors who do not have much knowledge about the fundamental analysis of public offers, and IPO normally come in market when markets are trading at highest trading multiple, this study will proved an insight to the investor to know the how these ipos perform in the market post listing .

SAMPLE SECTION:

Public offers made through Bombay stock exchange from July 2016 to June 2019 were considered. There were 91 IPO were issued through BSE, out of which 6 issue were withdrawn by the company and another three issues are not trading post listing. Total 82 issues are considered for evaluation purpose. All the IPOs are grouped in six groups of six months each.

Table 1. Sample profile of Initial public offers

Period	IPO's	%
Issued between July to Dec 2016	35	42.7
Issued between January to June 2017	23	28
Issued between July to Dec 2017	12	14.6
Issued between January to June 2018	04	4.9
Issued between July to December2018	05	6.1
Issued between January to July 2019	03	3.7
Total	82	100

Data

Data related to IPO issue price, sectors and present market price are taken from Bombay Stock Exchange and Money control websites

Analysis of data

Analysis of performance of IPO post listing market price appreciation from issue price is analysed over a period ranging from six months to 36 months. And cut off date considered to measure the appreciation / depreciation is December 31 2019. For analysis all IPOs are groups into six groups of six months period each, and performance is analysed for period of six to thirty six months. Data is analysed with the help of Mean difference in return and ANNOVA has been performed to test the significance difference in return between sectors of the industry.

HYPOTHESIS

Following hypotheses are tested

H1 - All the IPOs issued during period of last 3 years have posted negative returns

H 2 There no significance difference in returns generated by IPO post listing based on industry sectors.

Table 2. Sector wise distribution of selected initial public offers

Sector	No of co's	%
Finance	12	14.3
Miscellaneous	10	11.9
Mining and metal	9	10.7
Construction and infra	8	9.5
Power	6	7.1
Engineering	6	7.1
Retail and consumer goods	5	6.0
Media	4	4.8

Computer and software	4	4.8
Jewellery	4	4.8
Pharma	3	3.6
Packaging	3	3.6
Shipping	2	2.4
Chemicals	2	2.4
Textile	2	2.4
Telecommunication	1	1.2
Printing	1	1.2
Hotels	1	1.2
Rating	1	1.2
Total	84	100.0

RESULTS AND OBSERVATIONS

OVERALL RETURNS

During July 2016 to December 2016 there were 35 IPOs were issued and their performance over period of 36 months shows that it has generated negative return to the extent of 138 percent. Similarly issues which were made between Januarys to June 2017 and were in market for over a period of 30 months have shown negative return of 51 percent. IPOs issued between July to December 2017 and their performance over a priod of 24 months shows that there is a negative return of 54 percent. Issues which came in to market during January to June 2018 and which were studied for period of 18 months shows a negative return of almost 160 percent and issues of July to December 2018 has shown a negative return of 79 percent over a period of 12 months. Only latest IPOs which came in market in the first half of 2019 have shown a positive return of 58 percent.

Table 2. Overall returns of IPOs over period of six months to 36 months

Period	No. ofIPOs	%	Number Ofmonths	OverallReturn
Issued between July to Dec 2016	35	42.7	36	-138
Issued between January to June 2017	23	28	30	-51.14
Issued between July to Dec 2017	12	14.6	24	-54.51
Issued between January to June 2018	04	4.9	18	-160
Issued between July to December2018	05	6.1	12	-79.11
Issued between January to July 2019	03	3.7	06	58
Total	82	100		

Finding shows that overall IPO shows negative return and we can accept null hypothesis

H1 - All the IPOs issued during period of last 3 years have posted negative returns Sectorwise return analyses for three years

Market price appreciation across the sectors also shows similar results. During July 2016 to Dec 2016 there were thirty-five IPOs which issues across 14 different sectors, of which maximum seven were from mining and metal sector and six were from construction and infrastructure. Their performance is analyzed for over a period of thirty-six months.

Results show that only Jeweler sector has given a positive return of 50 percent over a period three year whereas rest of the all sectors have given a negative return. Highest negative return is from construction and infrastructure sector with a negative return of 313 percent from six issues. Three companies from retail sector also have shown a negative return of 191 percent. 7 companies from mining and metal sector has generated negative return of (-90) %

Table 3. Sector wise return of companies for 36 months

Sector	No of IPO	Average (%) return	Std. Devi	Maximum	Minimum
Finance	2	-79.00	26.87	-98.00	-60.00
Media	2	-73.00	19.79	-87.00	-59.00
Mining and metal	7	-90.34	123.62	-330.00	31.00
Shipping	2	-66.65	61.30	-110.00	-23.30
Construction and infra	6	-313.10	310.69	-880.00	-38.00
power	4	-107	189.68	-391.00	8.00
Retail and consumer	3	-191	182.79	-400.00	-57.20
Engineering	2	-230	158.39	-342.00	-118.00
Pharma	1	-64.00	.	-64.00	-64.00
Computer and software	1	-249	.	-249.00	-249.00
Jewellery	1	50.05	.	50.05	50.05
Miscellaneous	2	-64.60	52.89	-102.00	-27.20
Chemicals	1	-2.00	.	-2.00	-2.00
Printing	1	-39.00	.	-39.00	-39.0
Total	35	-138	182.22	-880.00	50.05

Analysis of return for 24 months

For twenty-four months period there were 12 IPO are analysed from nine different sectors and only one sector (computer and software) has generated positive return of 111 percent whereas rest of the all sectors have posted negativereturns.

Analysis of return for 18 months

There were four IPO came during January to June 2018 and their performance in secondary market over a period of 18 months shows that overall there is a negative return of 160 percent.

There is one each IPO from four different sectors of which three has generated positive return and one IPO form miscellaneous sector has generated a negative return of 725 percent .

Analysis of return for 12 months

IPO issued during July 2018 to December 2018 across six different sectors and their performance over a period of 12 months shows overall negative return of 79 percent and not single IPO has shown positive return.

Table 7.Sector wise return of companies for 12 months

Sector	No of IPO	Average (%) return	Std. Devi
Engineering	1	-50.55	
jewellery	1	-43.00	
Telecommunication	1	-84.00	
Hotels	1	-20.00	
Rating	1	-198	
Total	4	-79.11	70.30

Analysis of return for 6 months

IPOs issued during January 2019 to June 2019 and their performance over a period shows a positive return of 58 percent. Finance sector has given return of 65 percent and one company form miscellaneous sector has generated a return of 146 percent.

Table 8. Sector wise return of companies for 6 months

Sector	No of IPO	Average (%) return	Std. Devi
Finance	1	65.00	
Retail and consumer goods	1	-37.00	
Miscellaneous	1	146	
Total	3	58	91.70

ANOVA result of return and influence of industry sector (3 years return)

	Sum of squares	df	Mean square	F	Sig.
Between the groups	347123.543	13	26701.811	.717	.728
Within the groups	781887.732	21	37232.749		
Total	1129011.275	34			

SECTOR WISE ANALYSIS

To study the significance difference in return generated across the different industry sectors for period of last three years, results shows that there is no significance difference in return across the all the sectors.

CONCLUSION AND SUGGESTION

Normally initial public offers enter market when equities at trading at highest multiple or indices are at highest price , the study shows that in spite of sensex moving from 10000 to 20,000 over a period of 3 years overall IPO has given negative return over a period of 3 years. Similarly except

gold all sectors also has given a negative return. Possible we could conclude that all IPO were overpriced to take advantage of booming secondary market. With this negative return retail investors will be watchful before entering the primarymarket.

This study will be very useful for retail investor to take his investment call in primary market Further post preliminary election, NDA govt. Is at centre with majority it will be interesting to study what is the return these IPOs have generated over a period of 1 year of new government.

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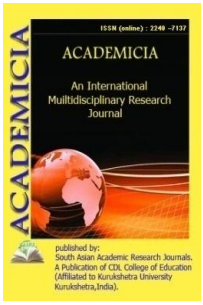

A STUDY ON PERFORMANCE APPRAISAL AT HERITAGE FOODS INDIA LTD

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ABSTRACT

Performance appraisal is a vital tool to measure the framework set by an organization to its employees. It is utilised to track individual contribution and performance against organizational goals and to identify individual strengths and opportunities for future improvements and assessed whether organizational goals are achieved or serves as a basis for the company's future planning and development. Employee should be appraised by their immediate superiors on one to one basis. Every year personnel experience evaluation in their past performance. Employees generally see these opinions as having some direct effect on their payments and livelihood. They may result in improved pay, a promotion, or assistance in personal development regions for which the worker needs a few trainings. As a result, any evaluation of worker's work can create an emotionally charged occasion. Because the performance assessment isn't the simple procedure it once was, it is now more important to perform one at the same time as simultaneously specializing in key activities of the job.

KEYWORDS: *Employee, Feedback, Company Performance, Employee Efficiency, Employee Reward System, Employee Performance Appraisal.*

INTRODUCTION

A performance appraisal is a systematic and periodic process that assesses an individual employee's job performance and productivity in relation to certain pre-established criteria and organizational objectives. Other aspects of individual employees are considered as well, such as

organizational citizenship behaviour, accomplishments, potential for future improvement, strengths and weaknesses, etc. To collect performance appraisal data, there are three main methods: objective production, personnel, and judgmental evaluation. Judgmental evaluations are the most commonly used with a large variety of evaluation methods. A performance appraisal is typically conducted annually. The interview could function as "providing feedback to employees, counselling and developing employees, and conveying and discussing compensation, job status or disciplinary decisions". It is often included in performance management systems. Performance

Management systems are employed "to manage and align" all of an organization's resources in order to achieve highest possible performance. "How performance is managed in an organization determines to a large extent the success or failure of the organization. Therefore, improving performance appraisal for everyone should be among the highest priorities of contemporary" organizations. Some applications of performance appraisal are performance improvement, promotions, termination, test validation, and more. While there are many potential benefits of performance appraisal, there are also some potential drawbacks. For example, performance appraisal can help facilitate management-employee communication; however, performance appraisal may result in legal issues if not executed appropriately as many employees tend to be unsatisfied with the performance appraisal process. Performance appraisal s created in and determined as useful in the United States are not necessarily able to be transferable cross-culturally.

A major concern of every organization should be to contribute positively towards the achievement of its objective. Organizational effectiveness is often equated with managerial efficiency. A manager can ensure organizational effectiveness only by guaranteeing the full utilization of human resource available through individual employees under his guidance. Hence, it is always required for a manager to monitor and measure the performance of employees. Moreover, since the organization exists to achieve the goals, the degree of success that individual employees have in reaching this individual goal is important in determining organizational effectiveness.

NEED OF THE STUDY

Performance appraisal is needed in order to provide information about the performance ranks basing on which decisions regarding salary fixation, confirmation, promotion, transfer and demotion are taken. Provide feedback information about the level of achievement and behaviour of subordinate. This information helps to review the performance of the subordinate, rectifying performance deficiencies and to set new standards of work, if necessary provide information which helps to counsel the subordinate.

Provide information to diagnose deficiency in employee regarding skills, knowledge, determine training and developmental needs and to prescribe the means for employee growth provides information for correcting placement.

OBJECTIVES

- To analyse the methods used for the appraisal program.

- To analyse and examine the effectiveness of performance appraisal programmes in Heritage Foods India ltd.
- To know the effectiveness of other human resource functions of the organisation such as recruitment, selection, training and development etc.
- To assess how often performance appraisal programmes are conducted.
- To study the important factors which are needed for performance appraisal.

SCOPE OF THE STUDY

In the present study an attempt has been made to know the actual implementation of performance appraisal techniques in general and some other aspects such as awareness of the workers, effectiveness of the performance appraisal system in performance appraisal particular.

Human resource projections are valid on appraisals. By improving job skills, the employees have lot of scope for development and performance appraisable themselves for higher responsibilities.

A thorough analysis of the performance appraisal system will help the management to know the short comings, if any. It also help the performance appraisal in knowing whether the performance appraisal techniques are used to full extent or not, there by the researcher can understand the effective implement of the performance appraisal system.

LIMITATIONS

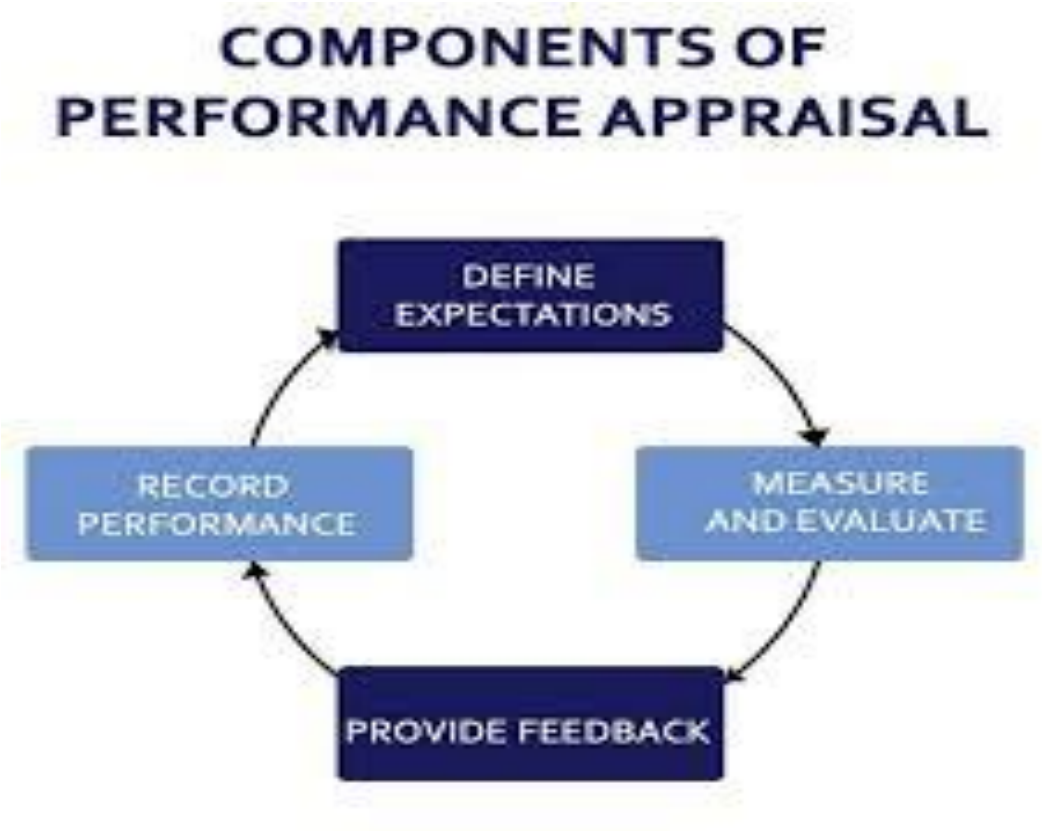
- Due to time constraints the study was limited only for short period.
- Random sampling method has been adopted and all limitations applicable to that method are applicable here also.
- Analysis of the data has been done based on the assumptions that the information provided by the respondents is genuine.
- The sample size is small when compared to total universe, Hence the capability of study to the whole universe is constraint.

LITERATURE REVIEW

Grote (2002) describes performance appraisal as a formal management tool that helps evaluate the performance quality of an employee. Schneier and Beatty as cited in Patterson (1987) define it as a process which apart from evaluating also identifies and develops human performance.

According to Karol (1996) performance appraisal includes a communication event planned between a manager and an employee specifically for the purpose of assessing that employee's past job performance and discussing areas for future improvement.

Dulewicz (1989) says that there is an indispensable human inclination to judge the work of other people as well as one's own work.It can thus be said that appraisal is both unavoidable and universal. Even without the existence of a planned appraisal system, one can have a tendency and find it natural to evaluate the job performance of another easily and subjectively.



RESEARCH METHODOLOGY

The research methodology is a systematic way to solve the problem and it is an important component of the study without which researcher may not be able to obtain the facts and figures from the employees.

SOURCE OF DATA

The study is based on primary as well as secondary data collected from different sources**:**

A) Primary Data:

The primary data is collected with the help of questionnaires, which consists of twenty questions each. The questionnaires are chosen because of its simplicity and liability. Researcher can expect straight answers to the questions.

B) Secondary Data:

Secondary data is collected through the documents provided by the personnel department of Heritage Foods India ltd. The documents include personnel manuals, books, reports, journal, etc.

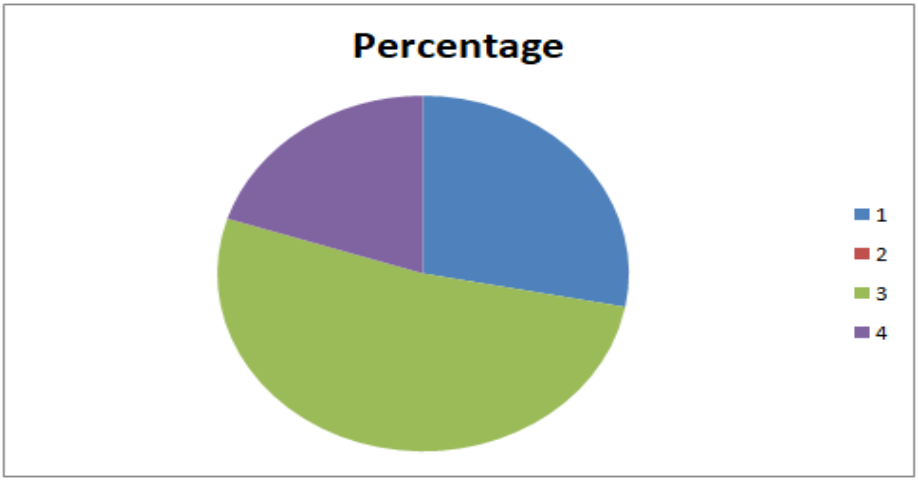
ATA ANALYSIS AND INTERPRETATION

1. In your experience the outstanding Performance of an employee is due to:

   (a) Actual Performance (b) Qualification

   (c) Experience (d) All the above

s.no	**Options**	**No. of Responses**	**Percentage**
1	Actual Performance	28	28
2	Qualification	0	0
3	Experience	52	52
4	All the above	20	20
	Total	100	100

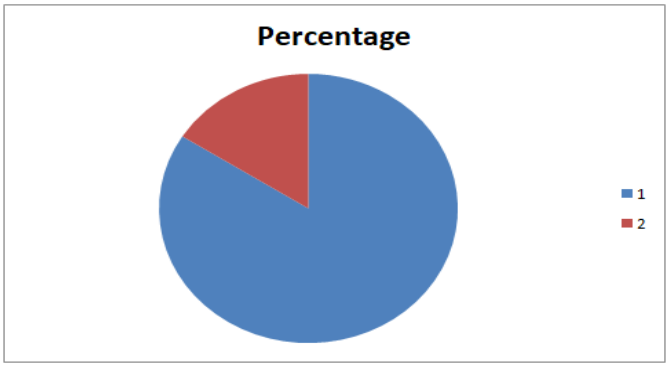


Interpretation: Above 28% of the employees responded that the outstanding Performance appraisal is due to Actual Performance, 52% of the employees is due to Experience and 20% of the employees is due to all the above.

2 .Do you think that a good workman gets motivated with frequent Performance Appraisal? Is conducted?

(a) YES (b) NO

s.no	**Options**	**No. of Responses**	**Percentage**
1	YES	84	84
2	NO	16	16
	TOTAL	100	100



Interpretation: A majority of 84% of the employees said that a good workman gets motivated with frequent Performance Appraisal and 16% of the employees are not satisfied with above.

3. What are the factors taken into consideration while appraising an individual?

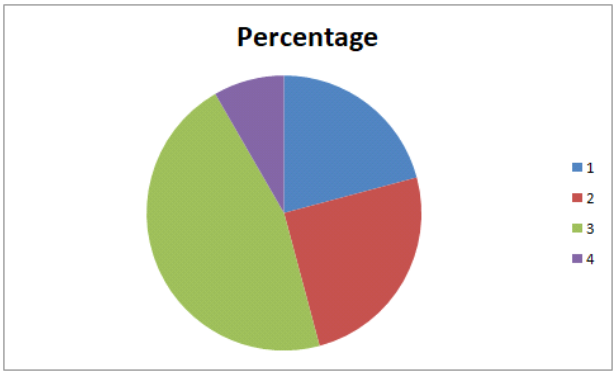
(a) Interpersonal effectiveness

(b) Team building skills

(c) Self motivate skills

(d) Leadership

s.no	Options	No. of Responses	Percentage
1	Interpersonal effectiveness	20	20
2	Teambuilding skills	24	24
3	Self motivate skills	44	44
4	Leadership	12	12
	Total	100	100

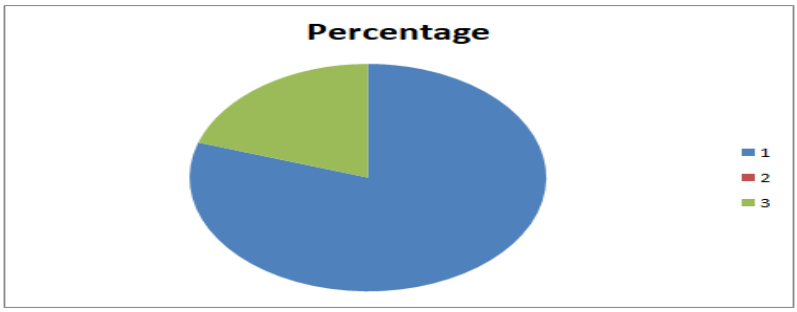


Interpretation: About 20% of employees considered interpersonal effectiveness while appraising an individual, 24% of employees considered Teambuilding skills, 44% of employees considered self-motivate skills and 12% of employees considered Leadership. By this we can say that these are the factors taken into consideration while appraising an individual.

4. In your opinion an employee should be:

(a) Effective (b) Moderate (c) Both A & B

s.no	Options	No. of Responses	Percentage
1	Effective	80	80
2	Moderate	0	0
3	Both A & B	20	20
	Total	100	100



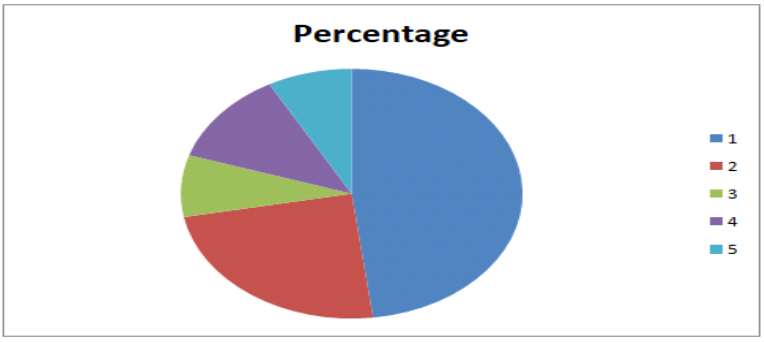
Interpretation: About 80% of the employees opinion is that the employee should be effective and rest 20% of the employees opinion is that the employee should be effective and moderate.

5. Which method you are using for evaluating Performance?

(a) 360º performance appraisal

(b) MBO (c) Assessment centre (d) BARS (e) any other

s.no	Options	No. of Responses	Percentage
1	360º performance appraisal	48	48
2	MBO	24	24
3	Assessment centre	8	8
4	BARS	12	12
5	Any other	8	8
	Total	100	100

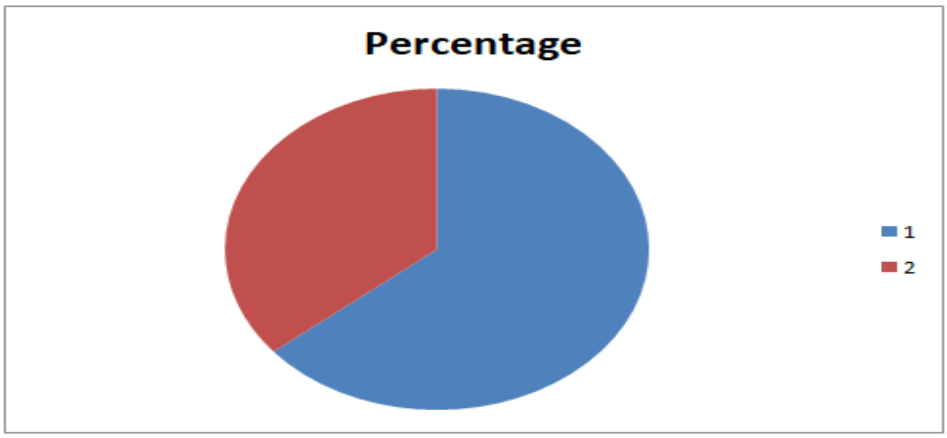


Interpretation: About 48% of the employees using performance appraisal appraisal method for evaluating Performance, 24% of the employees using Mgmt By Objects, 8% of the employees using Assessment centre, 12% of the employees using BARS, 8% of the employees using other method.

6. Is Appraisal process expensive and time consuming?

(a) YES (b) NO

s.no	Options	No. of Responses	Percentage
1	YES	64	64
2	NO	36	36
	Total	100	100

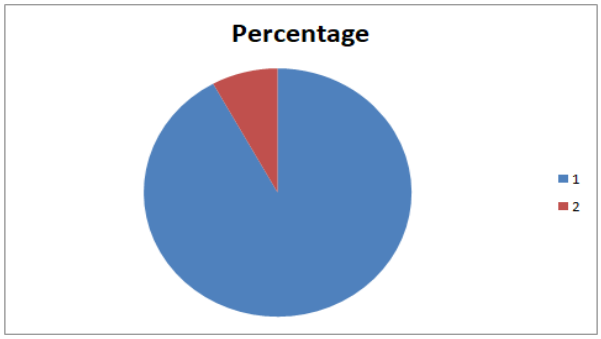


Interpretation: About 64% of the respondents said that the performance appraisal is expensive and time consuming. And 36% of the respondents said that the Performance appraisal is not expensive and time consuming.

7. Do you agree with the assessment of your reviewing/reporting officers?

(a) Agree (b) Disagree

s.no	Options	No. of Responses	Percentage
1	Agree	92	92
2	Disagree	8	8
	Total	100	100



Interpretation: Majority of 92% of the employees responded that reporting officer was good at grading the performance. Nearly 8% were disagreeing his duties as per the guidelines laid down.

FINDINGS

It is revealed that the executive are getting feedback on their performance though which they can review their performance. Sort on the problems and can overcome the difficulties.

The management has a clear understanding about the problem that the workers are the best with moreover, they are eager to solve the problems of the workers as and when they arise.

The management was giving requisite training to workers in the areas where they are weak.

Workers awareness about the fact that the appraisal is one of the factors for promotion was cent percent.

Performance appraisal system is considered as a means that aim at identifying the areas of improvement, identifying areas of training and development setting performance target for future.

The management desires having cordial relations with the work to hold mutual discussions.

The performance appraisal system it exists as it exists now is properly worked out and appropriately evolved. This revealed from the opinion given by the majority of the employees.

SUGGESTIONS

Based on the findings of the study and personal discussions held with various executives and employees at Heritage foods India ltd .Hyderabad possible suggestions and recommendations are given:

It is recommended that employees should be immediately communicated.

It is recommended that the supervisor should try to analyze the strengths and weaknesses of an employee and advise him on correcting the weakness.

It is commended to counsel the employees appropriately regarding their strength and weaknesses and assist in developing them to realize their full potential in line with the company's goals.

The top management is very much committed in implementing the performance appraisal system as it is. The performance appraisal system is consider as an essential tool for bridging gap between the top management and the executives it thus helps them to develop cordial relations and mutual understanding.

It is recommended that the employees should be communicated information about his performance, again his acceptance of it and draw up a plan for future improvement, if necessary.

It is recommended that the rater must be thoroughly well versed in the philosophy and of the rating system. Factor scales must be thoroughly defined, analyzed and discussed.

CONCLUSION

Because of lack of communication, employees behave different from what superiors actually think. Proper communication of these ratings can help the employers achieve the level of acceptability and commitment which is required from the employee. From the survey we can also derive that the appraisees expect a post appraisal interview to be conducted wherein they are given a proper feedback on their performance and they can also put forward their complaints if any. The appraisal should also be followed up with a session of counselling which is often neglected in many organizations. Counselling involves helping an employee to identify his strengths and weaknesses to contribute to his growth and development. The

Purpose is to help an employee improve his performance level, maintain his morale, guide him to identify and develop his strong points, overcome his weak points, develop new capabilities to handle more responsibilities, identify his training needs.

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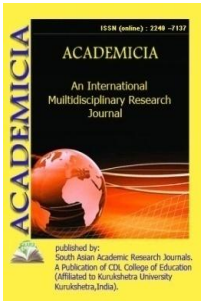

A STUDY ON KNOWLEDGE MANAGEMENT AT PENFO SYSYTEM PVT LTD

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ABSTRACT

Across the business world companies focus much on the performance of their employees. Since, it is the efforts of their employees that help the companies produce what they need. The department that deals with the activities of the employees is called Human Resource Management (HRM). Aswathappa (2005) points out that the human resource management (HRM) department in an organization deals exclusively with the activities of the employees that helps to maximize the performance of the employee and organizational effectiveness. TheHRM department is responsible towards the motivation, satisfaction and performance levels of the employees as well apart from dealing with the recruitment and selection, the payrolls, leaves and other factors involving the employees. Neslin (2008) points out that the human resource department views knowledge management as the human capital issue to the HRM department.

KEYWORDS: *Human Resource Management, Hr, Strategies, Knowledge Management.*

01. INTRODUCTION

Knowledge management can enhance the effectiveness of HRM practices. The application of knowledge management has resulted in improving worker skills and the workers productivity and effectiveness (OECD, 2004). These results found in studies determine that knowledge management is able to assist the HRM department to improve organizational productivity. Knowledge management can help the HRM department in creating a client-oriented organization. Executing knowledge management within the HRM department will allow the company to increase its competitive edge as the practice will improve the skills and expertise level of the employees. Hence, the HRM department would need to implement knowledge management so that it can help improve the productivity level of the company.

2.NEED FOR THE STUDY

As mentioned above that employees play a key role in the quality of an organisation's products or service. Hence, the need to have a good productive employee base is critical to the success of any organisation. Companies all over the world are looking for a workforce that will perform at the highest level and will be highly productive so that they can produce the best products and services, which can sell in the market.

3.RESEARCH OBJECTIVES

To evaluate the HRM practices and its application of knowledge management in its practices in PenfosSystemsPvt. Ltd.

To understand the effects of different types of knowledge management practices

To measure the positive impact that knowledge management will have on a company

To measure the relationship between human resource management and knowledge management in Penfos system Pvt. Ltd. In details.

4.SCOPE OF THE STUDY

The study will only focus on this relationship between knowledge management and human resource management and its impact on the productivity level and performance level of the company. The study will try to measure the impact that the concerned phenomena would have on the impact on the employees as a team and as an individual and their performance level, satisfaction level and productivity level.

5.LIMITATIONS OF THE STUDY

The limitations of this study during the research were quite a few, which challenged the researcher throughout the research process. The main limitations were time, the researcher had less time in hand to complete the project and getting appointments with the employees and management of PensofSystmePvt. Ltd made the limitation of time more critical.

6.RESEARCH METHODOLOGY

Data Collection

Data for a research is basically collected through two sources the primary data source and the secondary data source. For some research work both the sources are applied in order to produce a more valid and reliable work.

Primary Data Source

The primary data source is a source from where the researcher gathers data directly from the respondents through surveys, telephonic interviews, face to face interviews etc.

Secondary Data Source

The secondary data source is a source from the researcher can gather information through newspapers, journals, online articles, news, TV etc. The secondary data source is also known as second-hand data. However, the researcher will use both the primary data source and the secondary data source in order to conduct this research project.

7.LITERATURE REVIEW

According to Hibbard, 1997, "Knowledge management is the method of collecting a firm's communal know-how wherever it resides- in the file, on paper, or in people's heads-and spreading it to where it can help build the bigger recompense."

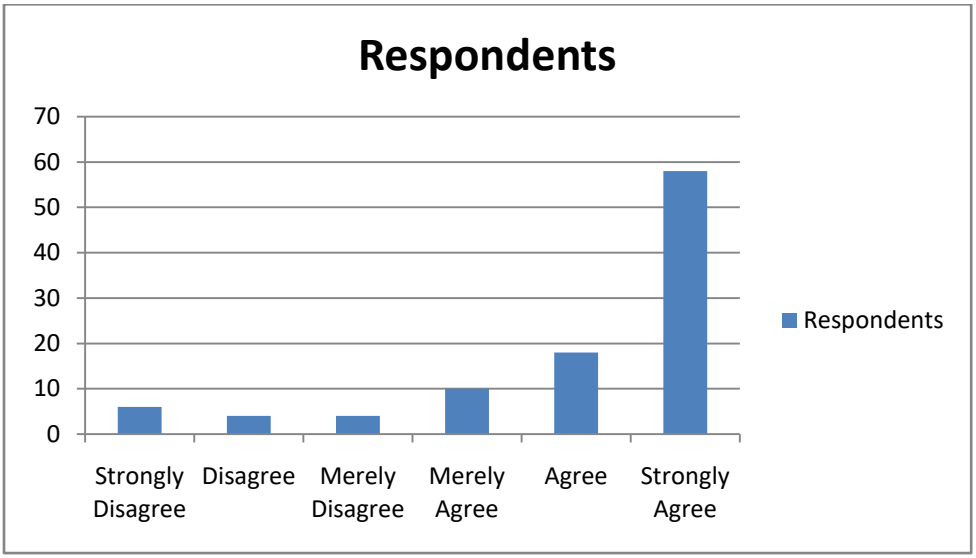
In the words of Bair (2001), "Knowledge management is a follower of identifying, recording, retrieving, giving, and evaluating an enterprise's in order possessions."

Consistent with David Delong and Patrica Seemann, "KM is the expansion of tools, processes, scheme, structures, and cultures openly to get better the building, sharing and utilizing of knowledge critical for decision making."

8.DATA ANALYSIS

2. Experience is highly valued.

Responses	Respondents	Percentage
Strongly Disagree	6	6
Disagree	4	4
Merely Disagree	4	4
Merely Agree	10	10
Agree	18	18
Strongly Agree	58	58
	100	100



The survey of respondents reveals the following:18% of the workers agree with the question, while 58% of the respondents powerfully agree.

From the study, we can analyse that most workers strongly agree that experience is exceedingly valued.

9.FINDINGS

- The process in Penfos System Pvt Ltd is an active generation of innovative ideas and application of knowledge management practices that helps in encouraging and motivating the workforce. The process is implemented, recorded and maintained for the future. Penfos system pvt ltd. Also encourages brainstorming within its operations.
- The company has implemented an electronic knowledge base in its newly opened stores to help the teams to solve and maintain the best performance and productivity levels.

10.SUGGESTIONS

1. Knowledge Management Programmes should become handled properly.
2. It ought to focus more on controlling understanding of past plus existing employees.
3. It ought to provide proper knowledge plus coaching towards the individuals who are usually managing understanding.

11.CONCLUSION

Employees and the success of a company go together, satisfied employees bring about success to the company and a successful company allows high level satisfaction within the company thus facilitating more opportunities to satisfy and motivate their employees.

The human resource department is the department that deals with all the activities of the employees right from the start of recruiting and selecting the employees. The role of the human resource department is with the employees evenwhen they are retiring or leaving the job, until then the role of the employee in a company is equally important as the customers and the mangers of the company.

This research finds that the employees in the concerned company have strong desire to gain knowledge and are in support of combing in the knowledge management process with the available human resource management techniques. The company by combining the two practices through sophisticated technology within the company can help map the competency that is critical to be carried out regularly and then the application of knowledge management will influence the growth of the company in due time when necessary.

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A STUDY OF EMPLOYEE SATISFACTION AT INDIA BULLS

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ABSTRACT

Employee satisfaction is Vital to The achievement of almost any company. The essential aspects which should be thought about at the work satisfaction of employees have been benefits for example wages, working state, pro motion. The Aim of the research to locate the Employees of their company is content with their benefits or maybe not also to identify the way that employee opinion concerning work benefits and place and understand about the type of benefits company provides with their employees. The analysis was completed as a Member of Descriptive research advantage sampling procedure has been used by selecting the sample. The main data was collected by way of questionnaire. The secondary data was accumulated from the organization records and also websites. A structure questionnaire has been fond of 50 employees and also the data had been examined with percent system and Likert scale procedure. The study contributes up into this end. The restriction of my analysis while I am Taking the meeting of employees for survey, they don't really have enough time for fulfilling questionnaire and likewise maybe not curious and perhaps not giving suitable answer because of this I confronted a problem once I had been assessing my poll.

KEYWORDS: *Job, Satisfaction, Employee Feedback, Human Resource Management.*

INTRODUCTION

Individuals are the most significant and Valuable resource every company has in the shape of its employees. Effective folks may lead to the efficacy of the corporation motivated and competent men and women may create matters happens and empower organization to realize its targets.

Individual resource is regarded as the most effective asset in any company. It could be noted here that individual resource needs to be utilized to the utmost possible degree so as to achieve

organizational and individual targets. It's hence the employee's operation that eventually determines and success of aims.

Employee's satisfaction may be that the terminology used to characterize if employees are happy and fulfilled and fulfilling their wants and requires in the office. Many measures emphasize that employee's satisfaction can be one element in employee's motivation, so employees goal success and positive employee morale at work.

OBJECTIVES OF THIS ANALYSIS

- To comprehend that the working conditions of employees in agency.
- To evaluate the satisfaction level of employees towards health advantages supplied by agency.
- To study about the job satisfaction factors in the Indiabulls financial services

SCOPE OF THE STUDY

Employee would be the Pair of almost any company It's throughout the employees. The company accomplishes its own purpose. It's quite crucial from the company Point of opinion to keep them fulfilled. The objective of study will be to know the satisfaction on the list of employees to agency of Karvy. And indicate the region for advancement should any.

RESEARCH METHODOLOGY

The research was centered on survey procedure. The intention of the analysis is to locate satisfaction levels of employees.

A sample layout is a definite strategy for obtaining a sample out of the given populace. Convenience sampling procedure employed in trials that were chosen.

Sample-size

Samplesize is a Component of goal People, carefully selected to represent the populace. Here within this study that the sampling size is 50.

Data-collection

The information gathered for the analysis contains both secondary and primary statistics.

Inside This study chief information were accumulated through employee's interview utilizing survey. The survey was administered for employees of bureau of Karvy.

Secondary information for the research was collected from.

• Previously published documents, study reports.

• Novels, internet sites.

QUESTIONNAIRE

In this research I had been used a questionnaire Comprising twenty five four choice-based questions

Graphical Representation instrument for example Bar Graphs and Pie Charts are useful for its data analysis.

LIMITATION OF THE STUDY

- Since My analysis sample were that the Employees of the provider, so that it had been quite difficult and hard to capture their time to get appointment which I had left a questionnaire and also have question from these since these certainly were never having time and energy to fulfill it.
- The Span of analysis has been short. Therefore, it wasn't feasible to get the appropriate advice with because period.
- Respondents weren't prepared to present certain information.
- Respondents have been somewhat anxious in fulfilling The questionnaire since they emphasized their termed will likely have been shown.
- Some older executives weren't eager to Share their real views since they termed it confidential.
- The Findings have been based mostly on the responses written by the employees, therefore any mistake or prejudice May be influencing the validity of this finding.

REVIEW OF LITERATURE

The Objective of this Employee satisfaction would be always to acquire an comprehension of employee demands and also a crystal clear notion of just how to enhance the answer to all those demands it demonstrates that you're enthusiastic about employee feedback. It really is 1 method to follow your employees.

·No successful Business Is conducted by keeping people at silos. People today work well in teams, and also to improve the operation of your own teams, you need to collect the info required to help them operate most economically. Our polls assist you to make sure your teams are still operating at peak efficiency.Improve satisfaction and endurance.

Employee satisfaction Estimates are a great Vehicle for discovering how employees view their tasks and also the company altogether. Do employees have the tools required to complete their tasks, a job place that's forcing high degrees of earnings, and therefore are they pleased with chances for progress? All these and several other questions might be answered using a questionnaire.

Assess employees' Long-term responsibilities:

One Of the greatest"costs"related to conducting a provider may be that the increased loss of employees, a lot of whom require institutional knowledge to lead competitors. Employee turnover wreaks havoc in your enterprise. Assessing this hidden price is important to the managing of almost any successful firm.

Identify series preparation demands:

Who is Are the prospective leaders? Are you currently arming them with the expertise and skills they should become prosperous? A specialist, detailed way of succession planning might be directed by employee satisfaction questionnaire outcomes.

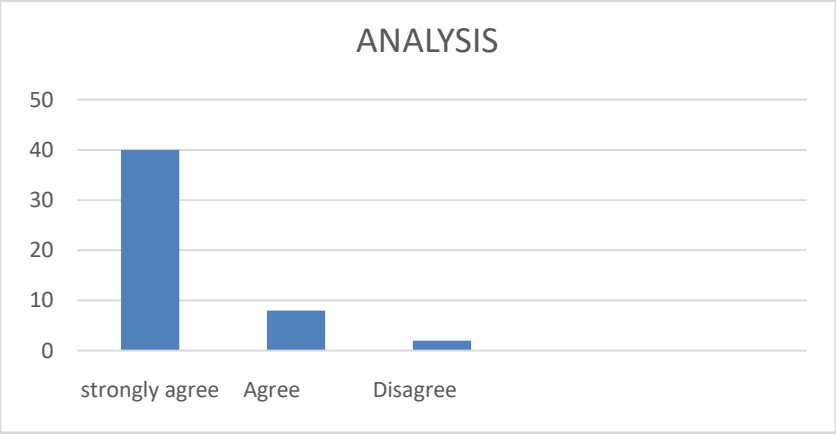
Enhance the job lives of employees:

Joyful employees get more work, plus so they do it more effortlessly. Joyful and productive employees typically possess a fantastic balance between their personal and work lifestyles; they hope and respect their own peers, managers, and upper direction. They enjoy coming into work and are pleased with these team and individual your employees display accomplishments traits? Information may be the trick to unlocking the entire potential of your employees, maintain happier, more fulfilled employees.

DATA ANALYSIS

Question1: Do you think medical benefits provided by BIS are helpful to you?

OPINION	NO OF RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0%
Disagree	2	4%
Do not know	0	0%
Agree	8	16%
Strongly agree	40	80%
TOTAL	**50**	**100**



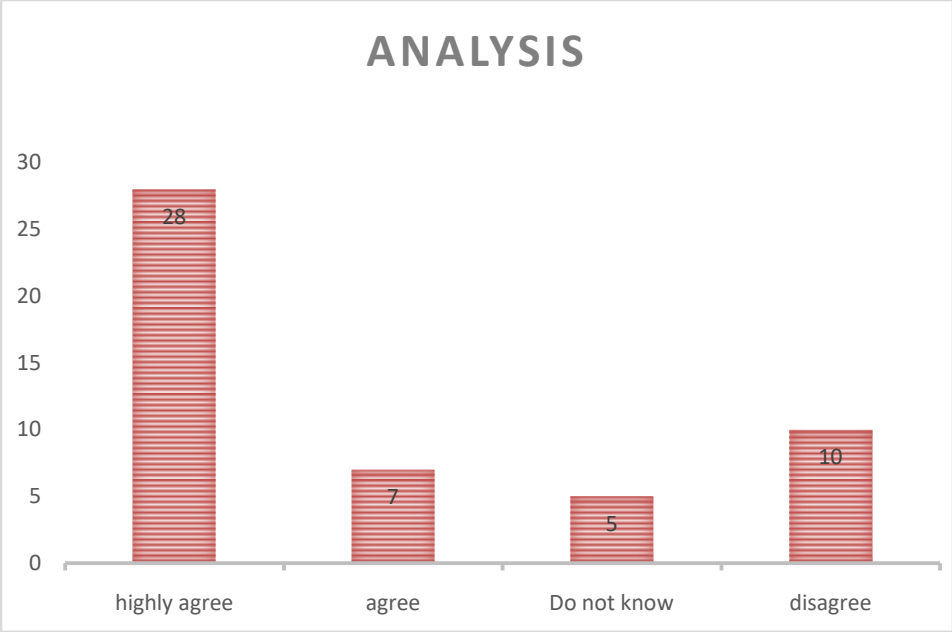
Interpretation:

Majority of employees satisfied with their medical benefits offered by bis i.e., 80% of employees strongly agree, 16% of employees agree

And only 4% of employees not satisfied with their medical benefits.

Question2: Does your medical policy meet up your expectations?

OPINION	NO OF RESPONDENTS	PERCENTAGE
Strongly agree	28	56%
Agree	7	14%
Do not know	5	10%
Disagree	10	20%
Strongly disagree	0	0%
TOTAL	**50**	**100**



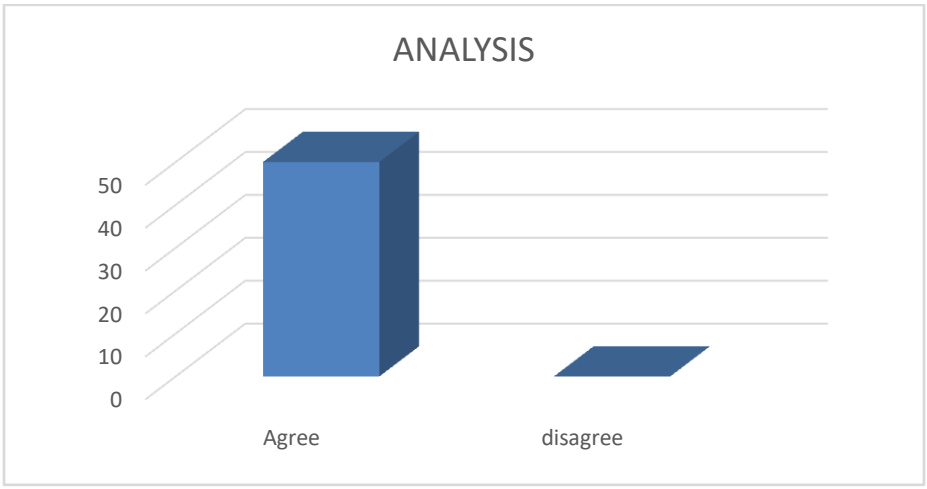
Interpretation:

56% of employees strongly agree ,14% of employees agree with their medical policy.

And 10% and 20% of employees do not know and disagree because some of the employees are not permanent in the company, they are on contract basis so they don't have any medical policy in their contract.

Question3: Are you comfortable with your working hours?

OPINION	NO OF RESPONDENTS	PERCENTAGE
Agree	50	100%
Disagree	0	0%
TOTAL	**50**	**100**



Interpretation:

According to the survey, maximum number of employees are satisfied with their working hours because its government office and the timing of working hours is fixed that's why 100% of employees are satisfied.

FINDINGS

- Out of 50 employees, most of employees were consented that provider provides benefits in their mind.
- They presume company permits them to do most useful every single day.
- Employees believe that they have adequate resources & infrastructure you want todo work nicely.
- Vast majority of employees believes that the benefits supplied by the business is vital.
- Nearly all of employees fulfilled (100 percent) the timing of this project.
- Vast majority of the employees are content with the healthcare facilities supplied by the business.

SUGGESTIONS

- In these times employee satisfaction is quite significant in the company. Company must provide benefits to employees depending on their wants and wants.
- Good guidance and counseling ought to be given to the employees in order that their emotional satisfaction may be made better.
- Company should simply take precautionary steps to improve overall working state of the business thereby employees will probably be fulfilled within their own job.

CONCLUSION

It's necessary for any company to Know the requirement of these employees and meet them until they leave the company. If nothing is carried out by the company then you will find opportunities to shed talented employees from some other company to its own competitors. Ergo it Is Essential for almost any Company to make certain employees satisfaction. Organization may determine the root causes of occupation difficulties and make solution for advancement using a precise view of employee perspectives. Satisfaction amounts increases when Employees realize that their problems have been addressed. Satisfaction of these employees is crucial from the company.

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(Double Blind Refereed & Peer Reviewed Journal)

A STUDY ON HUMAN RESOURCE INFORMATION SYSTEM

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ABSTRACT

Human being Resources Info Systems (HRIS) is usually an integration of HRM and Info Systems (IS). HRIS or Human being source Details program assists Human resources managers perform Human resources features in a even more effective and organized method using technology. It is normally the program utilized to acquire, shop, adjust, evaluate, obtain, and share appropriate details relating to an organization's individual assets. A individual reference details program (HRIS) is normally a program utilized to acquire, shop, adjust, evaluate, obtain, and share appropriate information regarding an organization's individual assets. The HRIS program is normally a component of the organization's bigger administration details program (MIS) which would consist of accounting, creation, and advertising features, to name simply a few. Individual reference and series managers need great individual reference details to facilitate decision-making. An comprehensive research by Podiums Perrin research uncovered the pursuing benefits of hris.

KEYWORDS: *Human Resources, Information System, Technology, Managers*

1. INTRODUCTION

Information system that support the sales & marketing function by facilitating the movementof goods and services from suppliers to customer point of sale (POS), telemarketing, sales force automation (SFA).Information system should help the sales & marketing for product planning, pricing decision, devising ad & other promotional mix, forecasting market

potential for new and existing products, & determining channels of distribution. Information system should help the HR for recruitment, placement, training, efficiency, advancement, evaluation, settlement, and career.

2. OBJECTIVES OF THE STUDY

- To provide human resource solutions and deliver highest possible standard of quality.
- To develop an insight of the HR services using information system
- To understand and to offer sufficient ,comprehensive and ongoing information about people and job
- To offer data security and personal privacy.

3. SCOPE OF THE STUDY

Human being Source of Info system is usually an built-in system designed to provide information used in HR decision making it is usually a tool through which an HR division can take the information of the employees when company requires any personal or any established information.

HRIS is actually a new technique which can be used in these different areas where Human resources may produce there function even more easy by making use of Individual Reference details program they may gather the details by providing them a kind of the equal structure which includes there firm information and personal information also.

4. NEED OF THE STUDY

It can be wished that a even more comprehensive research may make use of a study device created from the outcomes discovered right here. Understanding how to instruct. HRIS can be even more essential, as agencies require their employee's information for different reasons. If a provided HRIS can be to possess any worth in all to Human resources then info should end up being centered about two elements how many decisions will end up being improved by the HRIS and how very much ideals will each improved decision make.

Understanding these two elements can be comparative to any HRIS

5. RESEARCH METHODOLOGY

Research Methodology

To obtain the purposeful of analysis, a prepared and proper detailed analysis is certainly transported out. Descriptive research is certainly useful to understand the percentage of individuals in the provided inhabitants who possess socialized in a particular way producing projection of specific factors or identifying the romantic relationship between two or even more

factors. Descriptive research is inclined to end up being stiff and its strategy cannot end up being transformed every today treatment should end up being used just in the preliminary levels of preparing and analysis usually data gathered with the research a training applications executed for the workers in the firm.

Data resources:

Data is certainly gathered from main and secondary sources. Collection of the data is usually main element in the study process. Data which is definitely accumulated for the purpose regarding study helps in appropriate analysis to develop findings which are help full to conduct

study efficiently. The data resource which is definitely very important in the collection of data is definitely both main and secondary.

Primary data:

The data that is normally gathered through administrating the customer survey by immediate get in touch with and also included in personal conversations to get the edges of the details.

Secondary data:

This data gathered from information, guides and broachers, preserved by the personal section.

RESEARCH DESIGN:

Survey method:

The customer survey was administrated through immediate get in touch with the participants of Sumega Technology, Hyderabad.

Sampling decisions:

Sample size : 100 employees

Total population : 250 employees

Sampling technique : Convenience sampling

Sample unit : Staff, Supervisors, Assistant officers and Managers

6. LITERATURE REVIEW

Hewitt associates, February "(2002) - The recent yeas have witnessed the H.R function in the organization to reinvest itself with the help of technology and Web based applications ,the basic principle of web based H.R sounds relatively simple as it make personal data readily accessible for review and revision. This empowers employees and managers to assume greater control over employee details. This informative article focuses on the modification of the H.R strategy of the company to one that is more technology driven. The need was for an driven, multi-faceted approach to the E -HR that would result in advanced H.R.

Sandeep K Krishna, September 7, 2006)

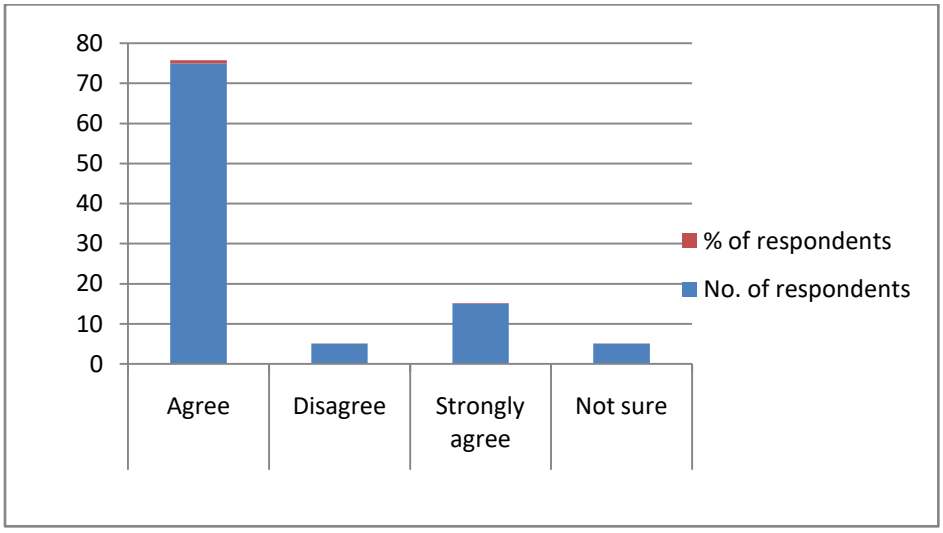
As both large and small companies are busy in transforming long held processes into web based solution to streamline operations and to provide better services .Its now common for senior management to motivate to reinvent itself either the help of technology and Internet based applications ,seeing that many of the agencies are breakthrough discovery the procedure of developing ,implementing and maintaining a successful E-H.U framework is more impossible then simply tracking and many facing complications in implementing HRIS

7. DATA ANALYSIS

Do you feel that the work burden of HR manager reduced utilizing the HRIS?

S. no	Options	No. of respondents	% of respondents
1	Agree	75	75%
2	Disagree	5	5%
3	Strongly agree	15	15%

4	Not sure	5	5%
Total		100	100%

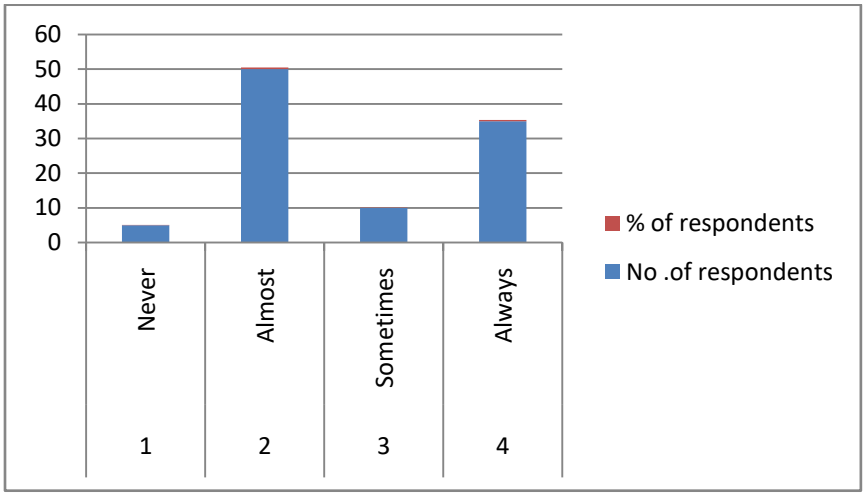


INTERPRETATION

From the above it is inferred that 75% are satisfied with agree, 5% are satisfied with disagree, 15% are satisfied with strongly agree and 5% are satisfied with not sure.

What's your opinion regarding organizational factors affecting by HRIS?

S. no	Options	No .of respondents	% of respondents
1	Never	5	5%
2	Almost	50	50%
3	Sometimes	10	10%
4	Always	35	35%
Total		100	100%



INTERPRETATION

From the above it is inferred that 5% are satisfied with never, 50% are satisfied with almost, 10% are satisfied with sometimes and 35% are satisfied with always.

8. FINDINGS & SUGGESTIONS

1) The business should put into action ERP program for better decision building regarding for protection.

2) They should install Login program, Consumer id & security password for protection factors.

3) There should install protection software program like antivirus for maintaining protection.

4) They should provide a organized & correct training to the consumer of the program.

9. CONCLUSION

HRIS is very important application for the expansion of the company. The system helps keeping the records of employee's attendance, payroll manager & all functioning of HR. this existing system is usually needful but some employees requires to change as per requirement. By proper training to employees it can help to reduce all the paper work. The need for the human resource function & HRIS is usually increasing day by day and it seems to benefit in future

I have been lucky enough to be given multiple assignments of varied nature and complexities, which gave me an opportunity to try out new avenues of marketing and also to analyze their effectiveness for procuring customers and maintaining long term bonds with them. The training has provided me sufficient knowledge of the HRIS software program, its information and several quests supplied. Aside from all this, I possess discovered to utilize several technology for advertising and building consumer romantic relationships in the Internship Plan.

I actually am grateful to my firm instruction, for generally getting supportive and encouraging me from period to period. No job acquired been designated to me, without correct training and understanding of the subject matter.

I actually would like to conclude by telling that the summer months internship plan has given me knowledge, functioning knowledge in corporate and also the skill of completing the given focus on in the allotted period.

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CONSUMERS ATTITUDE TOWARDS BRANDED APPAREL: GENDER PERSPECTIVE

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ABSTRACT

Consumer's attitudes play a prominent role in buying decisions. Attitudes are the favorable and unfavorable dispositions towards objects, people, goods and services. The relationship between consumers' decision-making styles and their choice between depends largely on their attitudes towards brands in the market. The attitudes of the people are investigated using a sample of Indian consumers. The objective of this paper is to gauge the factors affecting purchase decision taking gender perspective as base. The objective of this paper is to analyze the significance of demographic profile of consumers affecting the purchase decision of branded garments and to observe from gender perspective the consumer awareness about different apparel brands available in the Indian market and also to find out whether there is a significant difference in total expenditure on branded apparels done by males vice-versa females. The study highlights few points such as brand awareness levels, shopping interests, and amounts spent on shopping by both the genders. The results exhibit no significant differences in the brand awareness, shopping frequency and shopping expenditure between males and females.

KEYWORDS: *Private Labels, Shopping Behavior, Branded Apparels, Ashion, Gender Discrimination, Survey, Loyalty.*

INTRODUCTION

The likes and dislikes of the people are regarded as attitudes. People today are respected by what they wear and how they look. The external package which people make to them defines them. Clothes market a man" The Indian textile and apparel industry is the largest foreign exchange

earner for the country. It is also the second largest employment provider after agriculture and plays a key role in the development of the economy. This industry profile on the 'Textile and Apparel Sector in India' provides a gainful insight of the industry. The fashion industry is the fastest growing in the world. From the last few decades, the fashion industry in India has been experiencing an explosion due to considerable dynamic nature which increases fashion consciousness among consumers. Everyone has a separate and elegant fashion sense which is mainly related to the apparels throughout the world. Apparels define the personality, education, behavior and the way of thinking of the people. It is substantial to note that Indian fashion consumers will set the global fashion trends in the coming era. Consumers' attitude is changing with the present scenario, as the hoisting of tailoring costs and comparatively less charges of branded outfits; they are increasingly being attracted towards ready-mades. Ready-mades of specific brands have become not only a status symbol; these have brought a more latest style in offices as much as in social circles. According to Fashion Design Council of India, that apparels created by Indian designers are going to play a major role in the growth of the apparel industry in the next few years. These changes will have far-reaching implications for designers, manufacturers, and retailers targeting the Indian apparel market. The growing awareness of brands since 1980s and the convenience offered by ready-to-wear garments were largely responsible for the development of the branded apparel industry in India. Other factors affecting to its growth are considered as better purchasing power in the hands, access to fashion trends outside the country, and the superior quality of fabrics available in the fashion market. 1990s witnessed a drastic change in the overall economic environment of the country which is described liberal trade and new investment policies. It was seen the effects of such liberalized polices in the clothing industry also. After liberalization of Indian economy, there emerged more than 100 leading brands that jostled for consumer mind space. Today, Indians are more inclined than consumers in other markets to buy apparel for a specific purpose. The growth of the Indian and global fashion designers has encouraged the branded apparel market additionally. Designers do annual business. Formerly, readymade market was restricted to some limited extant only like, baby dresses and shirts, but currently, it has extended to all kinds of outfits and fashion clothing for men and women also. In the perspective of clothing, people express themselves through consumption in an innumerable ways. In gender perspective, for building individuality, a reasonableness of attainment and recognition for fashion conscious. The purpose of this research is to investigate buying behavior which constitutes expenditure, independence and frequency as regards males and females. In this competitive era marketer must be fully aware about the customer needs distinctly and separately as two groups males and females as regards what are they expecting from a brand, how they differ in their buying behavior, factors which push them to purchase a particular brand, their total outlay, shopping frequency etc to attain a competitive edge. This vital information can help the companies to formulate the strategies as per the customer needs & deliver them the products which consumer want from the company which will be profitable for the company embedding gender perspective. Retailers and marketers should understand the immense diversity among consumers if they are to market apparel accurately and successfully.

Need of the study

The opinions and attitudes of the male and female gender significantly vary in regard to the branded and unbranded products and services. The study is undertaken to understand the similarities and differences in the attitudes of male and female towards branded apparel.

REVIEW OF LITERATURE

Consumers' attitude of the brand preference towards the Indian and Multinational brand must be based on some important factors, and price and quality may be the main dominating factors which influence the brand choice decision between Indian brands and Multinational brands. Kotler (2008) defined quality as "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs". According to authors, quality is distinguished into two forms: objective (actual quality of the product) and subjective (consumer's perception of quality).

Consumers' perception of the brand preference towards the Indian and Multinational brand must be based on some important factors, and price and quality may be the main dominating factors which influence the brand choice decision between Indian brands and Multinational brands. Kotler (2008) defined quality as "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs". According to authors, quality is distinguished into two forms: objective (actual quality of the product) and subjective (consumer's perception of quality).

P. Kotler, G. Armstrong, V. Wong and J. Saunders (2008) defines national brand (also called manufacturer's brand) as "a brand created and owned by the producer of a product or service". National brands have been the leaders on the market since the last century, but there is a rapidly growing competition from the private labels

In accordance with assorted definitions of brands, two approaches of defining a brand are derived. The traditional one is a practical view which articulates a brand as a product identifier, including the source of the product. According to him, a brand is a distinguishing name and symbol which intended to identify the goods, services of either one seller or group of sellers and to differentiate those goods or services from those of competitors. Brand awareness is the strength of brand which is reflected by the identification of that brand under several conditions. It is a combination of recognition and recall performance. Brand image is consumers' perception about the brand .But there are not enough studies which considered gender issue in respect of consumer attitude and branded apparels existing in fashion industry, except few ones. Therefore, the current study enlightens the gender prospect of targeting consumers with their demographic characteristics because magnitude of brand knowledge may impact consumers' purchase decision differently depending upon their demographic distinctiveness.

Figure showing different apparel



Research Objectives

Purchase decision is facilitated by having a comprehensive knowledge of the brand which helps in evoking positive effects towards the brand, as these days people don't buy the product they buy images. It influences brand choice, preferences and intention to purchase of consumers. Therefore, it is indispensable for a marketer to comprehend about the perceptions of consumers for a brand which impact the purchase decision embedding gender perspective. The purpose of the study is to examine how brand awareness influences an outlook of the consumer about various brands which leads to take purchase decision.

Objectives of the study are:

1) To analyze the significance of demographic profile of consumers affecting the purchase decision of branded garments.

2) To observe consumer awareness about different apparel brands available in the Indian market in gender perspective.

3) To find out whether there is a significant difference in total expenditure on branded apparels done by male's vice-versa females.

Following hypotheses are formed to test the hypotheses:

- Males and females are not having differences in their brand awareness.
- Males and females carry out differences in their brand awareness.
- Males are equally interested to go for shopping as females.
- Males are less interested to go for shopping rather females.
- Males spend excess money during shopping than females.
- Males spend less or equal amount of their income to females.

Data and Methodology:

Data

In this study, 120 respondents from Hyderabad city participated fairly with the age group of 15-40. Participants, which included males and females, are varying from student to professional or

job seekers highlight the diversity of the survey. The sampling technique used for the paper is Random within Quota sampling by age and gender. Consumers with different demographic characteristics may differ in the amount and type of effort they put into shopping and the way they make purchase decisions. There are individual differences in information search process have been found to be related to demographic characteristics. Research has introduced relation among search effort age, gender and economic conditions.

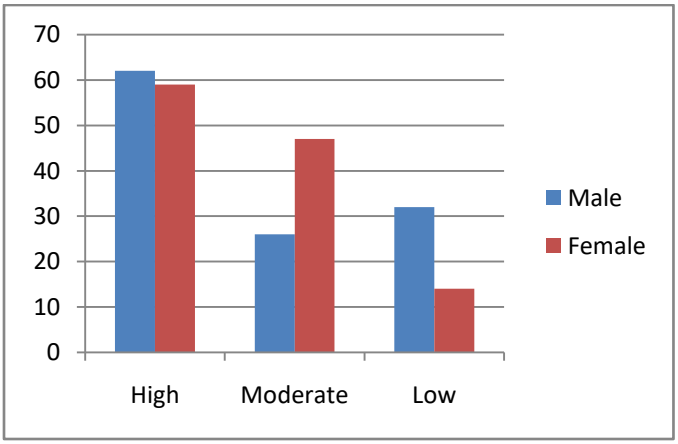
METHODOLOGY

A survey was conducted by a carefully developed questionnaire, to investigate the brand awareness and attitude of the consumers towards selected brands of apparel industry existing in India. A combination of both open-ended and close-ended questions was asked to analysis the pre-determined objectives. To test consumer perception of various brands, a rating question was incorporated wherein the consumers were required to rate each mentioned brand and their various attributes. The tool also included a part dedicated to psychographics so as to access consumer attitude towards branded clothing. It also involves use of secondary sources such as web and other research articles Printed by various financial institutions and other journals and magazines.

Data Analysis

Awareness levels of male and female shoppers

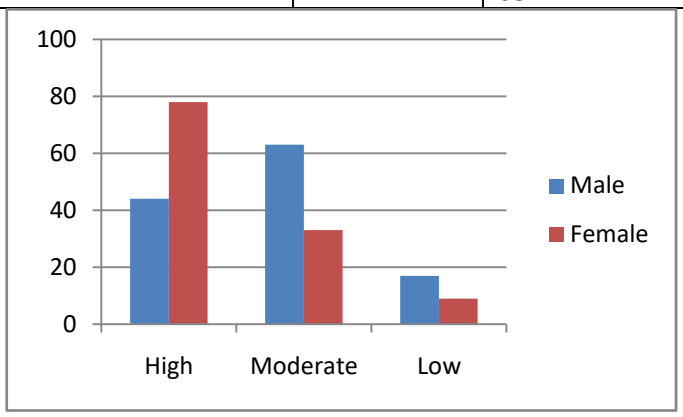
Awareness level	Male	Female
High	62	59
Moderate	26	47
Low	32	14



Males and females are not having differences in their brand awareness. Males and females carry out differences in their brand awareness. It is concluded that on a whole males and females are not carrying differences in their brand. Hence the study accepted the null hypothesis and rejected the alternative one which says that males and females are not having differences in their brand awareness. It's all about their way of living only. So that, the study confirmed the fact that awareness about the branded apparels is independent attribute which has no impact of gender discrimination.

Interest in Shopping

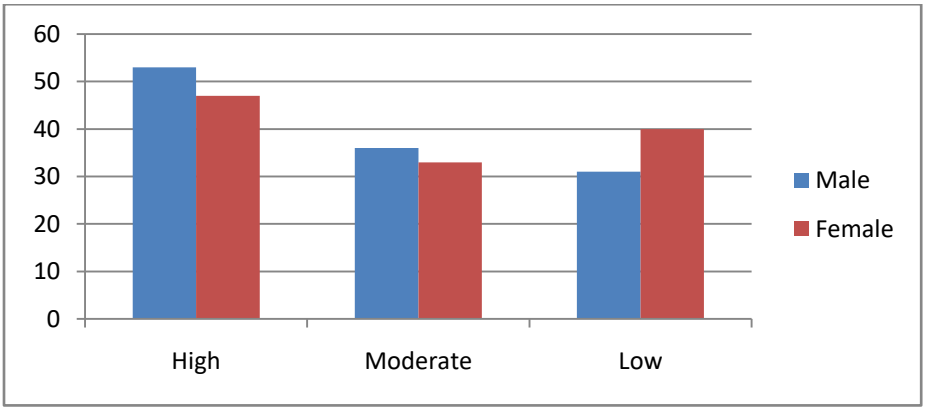
Interest in shopping	Male	Female
High	44	78
Moderate	63	33
Low	17	09



Males are equally interested to go for shopping as females. Males are less interested to go for shopping rather females. Though it has been observed that female are fond of shopping and male prefer staying at home rather wasting time on shopping. Another cause of this changing trend is the availability of a wide range and variety in the shopping malls designed for men's wear.

Amount spent for shopping

Amount spent for shopping	Male	Female
High	53	47
Moderate	36	33
Low	31	40



Males spend less or equal amount of their income to females. Females by nature are more savings oriented. On the converse, men spend more of their income as prestige comparatively to female consumers which is of great importance to them. Women consider price also before taking the purchase decision while men hardly care about the price of the product. Therefore,

there are many reasons for this difference, but lastly it is confirmed that males spend excess money during shopping than female consumers.

Findings

- The male and female are almost equally aware of the brands
- Female are a bit more inclined towards shopping
- The spending pattern of both the genders is more or less equal

Suggestions

- The companies have to position the products on the basis of gender and develop suitable communications
- The marketers must identify the priority of both the genders in attitude formation.

CONCLUSION

The preference of consumers for branded apparels is fast changing caused by the creation of personality and status with the quality and comfort they deliver. Due to the increased awareness and consciousness, people are ready to spend any price for comfort and quality. Hence, brand image is a not the only significant factor in choosing the product or brand to buy. There are other aspects like, quality, comfort, expectations and demographic characteristics that also influence the purchasing decision that dominate the purchase decision of males and females. From the analytical introspection it is evident that the gender differences do exist with respect to build attitude towards fashionable apparels and brands. Finally, male and female do not t have any significant differences in their brand awareness, shopping frequency and shopping expenditure.

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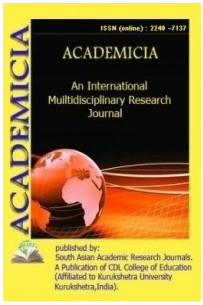

IMPACT OF MICROFINANCE IN EMPOWERING SOCIO-ECONOMIC STATUS AT CANARA BANK

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ABSTRACT

Microfinance is described as any interest that consists of the availability of economic offerings such as credit score, financial savings, and coverage to low-income people which fall simply above the nationally described poverty line, and negative individuals which fall underneath that poverty line, intending to create social value. The creation of social price consists of poverty alleviation and the broader impact of improving livelihood possibilities via the availability of capital for micro-enterprise, and coverage and financial savings for danger mitigation and consumption smoothing. A huge variety of sectors offer microfinance in India, using a variety of microfinance delivery methods. Since the ICICI Bank in India, diverse actors have endeavored to offer access to financial offerings to the negative in creative ways.

KEYWORDS: *Microfinance, Canara Bank, Poverty, Financial Savings*

1. INTRODUCTION

According to the International Labor Organization (ILO), "Microfinance is a monetary development approach that involves providing economic offerings via institutions to low-income clients".

In India, Microfinance has been described by "The National Microfinance Taskforce, 1999" as "provision of thrift, credit and other monetary services and products of very small quantities to the negative in rural, semi-city or city regions for allowing them to raise their income tiers and improve living standards".

2. Need For the study

Since independence, numerous governments in India have experimented with a huge number of furnish and subsidy based totally poverty remedy programs. These programs were based on grant/subsidy and the credit score linkage was through business banks only. Hence changed into adopted the idea of micro-credit in India. Success tales in neighbouring countries, like Grameen Bank in Bangladesh, Bank Rakyat in Indonesia, Commercial & Industrial Bank in Philippines etc., gave a similarly increase to the idea in India inside the 1980s. India as a result followed the similar version of extending credit score to the poorest area and took a no. Of steps to promote micro-financing within the country.

3. Scope of the study

The microfinance sector has emerged mostly from the efforts of Non-Governmental Organizations (NGOs), and as a response to the failure of existing structures to deliver financial services to the poor. The efforts by NGOs have emerged from grassroots and represent diversity. They do not fit into a straitjacket. Therefore, unlike the other structures like cooperatives, Regional Rural Banks (RRBs) and commercial banks, it is difficult to get statistics on microfinance. It is also difficult to make policy recommendations that impact the sector as a whole. There are different channels for microfinance services in the country. SHG (Self Help Group)-Bank Linkage Channel (SBLC) is the first one, which was developed early 1990s by NABARD. More recently, many Non-Governmental Organizations (NGOs), Community Based Organizations (CBOs) and Self-Help Groups have started micro finance delivery systems successfully in rural areas. These organizations motivate the poor to join the credit groups, helps to manage their savings, loan-deposit and recovery process and may also provide an interest free loan to the group that acts as a start-up fund.

4. Objective of the study

- To examine the impact of microfinance in empowering the social-financial repute of ladies and developing of socialentrepreneurship.
- To understand approximately the connection among SHG's members, microfinance banks and entrepreneur'swomen.
- To clarify the issue of microfinance programs as the device for ladies' empowerment and the type of help service essential to maximize the contribution of microfinanceservice.
- To observe potential hurdles in the improvement of ladies'entrepreneurship.

5. Research methodology

- This study is based on both primary and secondary data.
- The primary data was collected through structured questionnaire method.
- The secondary data was collected from various journals, textbooks, newspapers, websites etc.

6. Limitations

- Availability of data was a constraint due to which only secondary data is considered, which is available, and also there are some MFIs whose data was not available

- All the information available was from secondary sources and data was very vast to analyse properly & accurately.
- The whole study was based on historical data which was not much useful in analysis of present and prediction of future.

7. Analysis and interpretation of data

Objective 1: To study the impact of micro finance in empowering the social economic status of women and developing of social entrepreneurship.

AmountinCrore/No. in Lakhs

Particular	Year	Total SHGs		All Women SHGs		% of Woman Groups	
		No.	Amount	No.	Amount	No.	Amount
SHG Savings with banks as on 31st March	2017-18	69.53	6198.71	53.18	4498.66	76.4	72.6
	2018-19	74.62	7019.30	60.98	5298.65	81.7	75.5
Loan distributed to SHGs during the year	2017-18	19.87	18453.3	12.94	12429.37	81.6	86
	2018-19	19.96	18547.73	18.19	12622.33	85	86.8
Loan outstanding against SHGs as on 31st March	2017-18	48.51	28038.28	38.98	23030.36	80.30	82.1
	2018-19	47.87	31221.19	39.84	26123.75	83.2	83.7

Interpretation: According to main objective to know the economic and social development of women entrepreneurship. Above table show the economic development of women. In 2017-18loans disbursed amount to women is 12429.37crore and 2018-19 is 12622.33crore. In 2017-18 SHG Savings amount to women is 4498.66crore and 2018-19 is 5298.65crore and in 2017-18 loan outstanding amounts to women is 23030.36crore and 2018-19 is 26123.75crore.

Objective 2: To know about relationship between SHG's members, micro finance banks and entrepreneur's women.

Sr. No.	Name of The Bank	Details of SHGs Saving linked with Banks			Out of Total SHGs- Exclusive Women SHGs		
		No. Of SHGs	No. of Members	Saving Amount	No. Of SHGs	No. of Members	Saving Amount
Punjab							
1	Allahabad Bank	304	3040	9.40	95	950	2.94
2	Bank of Baroda	190	1200	50.30	182	718	24.50
3	Bank of India	374	4452	25.43	271	3253	19.76
4	Canara Bank	199	1936	9.53	177	1902	7.28
5	Central Bank of India	540	6022	64.42	354	4186	42.06
6	Punjab & Sind Bank	1917	19744	50.89	745	7919	31.08
7	Punjab National Bank	4319	46575	2041.77	2185	22073	193.38
8	State Bank of India	3944	47328	89.00	3196	37872	71.00

Sr. No.	Name of The Bank	Details of SHGs Saving linked with Banks			Out of Total SHGs- Exclusive Women SHGs		
		No. Of SHGs	No. of Members	Saving Amount	No. Of SHGs	No. of Members	Saving Amount
Haryana							
1	Bank of Baroda	192	725	19.00	129	350	2.60
2	Bank of India	179	1798	42.19	31	290	2.20
3	Canara Bank	453	4925	52.25	390	4052	37.59
4	Central Bank of India	482	5296	28.72	350	3844	19.18
5	Indian Bank	194	1918	3.63	194	1918	3.63
6	Punjab & Sind Bank	704	7040	49.76	419	4190	28.57
7	Punjab National Bank	18703	189260	7002.82	8037	84188	4264.19
8	State Bank of India	4984	59808	207.00	4190	50280	190.00

Sr. No.	Name of The Bank	Details of SHGs Saving linked with Banks			Out of Total SHGs- Exclusive Women SHGs		
		No. of SHGs	No. of Members	Saving Amount	No. Of SHGs	No. of Members	Saving Amount
Himachal Pradesh							
1	Bank of India	46	465	19.50	0	0	0.00
2	Canara Bank	198	1840	4.65	198	1840	4.65
3	Central Bank of India	412	4244	48.21	324	3382	33.68
4	Indian Bank	39	585	2.37	39	585	2.37
5	Punjab & Sind Bank	92	920	19.62	53	530	6.73

6	Punjab National Bank	19049	192407	1927.80	12301	123018	946.24
7	State Bank of India	6794	81928	126.00	5436	65232	180.00
8	UCO Bank	993	19432	333.19	760	8680	259.91

Sr. No.	Name of The Bank	Details of SHGs Saving linked with Banks			Out Of Total SHGs- Exclusive Women SHGs		
		No. Of SHGs	No. of Members	Saving Amount	No. Of SHGs	No. of Members	Saving Amount
Delhi							
1	Allahabad Bank	30	320	18.00	30	320	18.00
2	Bank of Baroda	383	3775	62.83	377	3685	60.96
3	Bank of India	35	552	6.73	35	552	6.73
4	Indian Bank	819	8956	43.59	789	8675	38.39
5	Central Bank of India	8	80	0.30	8	80	0.30
6	Syndicate Bank	19	193	2.58	19	195	2.54
7	Punjab National Bank	760	7600	188.42	705	7050	183.99
8	State Bank of India	751	9012	31.00	751	9012	31.00

Interpretation: There are four states which show the relationship between Banks SHGs and women SHGs. According to above table it shows the total saving of women SHGs with total SHGs and total saving of SHGs with banks. There are more % of women SHGs saving out of total SHGs saving. In Delhi region 2018-19 highest SHG Savings amount to women in Punjab national bank is 183.99 lakh and lowest in Central Bank of India is 0.30 lakh. In Punjab region 2018-19 highest SHG Savings amount to women in Punjab National Bank is 193.38 lakh and Lowest in Allahabad Bank is 2.94 lakh. In Haryana region 2018-19 highest SHG Savings amount to women in Punjab National Bank is 4264.19 lakh and Lowest in Bank of India is 2.20 lakh. In Himachal Pradesh region 2018-19 highest SHG Savings amount to women in Punjab National Bank is 946.24 lakh and Lowest in Bank of India is 0.00 Lakh. It shows the good relationship of women SHGs with SHGs group and banks.

8. FINDINGS

- Micro financial institutions play a very important role today to provide the micro finance to the women entrepreneur. Mostly MFI provide the assistance to the women entrepreneur through MFI- bank linked program.
- From the current situation we can understand that today the main focus of micro finance industry is to empower the woman that's why more loans are provided to woman and on easy terms.
- From the total SHG more SHG are coming in which only women are member because women can better run a business and his family.

- With the help of relationship data, we can see that there are more percentage of women SHGs out of total SHGs. So that is good indicator for women entrepreneur.
- The loan distributed data show increases the % of loan amount to women as compare to last year. This show the economic development of women entrepreneur.

9. Suggestions

- Making credit available to women does not automatically mean they have control over its use and over any income they might generate from micro enterprises.
- In situations of chronic poverty, it is more important to provide saving services than to offer credit.
- A useful indicator of the tangible impact of micro credit schemes is the number of additional proposals and demands presented by local villagers to public authorities.
- Globalization will not be allowed to expand the gap between the rich and the poor. Affluent countries cannot continue to dump aid on needy nations; developing countries must not be permitted to ignore the needs of their impoverished population.
- As the poor are vulnerable it is not sufficient for us just to provide micro credit, but to have a series of support systems provided at the appropriate time.

10. CONCLUSION

A conclusion that emerges from this account is that micro finance can contribute to solving the problems of inadequate housing and urban services as an integral part of poverty alleviation programmes. The challenge lies in finding the level of flexibility in the credit instrument that could make it match the multiple credit requirements of the low-income borrower without imposing unbearably high cost of monitoring its end use upon the lenders. A promising solution is to provide multipurpose lone or composite credit for income generation, housing improvement and consumption support. Consumption loan is found to be especially important during the gestation period between commencing a new economic activity and deriving positive income.

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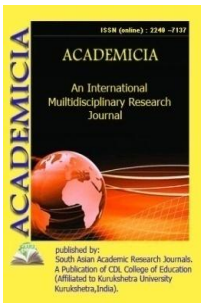

RETAIL SALES MANAGEMENT AT BIG BAZAAR

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ABSTRACT

Retail sales management is the set of activities that markets products or services to final consumers for their own personal or household use. The products are procured in bulk from the producers and offered for sale to the customers in smaller volumes. It does this by organizing their availability on a relatively large scale and supplying them to consumers on a relatively small scale. Retailers produce or order the products/services in bulk so they can take advantage of economy of scale and thus they can formulate competitive pricing strategies. Products and services are generally sold through the store or on the internet. "Retailing is a distinct, diverse and dynamic sector". "It is an activity of enormous economic importance to the upcoming and advanced nations". It generates revenue and wealth for nation, encourages investments, brings technological advancements and creates employment opportunities". Most of retail organizations state that they believe in extraordinary client care, yet not much arrangement is made to ensure that they offer it. It truly is broadly acknowledged that it's right around multiple times additionally remunerating to market to a prior client than to search for another client. The study at Big Bazaar examines the how management of retail sales is carried out to meet the customer requirements.

KEYWORDS: *Retail Sales, Smaller Volumes, Household Use, Wealth Creation*

1. INTRODUCTION

The first decade of modern retail in India has been characterized by a shift from traditional kirana shops to new formats including department stores, specialty stores hypermarkets, and supermarkets and across a range of categories. Modern retail formats have mushroomed in metros and mini-metros. In the last few years, modern retail has also established its presence in the small cities, exposing residents to shopping options like never before. Some of these stores are branded stores(exclusive showrooms either owned or franchised out by a manufacturer), specialty stores(greater choice to consumer, comparison between brands is possible), department stores/supermarkets (one stop shop catering to varied consumer needs), hyper-mart (low prices, vast choice available including services such as cafeterias.), shopping malls (variety of shops available to each other).

Big Bazaar offers a wide range of products which range from apparels, food, farm products, furniture, child care, toys, etc. Products of all the major brands are available at Big Bazaar. Also, there are many in house brands promoted by Big Bazaar. In all, the fashion, electronics and travel segments made up about 70 per cent of sales. The tag-line is "Is Se Sasta Aur Accha Aur Kahin Nahi". They work on the model of economics of scale. Their pricing objective is to get Maximum Market Share.

2. OBJECTIVES

- To examine the retail sales management activities at Big Bazaar
- To understand the stock management mechanism
- To observe the merchandise location in the store
- To observe how they execute their strategies to fulfill customer requirements
- To inspect item data through study report in retail part.
- To help the business undertaking to gadget new systems

3. SCOPE OF THE STUDY

The study may likewise assist the business with learning about the socioeconomics of the customers and their separate alternatives for items. To get comfortable with the client's view and factors connected to inclination that pulls in them to purchase from the hypermarket. The study can assist the organization with recognizing its entanglements and likewise how precisely to improve them. Retailers are utilizing propelled interchanges and data frameworks to control their business. The utilization of new innovations assists retailers with decreasing their capacities costs, while better serving their clients.

4. NEED FOR THE STUDY

The study highlights the placement merchandise varieties and availability of stock levels at Big Bazaar. The present investigation is attempted to grasp the effect of client administrations provided by Big Bazaar. The examination will be useful to discover the profile, inclinations, observation and fulfillment level of the customers who go to the outlet of Big Bazaar at Hyderabad & Secunderabad.

5. RESEARCH METHODOLOGY

RESEARCH APPROACH: - CUSTOMER SURVEY REPORT

RESEARCH INSTRUMENT:

The examination instrument utilized for gathering essential information were the survey

Approach adopted for the study:

- Customer study
- Discussion with the business administrators, directors and workers.
- Visiting and surfing site of the business
- Sample Size - 200
- Sampling Method - Random Sampling
- Research technique - Survey
- Type of information - Primary information
- Research instrument - Structured poll

Auxiliary data:

- Descriptive research
- Analyzing information through review report

6. LIMITATIONS

- The overview was restricted to the customers of Big Bazaar outlet at Hyderabad stores
- A model size of just 200 customers is taken
- Time might be the significant restricting component
- The precision of the discoveries is trusted by the exactness of the factual apparatuses utilized for examination

7. REVIEW OF LITERATURE

Indian retail segment is seeing basically the most boisterous marketing exercises everything being equal. The organizations are battling to win the hearts of client “Who is God” said by the business endeavor undertaking head honchos. Quite often there is a 'first mover advantage' in an up and coming part. In India, that bit of leeway would go to "BIG BAZAAR". It has taken about numerous adjustments in the purchasing propensities for individuals. Indian retail sector has become one of the most powerful and fast growing markets in the world. This growth influences the attitude of the Indian customers and marketing approach of the companies.

Indian Council for Research in International Economic Relations (ICRIER) developed research report titled _Impact of organized retail on the unorganized sector states that retail trade alone accounts for 41.83 percent job opportunities with 14.95 million employed in the sector. Establishments involved in retail trade claimed the highest percentage both in the rural (39.28

percent) and urban (45 percent) areas. It has been the most sought after activity amongst own account establishments with a share of 48.45 percent. In rural areas, 46.52 percent own account establishments were set up for retail trade while the percentage was 51.44 in urban areas. Retail trade along with manufacturing and social and personal service activities have emerged as the three major non-agricultural activities giving the maximum number of jobs, with a share of more than 72 percent of the total establishments. Manufacturing establishments followed retail trade with 8.32 million people employed. Social and personal service activities employed 7.35 percent during the review period.

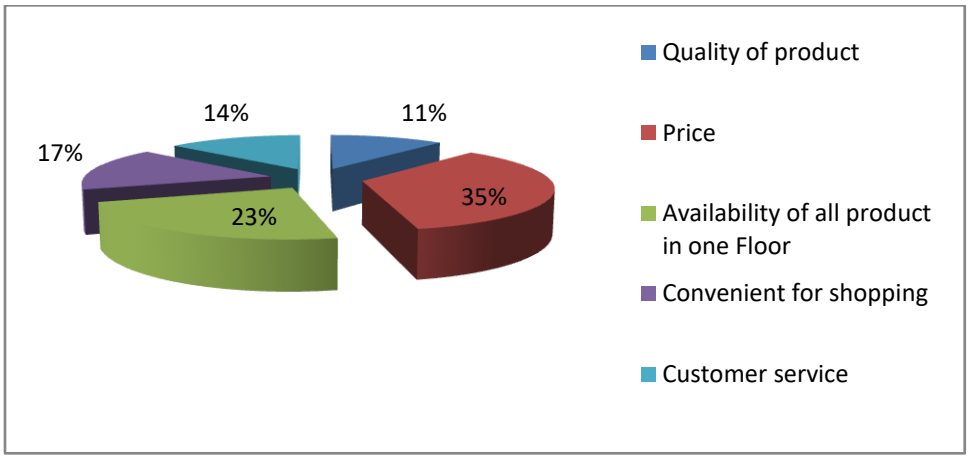
Nair Suja in her book _Retail Management‘ has tried to explain the growth of retailing in Indian context especially in the context of new economic policy, global economic development, changes in the marketing and economic system as well as changing pattern and classification of economic activity. The author has tried to stress that there is a significant effect of liberalization and privatization policies on development of retail format. According to author, retailing has come to occupy a prominent position in today‘s modern society. In spite of the Indian retail revolution, it is said that over 90 percent of the 20 percent urban India are still towards the traditional retail.

The investigation titled 'A Study on the successful limited time technique which impacts client to get something of Big Bazaar' encourages us to get a handle on the outcome of special methodology which is responsible for pulling in client towards the store. This examination is useful for top level administration to improve the present special system of BIG BAZAAR.

8. DATA ANALYSIS

Reason for visiting Big Bazaar

Reason	No. of Customers	Percent
Quality of product	23	11.5
Price	70	35
Availability of all product in one Floor	47	23.5
Convenient for shopping	33	16.5
Customer service	27	13.5

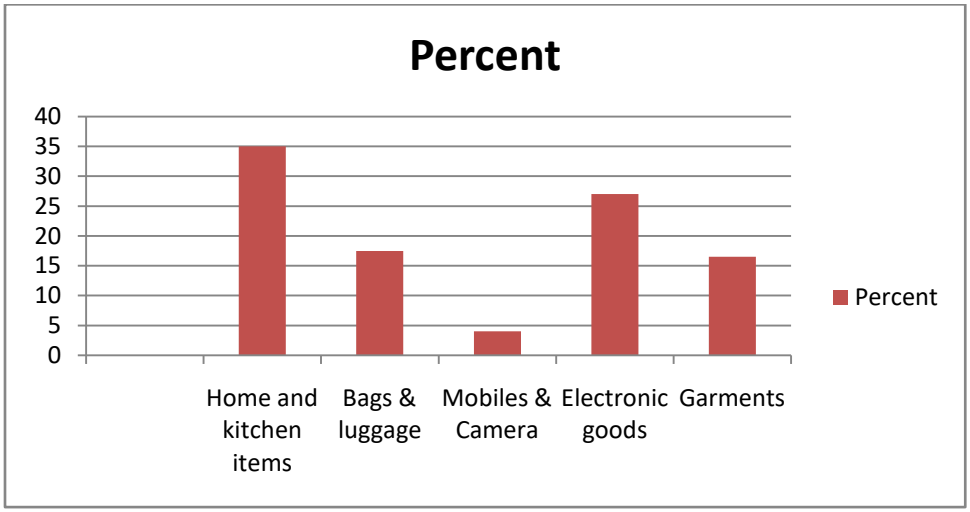


Derivation:

From the above table obviously, 35% of Customers lean toward Big Bazaar at the cost of the item, 23.5% favor the accessibility of all item under one rooftop, 16.5% incline toward for the advantageous shopping, 13.5% favor for the client support and staying 9.5 lean toward item for their quality.

Section most liked by visitors

Section	No. of Customers	Percent
Home and kitchen items	70	35
Bags & luggage	35	17.5
Mobiles & Camera	8	4
Electronic goods	54	27
Garments	33	16.5

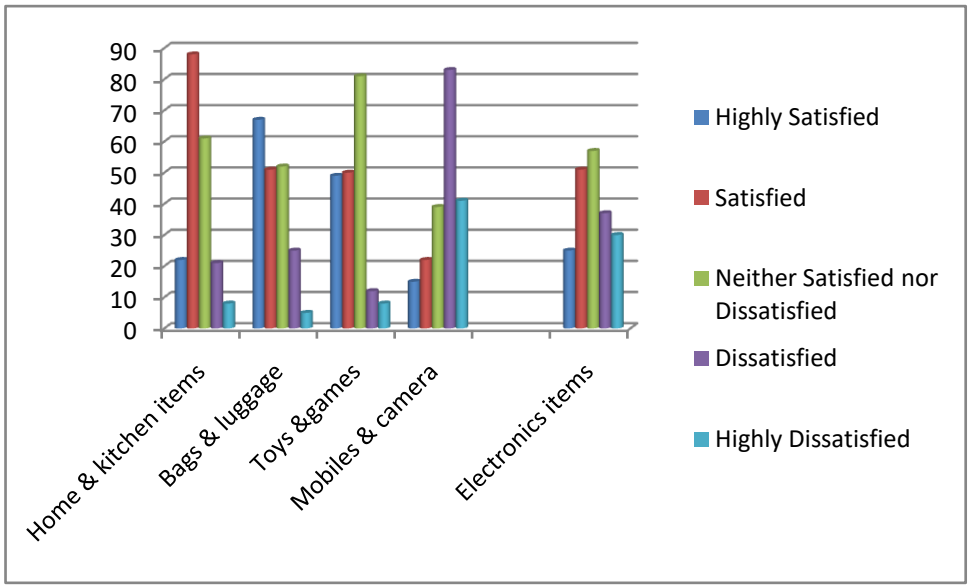


Induction:

From the above table, it is manifested that, 35% of customers move around home and kitchen items progressively, 27% like to purchase electronic goods, 16.5% like to purchase garments, 17.5% like to purchase sacks and packs, and remaining 4% lean toward mobiles and camera.

Section wise satisfaction levels of the customers

Section	Highly Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Highly Dissatisfied
Home & kitchen items	22	88	61	21	8
Bags & luggage	67	51	52	25	5
Toys &games	49	50	81	12	8
Mobiles & camera	15	22	39	83	41
Electronics items	25	51	57	37	30



Derivation:

From the above table, it is evident that most of the customers are satisfied with all the sections except with mobiles and camera section.

9. FINDINGS:

- Price and availability of products followed by quality pull the customers to Big Bazaar
- Home and kitchen items and electronic goods sections are most liked by the visitors
- The customers are happy with all the sections, mobiles and camera section being an exception
- Overall retail sales management is commendable at Big Bazaar

10. SUGGESTIONS

- Customer administration should be improved in my own field review
- New product mix shall be added to the store
- Kids section shall be focused upon
- Proper preparing should be aimed at workers concerning how precisely to hold them.
- Price of items might be diminished to have the alternative to pull in increasingly important clients
- More marked items might be presented
- All of the counters should be kept open all the days.
- Selection of items with high caliber ought to be earned

CONCLUSION

The retail sales management activities at Big Bazaar are superior in nature through which the people can be pulled towards the store. The merchandise location, the sections of various product mixes, is suitably maintained by the retailer. The pricing, quality and availability of products are the key factors in the success of the store. Individuals incline toward increasingly marked and determination of items with top quality. Clients additionally accept that there must be appropriate client assistance. As customer fulfillment assumes a basic job, it should be focused on genuinely. To close, coordinating client desire and fulfillment through appropriate help of advertising exercises will improve organization notoriety and make faithful clients.

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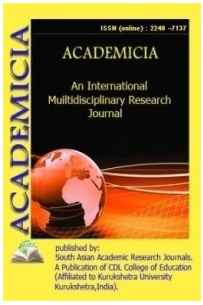

A STUDY ON RECRUITMENT AND SELECTION PROCESS AT KARVY COMPANY

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ABSTRACT

Recruit is the process of searching for prospective employees and stimulating them to apply for jobs in the organization. Selection may be defined as the process by which the organization chooses from pool of applicants, those people whom they feel would best meet the job requirement, considering current environmental condition. In today's rapidly changing business environment, organizations have to respond quickly to requirements for people. Hence, it is important to have a well-defined recruitment policy in place, which can be executed effectively to get the best fits for the vacant positions. Selecting the wrong candidate or rejecting the right candidate could turn out to be costly mistakes for the organization. One of the maximum critical talents for running a successful enterprise is the capability to recruit, select, and retain a professional and prompted work force. To be effective in today's increasingly aggressive exertions markets, the managers must be geared up and trained.

KEYWORDS: *Employees, Recruitment, Selection, Recruitment Policy, Enterprise, Capability, Organization, Candidates, Applicants, Interview, Qualification*

INTRODUCTION

Recruit the most qualified applicant. Establish regulations and processes that allow the satisfactory applicant to be selected. Talent acquisition and retention has emerged as a considerable task of HR manager. The achievement of an organization depends on deploying personnel who can adapt to be snug and the converting environment. In this study helps the organization to identify the area of problem and suggest way to improve the recruitment and selection

Process, this study focus on understanding recruitment and selection process this study helps to manage a manpower budget for the recruitment and selection process, this study helps to evaluate the time constrain for the recruitment process. The study stratified sampling technique is used.

NEED OF THE STUDY

The study is undertaken to analyze the recruitment and selection process at karvy as this process is a crucial one which supplies the required human talents to the organisation. The paper may help the management in attracting suitable candidates towards the company.To look at the importance of recruitment and selection processes in the present changing scenario. KARVY is one of the foremost transport facility supplied in Hyderabad. The take a look at was achieved to know how the recruitment and selection is completed and the delight of the employees concerning the recruitment and choice procedure.

OBJECTIVES OF THE STUDY

- Create a Talent Pool
- Improve the Quality of Hires
- Ascertain Who Fits in the Company Culture
- Streamline the Process
- To assess the perception of the employees regarding recruitment process they have undergone.
- To identify new ways of improving the present recruitment
- To analyze the satisfactory level of the employees about recruitment and selection procedure of organization
- To observe the recruitment and selection procedure in KARVY head office.
- To examine whether or not the employees are happy with the recruitment and selection rules followed within the KARVY
- To make hints and draw inferences

SCOPE OF THE STUDY

The scope of Recruitment and Selection is very extensive and it contains of a multiple of operations. Resources are measured as most significant asset to any organization. Therefore, signing right resources is the most significant aspect of Recruitment. Every corporation has its own pattern of recruitment as per their recruitment policies and procedures.

The scope of Recruitment and Selection contains the subsequent operations

- Dealing with the surplus or lack of resources
- Analyzing the recruitment policies, processes, and procedures of the organization
- Identifying the areas, where there could be a scope of improvement
- Streamlining the hiring process with suitable recommendations

- Choosing the best suitable process of recruitment for effective hiring of resources

LIMITATIONS

- Time is the major limiting factor
- Biased responses may have crept in
- Information may be incomplete leading to inaccurate results

LITERATURE REVIEW

According to Korsten (2003) and Jones et al. (2006), Human Resource Management theories emphasize on techniques of recruitment and selection and outline the benefits of interviews, assessment and psychometric examinations as employee selection process. They further stated that recruitment process may be internal or external or may also be conducted online. Typically, this process is based on the levels of recruitment policies, job postings and details, advertising, job application and interviewing process, assessment, decision making, formal selection and training (Korsten 2003).

Jones et al. (2006) suggested that examples of recruitment policies in the healthcare, business or industrial sector may offer insights into the processes involved in establishing recruitment policies and defining managerial objectives.

Successful recruitment techniques involve an incisive analysis of the job, the labour market scenario/ conditions and interviews, and psychometric tests in order to find out the potentialities of job seekers. Furthermore, small and medium sized enterprises lay their hands on interviews and assessment with main concern related to job analysis, emotional intelligence in inexperienced job seekers, and corporate social responsibility. Other approaches to selection outlined by Jones et al. (2006) include several types of interviews, role play, group discussions and group tasks, and so on.Any management process revolves around recruitment and failure in recruitment may lead to difficulties and unwanted barriers for any company, including untoward effects on its profitability and inappropriate degrees of staffing or employee skills (Jones et al. 2006). In additional, insufficient recruitment may result into lack of labour or hindrances in management decision making, and the overall recruitment process can itself be advanced and amended by complying with management theories. According to these theories, the recruitment process can be largely enhanced by means of Rodgers seven point plan, Munro-Frasers five-fold grading system, personal interviews, as well as psychological tests (Jones et al. 2006)

RESEARCH METHODOLOGY

Primary sources

It is also known as first handed facts the records is gathered through the observation within the enterprise and interviews with officials. The data was amassed by the responses got by using the questionnaires giving to the personnel.

Secondary sources

These secondary facts is existing records which is amassed by the net and the books provided by KARVY

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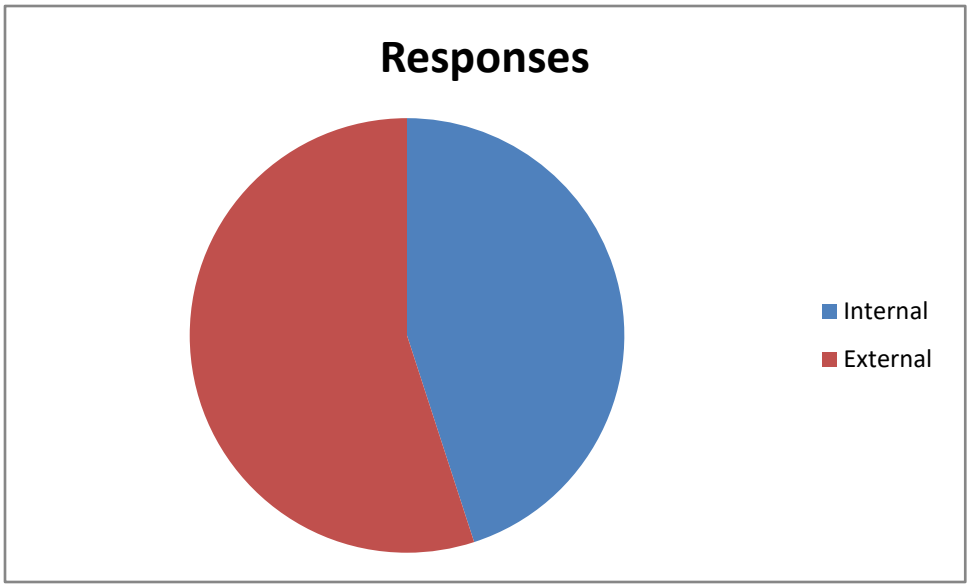
DATA ANALYSIS AND INTERPRETATION

1. Which of the source of recruitment and selections used in Karvy?

a) Internal

b) External

Options	Internal	External
Responses	45	55
Percentage	45	55



Interpretation:

The karvy hires through internal and external sources almost equally

2. Which of the following external source is used for recruitment

a) Advertisement

b) Campus recruitment

c) Consultancies

d) All the above

Options	Advertisement	Campus recruitment	Consultancies
Responses	35	20	45
Percentage	35	20	45



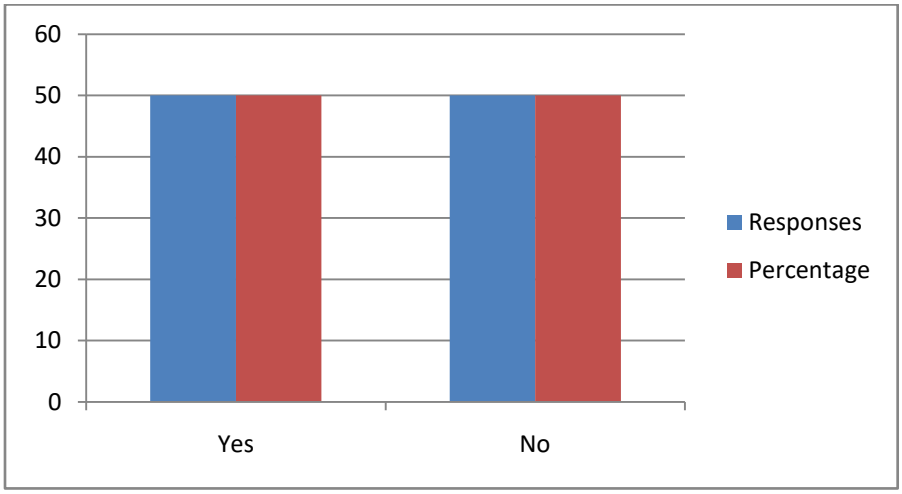
Interpretation: majority of the candidates are hired through consultancies and advertisement followed by campus recruitmant

3. Are you satisfied with the recruitment process?

a) Yes

b) No

Options	Yes	No
Responses	50	50
Percentage	50	50



Interpretation:

Half of the respondents are satisfied with the recruitment process while the other half are dissatisfied.

4. Which of the following methods does Karvy uses during selection?

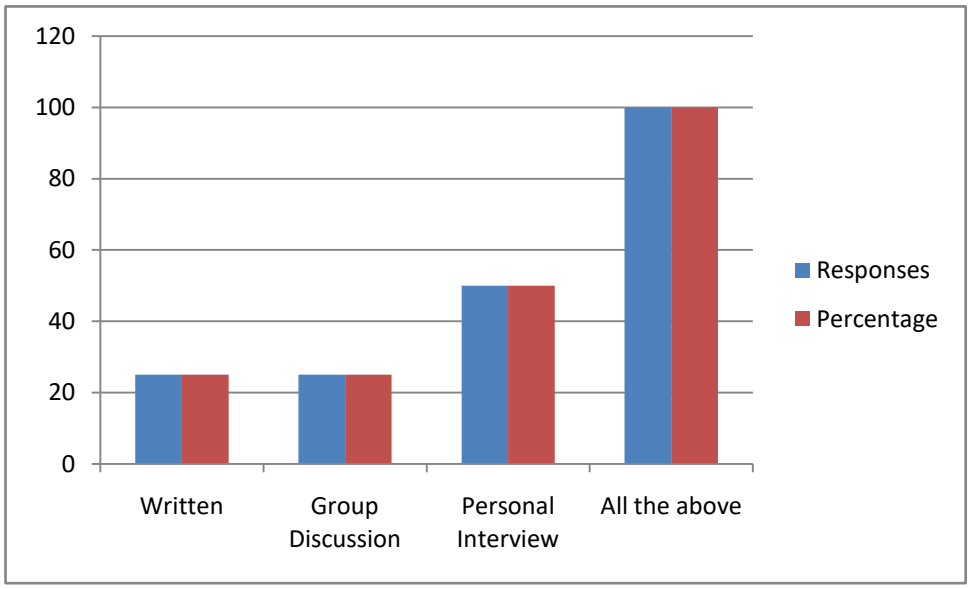
a) Written

b) Group Discussion

c) Personal Interview

d) All the above

Options	Written	Group Discussion	Personal Interview	All the above
Responses	25	25	50	100
Percentage	25	25	50	100



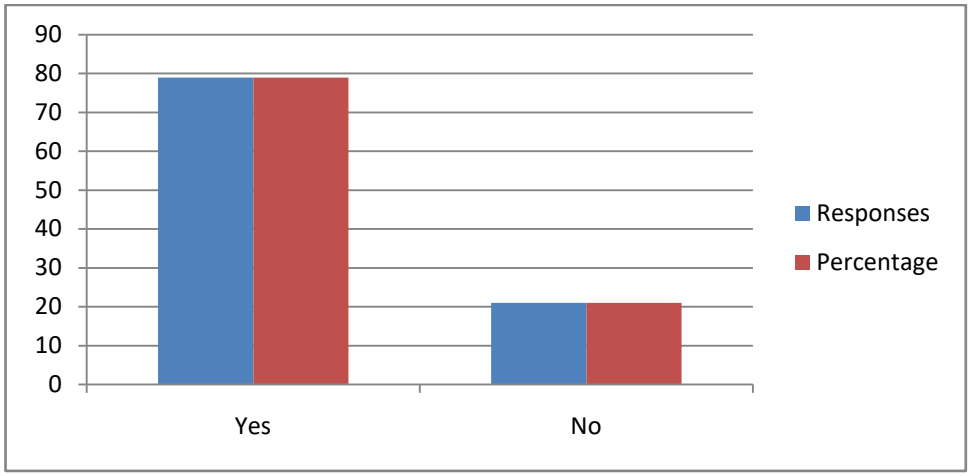
Interpretation: 50% of the respondents are selected through personal interview and the remaing got selected through group discussion and written test.

5. Are you Comfortable with the HR policies of the company?

a)Yes

b) No

Options	Yes	No
Responses	79	21
Percentage	79	21



Interpretation:

Huge number of employees claimed that they are comfortable with the HR policies of the Karvy

FINDINGS

- It is observed that employees of Karvy are happy with the HR policies.
- Internal and external sources are proportionately adopted for recruitment..
- Consultancies, Advertisement and campus recruitment are the major modes of recruitment process in the Karvy.
- Personal interview method is highly used for selection followed by GD and Written test.

CONCLUSION

Promotions are mainly based on seniority they ought to be even based on expertise and performance. When bulk recruitment is achieved for areas and head workplace O.M.R type answer sheet is provided for quick results.Interview committee concentrates on the marks secured in interview they ought to even take into account experience.Unbiased and truthful recruitment need to be performed which results in strengthening of enterprise. KARVY could be very a hit in its recruitment programs because it follows exact recruitment regulations and techniques with proper guidelines in the corporation. Recruitment is executed at diverse ranges of the company as in step with the needs and requirements of the corporation

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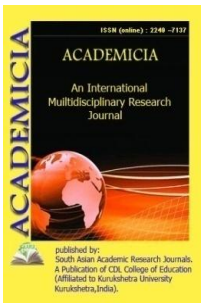

A STUDY ON IMPROVING BRAND AWARENESS AND ITS IMPACT ON CONSUMER BEHAVIOUR

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ABSTRACT

The Brand Awareness has turned into a important variable that emphasizes on customer perceptions of Brand Awareness, the Brand Awareness is to create a strong characteristics that will impact on consumers when they stand on their on decisions this is focused on the assumption that all the dimensions of customer based - brand image and loyalty of the customers perceptions of a particular product. This paper provides a solution to Brand awareness.

KEYWORDS: *Brand, Brand Awareness, Strategies, Brand-Image, Loyalty*

INTRODUCTION

The aim of the paper is to propose methods through which awareness can be created through media for brands in the market. The trend in the market that has been observed particularly for consumer products over last couple of decades is high level of brand consciousness amongst consumers behavior. Catering to this demand presented by the consumers behaviour, the fast food in the market seek to introduce products into the market as brands. In such a market the issue of creating awareness for brands is a difficult task. On the other hand the advancement of the market in terms of their knowledge and maturity provides new opportunities and avenues for marketing as well. The proposed paper targets this issue by providing businesses with optimal methods for creating awareness for their brand using traditional as well as new media. Consumers' behavior is distinctive in every consumer and is influenced by purchasing habits and decisions and tempered by psychological through media and traditional media. In this technical period the three W's i.e. World Wide Web is structured around the people where social and professional circles are influential and leads to online buying and also online awareness.

LITERATURE REVIEW

Branding is a subject which has a significant amount of work done by academics as well as researchers on new product launch and brand awareness. Brands are also more powerful in terms of forging relationship with customer which is sustainable and profitable compared to regular unbranded products. Through the literature ascertained, it has been derived that brand awareness can be created through the presentation of various brands to the customers which in turn develop a stimuli like response from them where they are able to relate, recognize, recall and be on the whole aware of brands. Existing brand tend to use brand reinforcement techniques to build on their brand awareness programs. The new products on the other hand make use of advertising and promotion to increase the awareness of product amongst the existing and potential consumers of the product. Strategies that can be employed by businesses to increase awareness of brands include making us of attitude advertising and management of the brand image,

The behavior of customers associate with their purchase of products in the market is largely based on elements of their value framework (Oh, Haemoon,*2000).*For consumers in the market place value framework is made up of items like the brand image, the class association, of the brand, its price and its overall awareness in the market relative to others. Work conducted by (Farris et al.,2010).depicts that the purchase decisions made by consumers on a cognitive level are influenced significantly by the brand image and its awareness amongst the target market. Research also provides that brands that have a higher level of associated brand image and awareness amongst the consumer are likely to be purchased again and again by consumers. (Hoyer, Wayne, D., & Steven P. Brown,1990).Therefore specifically for inducing repeat purchase behavior in the consumers, brand awareness can be considered as a significant contributor (Macdonald, Emma, K.,& Byron M. Sharp,2000). New products can increase their awareness in the marketplace amongst consumers through a number of different strategies employing new as well as traditional media. Traditional media based advertising and promotions using ATL techniques have the widest reach in the market but can be expensive to manage for new products. As a result new BTL launch techniques,(Salcido T.,2011), are innovatively employed by businesses to introduce new brands into the marketplace in a more personal way in which consumers in the market can relate to the new brands more effectively while reducing the overall costs incurred. Popular new media strategies that are being employed by businesses include using internet and mobile based network marketing strategies. (*Jenkins, H.,2006).*

brand loyalty as inferred promise to repurchase the solicitous goods. It expands the motivation of purchasers towards buying behavior.They said that brand loyalty can be expanded by building strong customer relationship and consumer loyalty programs.(Moraga, Parraga& Gonzalez 2008) clarify brand loyalty as continual purchasing ethics. Brand loyalty is not an onetime stroke however a continual process. It helps the organization to get customer preference, buy intention and secured profitability. Brand loyalty is the interpreter of organization's financialperformance.

Research Problem and Research Questions

The objective of this research is to figure out which approaches to satisfy customers and how to promote awareness of its brand image, and loyalty with an immigrant population in North-Cyprus and a suitable area where there are heaps of migrants and a hard transportation, what variables impact consumers behavior and decision making which can build the offers of the

product and services? There are focal inquiries that must be replied so as to determine the purpose for these low customers turn out and frail brand awareness andcharacter:

1. which among these three dimensions of customers based-brand value brand image, brand loyalty and perceived quality seems to have the slightest brand equityrating?
2. Which factors have significant impacts on customer's behavior to product andservices?
3. Which strategies may be utilized to improve the brand value and image, loyalty awareness of thecooperative?
4. Does customer based-brand value differ between restaurants as for each one quality of brand awareness, brand image, perceived quality and brandloyalty?

Research Aims & Significance

The main aims of the research are depicted as follows

1. Highlight the significance of brand awareness of products and how it can improve their market successrate.
2. Provide that a direct relationship exists between brand awareness and consumer purchase design making behavior.
3. Depict how new and alternative media can be used in a more creative and effective mannerto improve brand awareness for new brands amongstconsumers.

The proposed research is significant as it not only highlights the importance of brand awareness for new brand penetration in the market but provides strategies that can be employed by new brands to create awareness in the market place in a more cost effective and efficient manner.

METHODOLOGY

Research methods can be inductive, deductive or adductive. (Saunders, Lewis &Thornhill2000). Deductive approaches will test the hypothesis against reality and thereafter, verified or nullified. These methods arequalitative. In this report, deductive approaches will attest to the impact that culture plays in the M&A (Media Awareness) process and the accrued benefits if a company indulges in pre-merger sensitization. Inductive approaches deal with the empirical findings and look for any laws, theories or generalizations that describe them. The culture aspect will be reviewed and analyzed basing the findings on case data retrieved from interviews and surveys. These methods are quantitative. The adductive approach equilibrates between the deductive and the inductive approaches. In the case of this research, the approaches that will gain prominence include the deductive approach in liaison with the qualitative and the quantitative methods.

Materials and Methods

The research methodology of the thesis is a combination of secondary data and primary data. Secondary data were collected from journals, articles and books using the school library and web. The primary data were collected utilizing communication with the utilization of surveys. Questionnaires were distributed personally. the study depend more on the primary data since the research work is about individuals' attitude, intentions, and purchasing behavior for a specificbrand.

This study accept that help researcher know more about the purposes behind buyer's behavior and managers decision. Regarding to reason for this study, data was collected by distributing questionnaire among people with different gender and age, levels of education, profession. A self-designed questionnaire has been considered for data collection. The questionnaire and its validity has been measured and ensured by scholarly and practitioners. Participants have needed to answer each one inquiries utilizing five-point Likert scale, ranging from **5=strongly agree to 1=strongly disagree.**The study is deductive in nature where is gathered and analyzed the primary date to find the factors which impact brand awareness and customer behavior by media particularly for fast food restaurants, such as brand equity, brand image, and loyalty, accessibility in local store, efficient, to know consumer concerns about online purchasing, and brand awareness like recall of brand privacy, trust, after sales service, delivery, nature of merchandise services, and consumer characteristics about these demographics. In order to measure underlying factors to buying of fast food products online or to order in a store the study have calculated factor analysis, a data reduction technique by combining related variables to factors. This study have likewise figured average rating to find the main barriers in internet shopping. In the study the questionnaire has main segments for example, demographics variables, general purchaser behavior and particular brand awareness. The questionnaire was filled in by local people of Girne in north - Cyprus. So as to meet time and asset constraints, particular populations in the researcher's round were utilized. Out of 150 questionnaires 115 respondents were contemplated for analysis andresearch.

LIMITATIONS

A questionnaire was one of the methods applied in the collection of market information. This was done before using the brand awareness strategy in the promotion of the commodities. However, there were some limitations experienced in the use of questionnaires. For instance, the questionnaire was prepared in English language, which most of the respondents did not understand. The target market is composed of clients from diverse backgrounds. This means that most of the respondents use English as their second language so maybe they did not understand the questions postedto complete and this was not enough to gather sufficient information. Disseminating the questions and analyzing the responses required substantial time to understand the market trends.Similarly, use of questionnaires did not express the true changes of consumer characteristics such as changes of emotions, behaviors or feelings. This implies that the responses do not show the valid reactions of respondents. It is not easy to tell how truthful the clients are when giving their suggestions(Saunders and Thornhill,2000). It was also noticed that some respondents did not submit their questionnaires after answering the questions. This is because some people were not willing to offer their opinions or fill in the questionnaires. Sometimes they thought that the questions were too standardized and did not allow them to offer their suggestions.

The questions are constructed in such an approach to answer the exploration question and the questions were additionally built in relation to consumer perceptual measure of brand awareness. Question 1, 2, 3 and 4 were constructed to know the demographical variables of our respondents.

Consumers Purchasing Behaviour

As indicated by (söderlund,2001), consumers purchasing conduct needs to do with the mentality, intention, inclination and strength to commitment and the consumer’s methods for identification

proof. Customers purchasing behaviour can likewise be referred to as the purchasing behaviour of the final Consumer. Consumer purchasing behaviour is a convoluted issue because of the way that numerous internal and external components have impact on consumers purchasing decision.

According to (Kotler et al.,1999).there are five phases of consumers purchasing behaviour . This can be seen in the diagram below.

Figure 1: Purchasing decision Process



Source: (Kotler et al.,1999. p.254)

TABLE 1: RESPONDENTS' DEMOGRAPHIC

ITEM	FREQUENCY	PERCENTAGE
Gender		
Male	39	32.8 %
Female	76	63.9 %
Total	**115**	**100 %**
Age		
b/w 21 and 30 years	94	79%
b/w 31 and 40 years	21	17.6 %
Total	**115**	**100 %**
Education Level		
Secondary Education	2	1.7%
Diploma Certificate	5	4.2%
Bachelor	85	71.4 %
Master	20	16.8 %
MPhil / PhD	3	2.5%
Total	**115**	**100 %**
Nationality		
Cypriot	3	2.5%
Turkish	1	0.8%
Others	111	93.3 %
Total	**115**	**100**

5	%

To investigate the objectives of this research study, the relationship between the dependent variable and the independent variables, linear Regressions were used. The dependent variable is Brand Awareness (Y) and three independent variables are Costumer behavior (X1), Product Loyalty, Image (X2) and Media (X3). These variables are used in the linear regression models:

TABLE 2 MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.953[a]	.907	.888	.15943

Predictors: (Constant). Brand loyalty, Brand Image, Costumer Behavior, Media
Dependent Variable: Brand Awareness

Table 2 presents the output model summary, to present the strength of the relationship between the independent variables of Linear regressions and the dependent variable which is measured by the relation R. Regarding the results of analysis, R=0.953 which shows a reasonable positivecorrelation. The R Square value (= 0.907) shows the independent variables explain 90.7% of the variance in adoption. It means about 90.7% of the variation in brand awareness can be described by the variation in brand loyalty, brand Image, customer behavior and Media.

TABLE 3 ANOVA

Model	Sum Of Squares	df	Mean Square	F	P
Regression	23.385	21	1.113	46.001	.000[a]
Residual	2.389	94	.025		
Total	25.774	115			

a. Predictors: (Constant), Media, Customer Behavior, Brand Image, Brandloyalty
b. Dependent Variable: BrandAwareness

In Table 3, the ANOVA illustrate information about levels of variance within a linear regression model which is utilized for tests of coefficients' significance. One-way ANOVA analysis, shows that acceptance of brand awareness toward media is statistically significant, because F-value is statistically significant, F (21,94) = 46.001. The p-value is less than 0.05 (P=0) which means that at least one of the four predictor variables can be used to model brand awareness.

TABLE 4 MODEL OF COEFFICIENTS

Predictors	Coefficients	Std. Error	t	Sig.
(Constant)	1.597	.300	5.323	.000
BrandLoyalty	0.322	0.288	1.118	000
BrandImage	0.395	0.060	6.583	000
CostumerBehavior	0.346	0.306	1.130	000
Media	0.339	0.110	3.081	0.64

a. Dependent Variable: Brand Awareness

The coefficient test is used to find the most effective independent variable(s). According to the result (Table 4), the estimated linear regression model. According to the table of coefficients, the highest coefficient is possessed by Brand Image which is equal to 0.395 with highest *t*-statistic (6.583) and *p*-value of 0.000. And, brand loyalty has the lowest coefficient with weight 0.322. It

illustrate that one standard deviation increase in Brand Image is followed by 0.395 standard deviation increase in brand awareness, provided that the brand loyalty, costumer behavior and media are left unchanged. It can be explained for both other independent variables in the same way. Therefore, this model can be used for an estimation objective.

CONCLUSION

The main objective of this research is to assess the impact of consumer behavior via media on brand awareness by evaluating four factors, *brand loyalty*, *brand image*, *customer behavior* and *media*. It was revealed from the study that media which is traditional media and new media (social media) positively influence the brand awareness. Parameters' appreciation for the model was measured at significance levels. The results of this study are consistent with previous studies. Positive impact of brand image was proved and confirmed by (Arslan&Altuna,2010) and previous researches such as (Fitzsimon et al.,2008). This theory illustrate that the unintentional involvement procedures happen in majority of the marketing communications tools to expose a brand (Cianfrone et al.,2008). (Keller's,2009) research indicates that customer loyalty increases brand awareness during the information rally process. In (Bond's model,2010), the utilize-and-Gratification Theory indicates the brand awareness is one of the outcomes of customer behavior in the context of social media (Bond, 2010). This research too found that the most efficient variable on brand awareness is customer Image because it maximizes awareness during involvement and interaction processes (Kotler& Keller's,2009).Integrating Marketing Communications Model for building brand equity, and also the study display the relationship between media and brand awareness. The media specially transfer information from one customer to another and social media's interactive features assist customers to share their thoughts quickly and widely.

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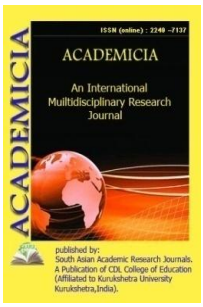

A STUDY ON CUSTOMER RELATIONSHIP MANAGEMENT AT AIRTEL COMPANY

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ABSTRACT

Customer relationship management (CRM) is a combination of people, processes and technology that seeks to understand a company's customers. It is an integrated approach to managing relationships by focusing on customer retention and relationship development. CRM has evolved from advances in information technology and organizational changes in customer-centric processes. Companies that successfully implement CRM will reap the rewards in customer loyalty and long run profitability. However, successful implementation is elusive to many companies, mostly because they do not understand that CRM requires company-wide, cross-functional, customer-focused business process re-engineering. Although a large portion of CRM is technology, viewing CRM as a technology-only solution is likely to fail. Managing a successful CRM implementation requires an integrated and balanced approach to technology, process, and people. The main objective of the project is to study to examine and analysethe CRM of airtel with the final customer satisfaction.With the sample size of 100 and statistical methods is bar graphs and the statistical tools used isChi square test. The variables used are dependent variable are customer relationship management and independent variables are domestic factors {age, income, customer type}.

KEYWORDS: *Customer Relations, Business Process Re-Engineering, Relationship Marketing, Integration.*

INTRODUCTION:

Customer relationship management (**CRM**) is an approach to managing a company's interaction with current and potential customers. It uses dataanalysis about customers' history

with a company to improve business relationships with customers, specifically focusing on customerretention and ultimately driving sales growth.

One important aspect of the CRM approach is the systems of CRM that compile data from a range of different communication channels, including a company's website, telephone, email, live chat, marketing materials and more recently, social media. Through the CRM approach and the systems used to facilitate it, businesses learn more about their target audiences and how to best cater to their needs.

OBJECTIVES OF THE STUDY:

1. To study the factors related to Customer relationship management in AIRTEL.
2. To examine the factors those are related with AIRTEL.
3. To analyze the Customer relationship management of aitel with the satisfaction of the final consumer.

REVIEW OF LITERATURE:

McKenna 1991; Shani and Chalasani 1991 Relationship marketing attempts to Involve and integrate customers, suppliers and other infrastructural partners into a firm's developmental and marketing activities.

Wilson (1995) summarized different relationship variables that affect the relationship of firm with different stakeholders, those variables are Commitment, Trust, Cooperation, Mutual Goals, Interdependence and Power, Performance Satisfaction, Structural Bonds, Comparison Level of Alternatives, Adaptation, Non-retrievable Investments, Shared Technology, and Social Bonds.

Morgan and Hunt (1994), while discussing relationship variables focused more on commitment and trust as a major variable affecting relationship between different parties involved in marketing transaction & exchange.

DATA COLLECTION METHOD

PRIMARY DATA: The crux of the study is based on the information collected from the respondents with the help of questionnaires. The primary source of information has been consumers who have filled up the questionnaire. Consumer who interviewed separately and the respondents noted down in the questionnaire for the purpose.

SECONDARY DATA: Information has also been borrowing from both internal sources such as company records and external sources like journal, magazines and internet.

RESEARCH TOOLS: A set of questions were provided to customers in order to gain information about the perception of the consumer towards Airtel.

SAMPLE SIZE: 100

STATISTICAL TOOLS: Chi square test.

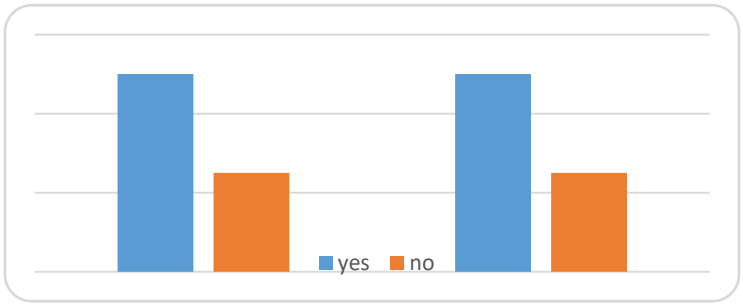
VARIABLES: Dependent variable - Customer relationship management. Independent variable-domestic factors {age, income, customer type}.

DATA ANALYSIS AND INTERPRETATION:

This study was undertaken to analyze the effect of Customer relationship management on consumer preference on purchase branded products.

1. Would you like to recommend this product to others?

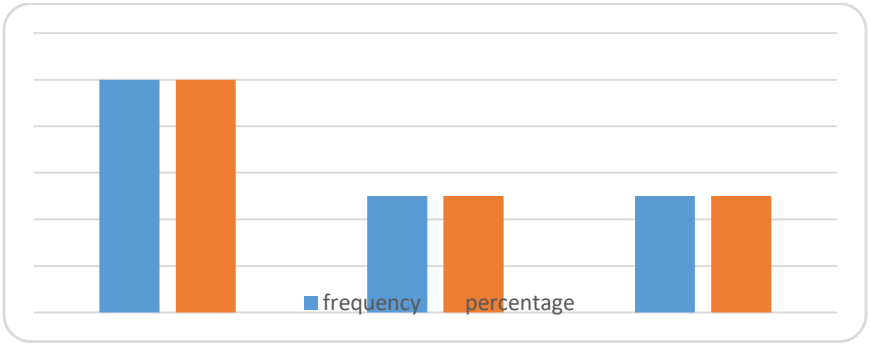
	FREQUENCY	CALCULATE	PERCENTAGE
Yes	91	91*100/100	91%
No	9	9*100/100	9%
Total	100		100



Interpretation: When the people were asked whether they would recommend this product to others 91 people that is 91% replied they would recommend this product to others, 9% replied in a negative way.

2. Do you know the logo of Airtel?

	FREQUENCY	CALCULATE	PERCENTAGE
Yes	50	50*100/100	50%
No	25	25*100//100	25%
Not Sure	25	25*100/100	25%
Total	100	100	100



Interpretation: When the sample was asked whether they know the logo of Airtel or not 50 people out of 100 people that is 50% replied that they know the logo of Airtel and 25% of the sample that is 25 people said they do not know the logo of Airtel and 25% were not sure.

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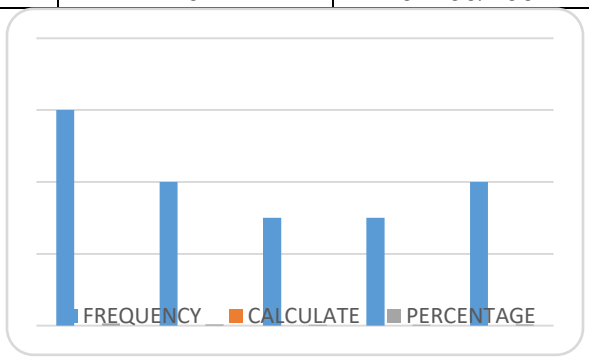
3. Why do you want to purchase this brand?

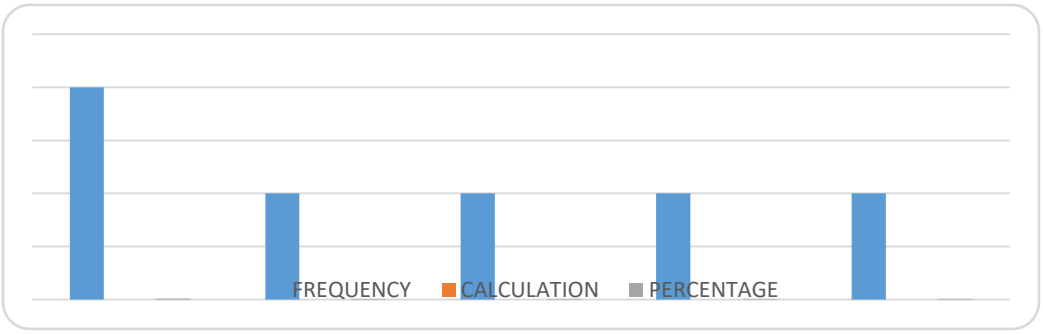
	FREQUENCY	CALCULATE	PERCENTAGE
Mileage	30	30*100/100	30%
Price	20	20*100/100	20%
Comfort	15	15*100/100	15%
Style	15	15*100/100	15%
Others	20	20*100/100	20%



Interpretation: When the sample was asked why do they want to purchase the brand Airtel or what is the attribute which enforces him or her to make the purchase decision 15% responded they were by the the product, 15% mention that the were using by the network and 20% gave the other reasons and the factors like price and network were highlighted very high by the respondent.

4. Opinion of people of different age groups on Airtel**?**

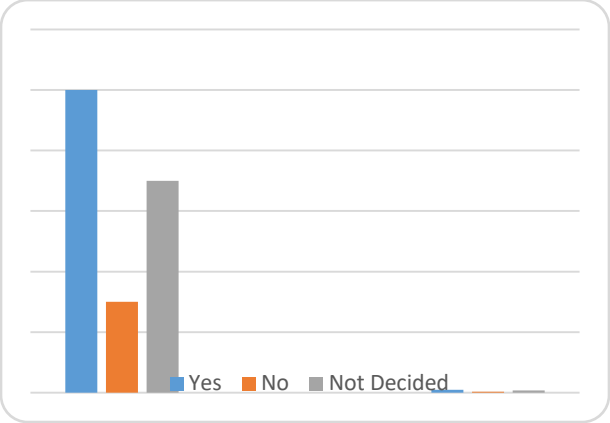
	FREQUENCY	PERCENTAGE
20-30	20	20%
30-40	30	30%
40-50	15	15%
50-60	20	20%
60 and above	15	15%



Interpretation: The analysis for this was taken with the help of open ended question and the people who were surveyed went a long way describing their wishes for and the highest rate of preference is made by 20-30 age group people and the preference rate was same in other age group people.

5. Do you wish to purchase Airtel network?

	FREQUENCY	CALCULATE	PERCENTAGE
Yes	50	50*100/100	50%
No	15	15*100/100	15%
Not Decided	35	35*100/100	35%



Interpretation: when the sample was asked about their wish to purchase the product 50% of the total sample that is 50 people replied that they wish to purchase the product, 15% that is 15 people said they do not wish to purchase the product and 35% replied that they have not decided anything regarding the product, after the analysis we came to know that the those who wanted to buy the merchandise is extremely high

STATISTICAL ANALYSIS:

HYPOTHESIS TEST:

H0: There is no relation between Customer relationship management and Customer satisfaction.

H1: There is relation between Customer relationship management and Customer satisfaction.

CHI SQUARE TEST:

O	E	[O-E]	[O-E)2/e
20	33	-13	5.12
30	33	-3	0.27
15	33	-18	9.81
20	33	-13	5.12
15	33	-18	9.81
Total			30.13

Chi square test- 30.13

Table value- 5.95

CONCLUSION: calculated value of chi square value is 30.13 is more than table value 5.97 where H0 is rejected and H1 is accepted. Hence there is relationship between brand loyalty and customer satisfaction.

FINDINGS:

1. Most of the respondents were aware by the internet and suppliers (63%). E magazines (25%) also helped in providing information to the respondents.
2. 82% of the respondents were aware of AIRTEL brand.
3. In advertisement media magazines (25%) were much affective and internet was only a major advertising media.
4. Many factors like word of mouth advertising were responsible for influencing the customers to buy AIRTEL products.
5. 30% of the customers were very much satisfied with AIRTEL products Where as 60% was satisfied with AIRTEL products.
6. 39% of the respondents were satisfied with the service of the AIRTEL T.
7. After sales service at door step 38% was one of the factors which help the purchaser to buy the AIRTEL product**.** Prompt service 52% also help to attract the purchaser.
8. 54% of the respondents considered the price of the AIRTEL product as higher where as only 8% considered as economical and 38% of the respondent said it as reasonable.

SUGGESTION:

1. The respondents are satisfied with the overall service provided by their dealers.
2. According to the survey, many respondents are satisfied with the quality of other services provided by the dealers.
3. Some of the respondents opined that the value added features like printer beep sound should be improved so as to enhance its comfort ability.
4. According to the study, many respondents in the age group of 30-50 years prefer Handheld billing machines at their outlets. These groups of people are basically self-sufficient.
5. The quick response of the company towards after sales service, which contributed for the increase in the prosperity.
6. Despite of increase in the continuous sales of AIRTEL, they are still maintaining good customer relations with the help of marketing research and service as their tools.
7. Many respondents feel that the price as well as the size of the machine is most suitable to business men who issues a ticket or a token or a bill as it suits to the average income level of the person..
8. A majority of the respondents feel that there shouldn't be any changes to be made to the application, as they feel that the POS APP is tailor made for them.
9. The dealers responsiveness towards the customers related to service should be more effective in order to maintain the reputation of the company.
10. Half of the customers give their machine for servicing and software updating according to their convenience. This shows that most of the customers use the machines with ease and is user friendly.

11. Due to the accuracy of the post sales service of the company, most of the respondents are satisfied.

CONCLUSION:

Most of the people are satisfied with the features of the POS machine and does not want any changes to be made to it. As far as small electronic manufacturing industry is concerned, we can say that AIRTEL is the brand leader in India as compared to the other brands. Many customers are opined that they did not face any major technical problem with the machine from the time of purchase till date. This made a positive referral for others. Many respondents also feel that the maintenance cost of the POS machine is also affordable. This enables the customer to use the machine on regular basis and in more numbers When asked about which billing machine you would prefer next, many customers said that they would go for AIRTEL itself for the next purchase. This shows the image of the company as well as the customer's belief in the company. Some of the customers also felt that the CRM service of the POS machine should be made more efficiency with addition of innovative services. Many customers complained about the other services that are provided to the POS machine like beep sound when the printer is opened. They feel that these features should be improved in order to make it more efficient. According to the respondents, they feel that AIRTEL POS machine is the most efficient billing machines in comparison of other small and large billing machines. Due to the affordability nature of the car i.e., economical pricing, which is inspiring the respondent to go for this car. Overall we can conclude that AIRTEL is the brand leader in the Indian market as far as small electronic billing device manufacturing industry is concerned providing maximum satisfaction to its customers.

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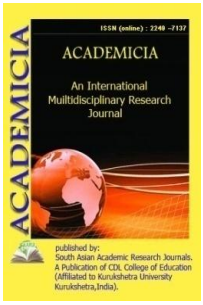

A STUDY ON RISK AND RETURN ANALYSIS OF INSURANCE SECTOR

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ABSTRACT

Risk is concerned in each activity whether or not it's of non-public, skilled or business. each individual, whereas doing any activity expects some returns. How ever it's obvious that the particular returns could ne'er be an equivalent as that of the expected returns. There invariably exists a distinction between the expected and therefore the actual returns. This distinction is termed as RISK. The start line of any course on insurance should be the conception of risk itself. a happening would possibly occur and if it will, the outcome might not be favourable to us ;it isn't associate outcome we glance forward to. The word risk implies each doubt concerning the future, and therefore the proven fact that the end result might leave U.S. in an exceedingly worse position than we tend to ar in at the instant. The volatility of equity shares of insurance firms explains the connection between risk and returns by victimization some applied math tools like variance, beta, correlation and variance.

KEYWORDS: *Returns , Volatility, Risk, Insurance*

INTRODUCTION

LITERATURE REVIEW

PHILIPPE GERGOOIRE (2001) conducted a study on “Predictive Power of Technical Analysis: The moving average rules on European” in step with him straightforward forms of technical analysis possessed important forecast power on varied market indexes. He shows that these results will be replicated on formally elite European indexes, which almost fully eliminates any influences from information snooping. Implications of those leads to terms of market efficiency also are mentioned.

Dr S NIRMALA & KDEVENDRAN (2017)In their study they explained that if Associate in Nursing capitalist needs to earn high returns, it is achieved by acceptive a proportionate increase

in risk. Through their study, they declared that long run investors will benefit of the market once it's less volatile.

OBJECTIVES

- To gain sensible data and perceive the conception of risk and come back analysis.
- To grasp the situation of insurance sector.
- To counsel the general public whether or not to take a position in insurance sector and acquire secured.
- Analysis of risk and come back unconditional with insurance sector.

RESEARCH METHODOLOGY

Primary data

The information gathered directly from the company in a required manner is called primary data.

Secondary data

The research is based on secondary data. The information is collected from journals, books, websites is called as secondary data.

STATISTICAL TOOLS

Mean is the most common and best general purpose for the midpoint of a set of values.

Mean is the average of the number.Mean is calculated by using the formula

$\bar{X} = \Sigma X/N$

Where $\bar{X}$ = mean

ΣX = symbol for sum of observations

N = number of observations

Standard deviation

Standard deviation is applied to the annual rate of returns of an investment so that it reveals the historical volatility of that investment. Higher the standard deviation of a security, the higher the variance between each price and mean.

Standard deviation can be calculated by using the formula

$\sigma = \text{sqrt}\ [\Sigma\ (X-\mu)]$

where σ = standard deviation, X = each value in population

μ = mean, N = number of values

HYPOTHESIS FORMULATION

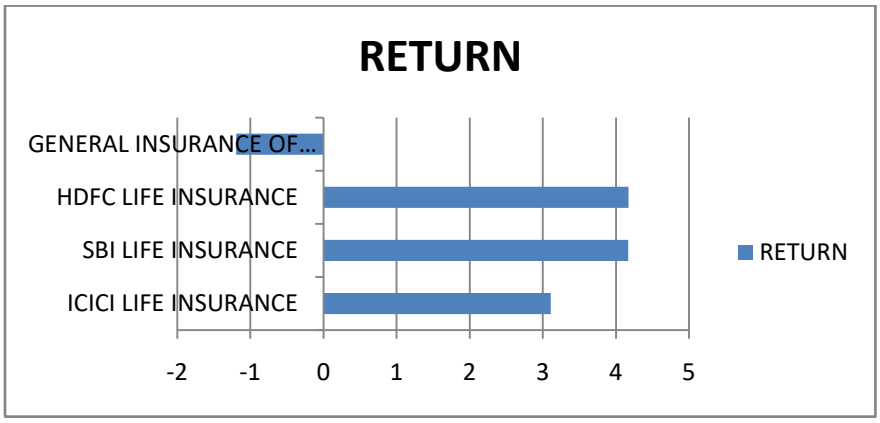
H0; There is no significant relationship between market returns and risk of insurance sector firms

H1; There is a significant relationship between market returns and risk of insurance sector firms

DATA ANALYSIS

CALCULATION OF RETURNS

COMPANIES	RETURN
ICICI LIFE INSURANCE	3.108
SBI LIFE INSURANCE	4.169
HDFC LIFE INSURANCE	4.171
GENERAL INSURANCE OF INDIA	-1.195

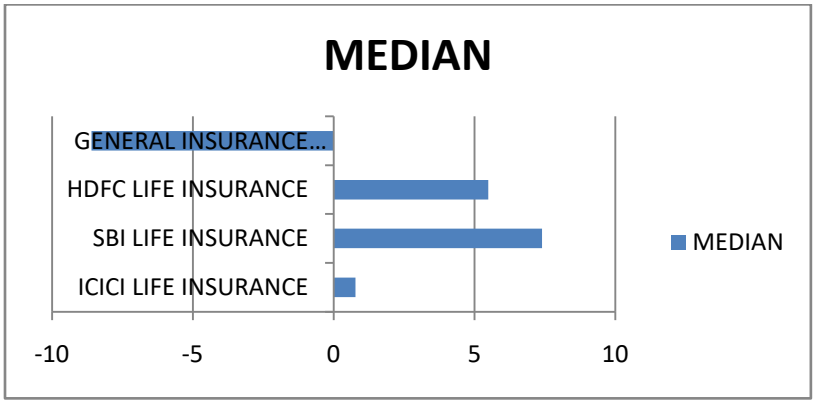


INTERPRETATION:

From the above graph HDFC having highest returns (4.17), and GENERAL INSURANCE OF INDIA having the lowest returns (-1.195) when comparing with other selected companies.

CALCULATION OF MEDIAN

COMPANIES	MEDIAN
ICICI LIFE INSURANCE	0.7765
SBI LIFE INSURANCE	7.402874
HDFC LIFE INSURANCE	5.484651
GENERAL INSURANCE OF INDIA	-8.60749



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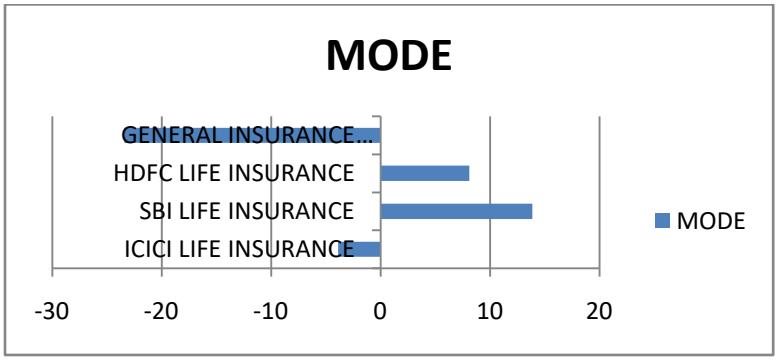
INTERPRETATION

From the above diagram SBI having the highest median value (13.8695) and GENERAL LIFE INSURANCE having the lowest median value (-23.431) when compare with all the selected companies.

CALCULATION OF MODE

COMPANIES	MODE
ICICI LIFE INSURANCE	-3.887306021
SBI LIFE INSURANCE	13.86957124
HDFC LIFE INSURANCE	8.1113517
GENERAL INSURANCE OF INDIA	-23.431803

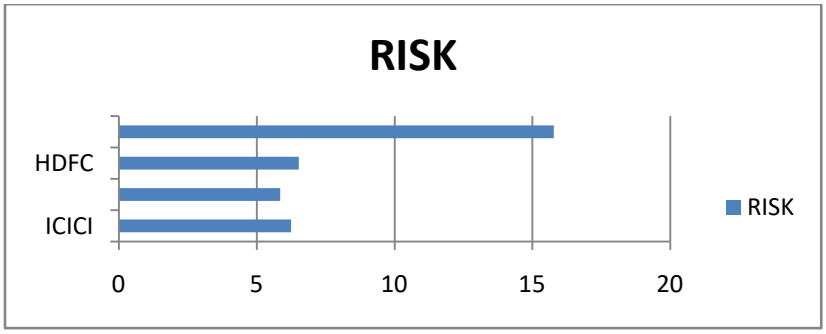


INTERPRETATION

From the above diagram SBI having the highest mode value (13.869) and GENERAL INSURANCE OF INDIA having the least mode value (-23.431) when compare with other selected companies.

Calculated values of Standard Deviation:

COMPANIES	RISK
ICICI	6.24
SBI	5.85
HDFC	6.52
GENERAL INSURANCE OF INDIA	15.78

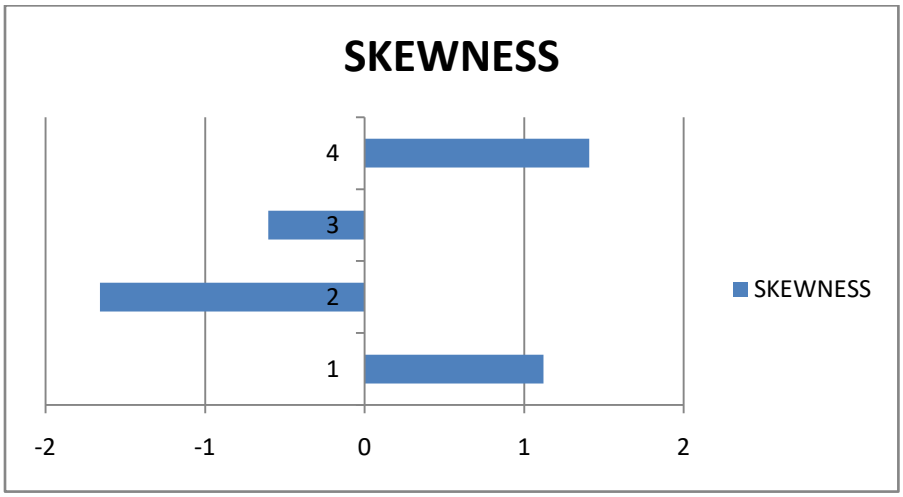


INTERPRETATION;

From the above graph we observed that GENERAL INSURANCE OF INDIA having the highest RISK (15.78) and SBI having the lowest RISK of (5.85) compare with other selected companies.

CALCULATION OF SKEWNESS

COMPANIES	MEAN	MODE	SD	MEAN-MODE	SKEWNESS
ICICI	3.108	-3.8873	6.24	6.995306021	1.12104263
SBI	4.169	13.8696	5.85	-9.70057124	-1.6582173
HDFC	4.171	8.11135	6.52	-3.9403517	-0.6043484
GENERAL INSURANCE OF INDIA	-1.195	-23.432	15.78	22.236803	1.40917636



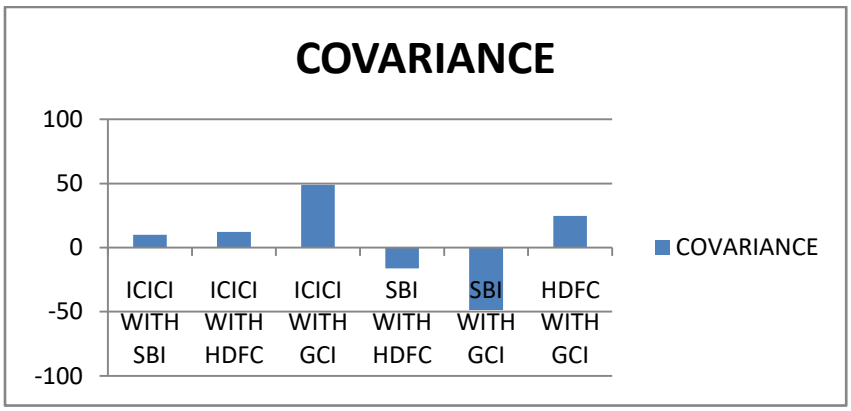
INTERPRETATION

From above diagram GENERAL INSURANCE OF INDIA Having the highest value (1.409) and

SBI Having the least value (-1.658) when compare with all the other selected companies.

CALCULATED VALUES OF COVARIANCE

COMPANIES	COVARIANCE
ICICI WITH SBI	9.86228
ICICI WITH HDFC	12.2598
ICICI WITH GCI	48.7721
SBI WITH HDFC	-16.2933
SBI WITH GCI	-48.6702
HDFC WITH GCI	24.6077



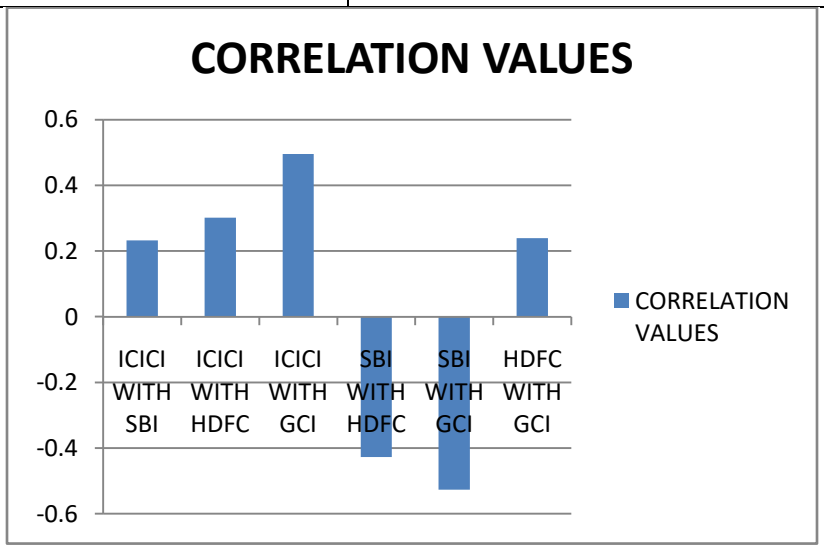
INTERPRETATION

From the above diagram ICICI with GCI having the highest covariance value (48.7721)

And SBI with GCI having lowest covariance value (-48.6702) when compare with all the other companies.

CALCULATION OF CORRELATION

COMPANIES	CORRELATION VALUES
ICICI WITH SBI	0.2328
ICICI WITH HDFC	0.3013
ICICI WITH GCI	0.4953
SBI WITH HDFC	-0.42717
SBI WITH GCI	-0.52723
HDFC WITH GCI	0.23917



INTERPRETATION

From the above diagram we observe that ICICI with GCI having the highest correlation coefficient value (0.4953) and SBI With GCI having the lowest correlation coefficient value (-0.52723) when compare with all the other selected companies.

HYPOTHESIS FORMULATION

HFC WITH ICICI		
t-Test: Paired Two Sample for Means		
	-4.25697	***-11.7874***
Mean	**4.937507**	**4.462564**
Variance	**43.31413**	**28.50514**
Observations	**11**	**11**
Pearson Correlation	**0.028918**	
Hypothesized Mean Difference	**0**	
Df	**10**	
t Stat	**0.18856**	
P(T<=t) one-tail	**0.427105**	
t Critical one-tail	**1.812461**	
P(T<=t) two-tail	**0.854209**	
t Critical two-tail	**2.228139**	

INTERPRETATION

Since the tabulated value is more than the calculated value we reject H1. Hence we accept H0 which means there is no significant relationship between market returns and risk of insurance sector

HDFC WITH SBI			
t-Test: Paired Two Sample for Means			
	-4.25697	***1.046901***	
Mean	**4.937507**	**4.4534**	
Variance	**43.31413**	**41.73302**	
Observations	**11**	**11**	
Pearson Correlation	**0.392343**		
Hypothesized Mean Difference	**0**		
Df	**10**		
t Stat	**0.223333**		
P(T<=t) one-tail	**0.413886**		
t Critical one-tail	**1.812461**		
P(T<=t) two-tail	**0.827772**		
t Critical two-tail	**2.228139**		

INTERPRETATION

Since the tabulated value is more than the calculated value we reject H1. Hence we accept H0 which means there is no significant relationship between market returns and risk of insurance sector

HDFC WITH GIC		
t-Test: Paired Two Sample for Means		
	-4.25697	*-6.17046*
Mean	4.937507	-0.74305
Variance	43.31413	296.4349
Observations	11	11
Pearson Correlation	0.220234	
Hypothesized Mean Difference	0	
Df	10	
t Stat	1.106648	
P(T<=t) one-tail	0.147178	
t Critical one-tail	1.812461	
P(T<=t) two-tail	0.294357	
t Critical two-tail	2.228139	

INTERPRETATION

Since the tabulated value is more than the calculated value we reject H1. Hence we accept H0 which means there is no significant relationship between market returns and risk of insurance sector

FINDINGS

- The average returns of the HDFC company is 4.17. where it is better than the average returns of SBI (public limited company) is 4.16.
- HDFC and market returns are highly correlated.
- The risk factor is high in GIC compare with all the other companies
- In all the three companies the investors face less risk factor with SBI and also the returns of this company are in positive trend.

SUGGESTIONS

- Investors who can afford more risk, its better to take a position in GIC.
- Investors who don't want to require more risk should go and invest in SBI.
- If investors want to urge more returns then they ought to invest in HDFC.
- If the investors consider market returns then it's better to take a position in HDFC.

CONCLUSION

- In the study the volatility of insurance companies is not constant it is sometimes high and sometimes low. In order to get the full amount of money which the investor has invested in the market, he should have a good study about the market conditions.
- The investor should be able to analyse the various investment opportunities available to him and thus maximise the returns with minimum risk.
- Based on these calculations we can determine that investor should get updated with the market fluctuations so that he can select the best companies to invest their funds.

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A STUDY ON ASSET LIABILITY MANAGEMENT

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ABSTRACT

Assets and Liabilities Management (ALM) is a dynamic process of planning, organizing, coordinating and controlling the assets and liabilities – their mixes, volumes, maturities, yields and costs in order to achieve a specified Net Interest Income. As all transactions of the banks revolve around raising and deploying the funds, Asset-Liability Management (ALM) gains more significance as an initiative towards the risk management practices by the Indian banks. Measuring and managing liquidity risk is an important dimension of ALM. Mismatch in the maturity profile of assets and liabilities exposes the balance sheet to liquidity risk. This paper is aimed at measuring the liquidity Risk, by using Gap Analysis Technique (maturity profiling).

KEYWORDS: *Asset, Liability, Banking Sector, Nationalization, Balance Sheet, Liquidity, Net Interest, Margin.*

I. INTRODUCTION :

Asset Liability Management (ALM) is a strategic approach of managing the balance sheet dynamics in such a way that the net earnings are maximized. This approach is concerned with management of net interest margin to ensure that its level and riskiness are compatible with the risk return objectives.

If one has to define Asset and Liability management without going into detail about its need and utility, it can be defined as simply “management of money” which carries value and can change its shape very quickly and has an ability to come back to its original shape with or without an additional growth. The art of proper management of healthy money is ASSET AND LIABILITY MANAGEMENT (ALM).

II. OBJECTIVES OF THE STUDY

- To study the concept of Asset and Liablity Management **in The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**
- To study process of CASH INFLOWS and OUTFLOWS in **The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**
- To study RISK MANAGEMENT under **The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**

III. RESEARCH METHODOLOGY

The study of **ALM Management** is based on two factors.

1. Primary data collection.
2. Secondary data collection

PRIMARY DATA COLLECTION:

The sources of primary data were

- The chief manager – ALM cell
- Department Sr. manager financing & Accounting
- System manager- ALM cell

SECONDARY DATA COLLECTION:

Collected from books , journal, and management containing relevant information about ALM and Other main sources were

- Annual report of **The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**
- Published report of **The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**
- **RBI** guidelines for **ALM.**

IV. LIMITATION OF THE STUDY:

(i) This subject is based on past data of The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)

(ii) The analysis is based on structural liquidity statement and gap analysis.

(iii) The study is mainly based on secondary data.

(iv) Approximate results: The results are approximated, as no accurate data is Available.

(v) The study is based on the issues that are listed on NSE only.

V. REVIEW OF LITERATURE

Asset-Liability Management (ALM) can be termed as a risk management technique designed to earn an adequate return while maintaining a comfortable surplus of assets beyond liabilities. It

takes into consideration interest rates, earning power, and degree of willingness to take on debt and hence is also known as Surplus Management. But in the last decade the meaning of ALM has evolved. It is now used in many different ways under different contexts. ALM, which was actually pioneered by financial institutions and banks, are now widely being used in industries too. The Society of Actuaries Task Force on ALM Principles, Canada, offers the following definition for ALM: "Asset Liability Management is the on-going process of formulating, implementing, monitoring, and revising strategies related to assets and liabilities in an attempt to achieve financial objectives for a given set of risk tolerances and constraints."

ANALYSIS OF STUDY

VI. Risk management system:

Assuming and managing risk is the essence of business decision-making. Investing in a new technology, hiring a new employee, or launching a marketing campaign is all decisions with uncertain outcomes. As a result all the major management decisions of how much risk to take and how to manage the risk. The implementation of risk management varies from business to business, from one management style to another and from one time to another. Risk management in the financial services industry is different from others. Circumstances, Institutions and Managements are different. On the other hand, an investment decision is no recent history of legal and political stability

Data Interpretation

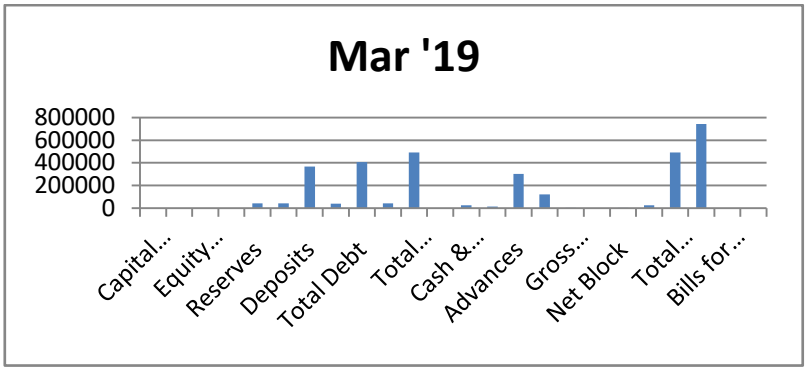
GENERAL:

The classification of various components of assets and liabilities into different time buckets for preparation of Gap reports (Liquidity and interest rate sensitivity) may be done as indicated in Appendices I & II as a sort of **bench mark,** which are better equipped to reasonably estimate the behavioral pattern, embedded options, rolls-in and rolls-out etc. of various components of assets and liabilities on the basis of past date. Empirical studies could classify them in the appropriate time buckets, subject to approval from the STATE STREET INDIA PRIVATE LIMITED / Board. A copy of the note approved by the ALOC / Board may be sent to the Department of Supervision.

COMPARATIVE ASSET LIABILITY SHEET AS ON 31ST MARCH 2018-19

	Mar '19	Mar '18	**Increase (+) / Decrease (-) (in Rs)**	**Percentage (%)**
Capital and Liabilities:				
Total Share Capital	479.81	475.88	3.93	0.82583845
Equity Share Capital	479.81	475.88	3.93	0.82583845
Share Application Money	0.00	0.00		
Reserves	42,998.82	35,738.26	7260.56	20.3159303
Net Worth	**43,478.63**	36,214.14	7264.49	20.0598164
Deposits	367,337.48	296,246.98	71090.5	23.9970379
Borrowings	39,438.99	33,006.60	6432.39	19.4881933
Total Debt	**406,776.47**	329,253.58	77522.89	23.5450409

Other Liabilities & Provisions	41,344.40	34,864.17	6480.23	18.5870766
Total Liabilities	**491,599.50**	400,331.89	91267.61	22.7979864
Assets				
Cash & Balances with RBI	25,345.63	14,627.40	10718.23	73.2750181
Balance with Banks, Money at Call	14,238.01	12,652.77	1585.24	12.528798
Advances	**303,000.27**	239,720.64	63279.63	26.3972389
Investments	**120,951.07**	111,613.60	9337.47	8.3658891
Gross Block	2,939.92	2,703.08	236.84	8.76185684
Accumulated Depreciation	0.00	0.00		
Net Block	**2,939.92**	2,703.08	236.84	8.76185684
Other Assets	25,124.60	19,014.41	6110.19	32.1345232
Total Assets	**491,599.50**	400,331.90	91267.6	22.7979834
Contingent Liabilities	744,097.98	746,226.39	-2128.41	-0.28522309
Bills for collection	0.00	0.00		
Book Value (Rs)	181.23	152.20	29.03	19.0735874



Interpretation:

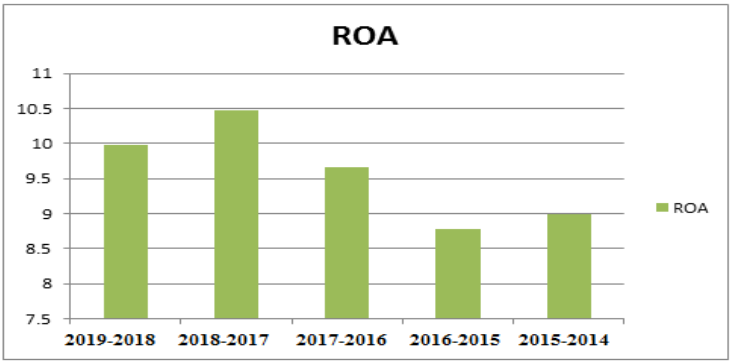
The total current liabilities for the year are Rs.491599.50 in the year 2019 is less than the total current assets for the year. Therefore the assets are more than the liabilities. So there is a positive gap of Rs.236.84 i.e 8.76 % .

Ratio Analysis

- Return on Assets (ROA)

$$\text{Return on Assets (ROA)} = \frac{\text{Net Income}}{\text{Average Total Assets}}$$

Year	Net income	Average Total Assets	ROA
2018-2019	49055.17	491599.50	9.97868
2017-2018	41917.49	400331.90	10.47068
2016-2017	32619.76	337909.49	9.653402
2015-2016	24361.72	277352.61	8.783664
2014-2015	19983.52	222458.56	8.98303



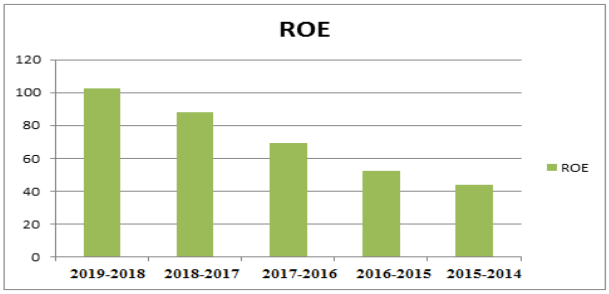
Interpretation:

In the ROA the total Average Assets was increasing year by year and the net income was also in the decreasing position

- Return on Equity (ROE)

$$\text{Return on Equity (ROE)} = \frac{\text{Net Income}}{\text{Average Stockholders' Equity}}$$

Year	Net income	Average Equity	ROE
2018-2019	49055.17	479.81	102.233874
2017-2018	41917.49	475.88	88.0841598
2016-2017	32619.76	469.34	69.5013423
2015-2016	24361.72	465.23	52.3648948
2014-2015	19983.52	457.74	43.6569231



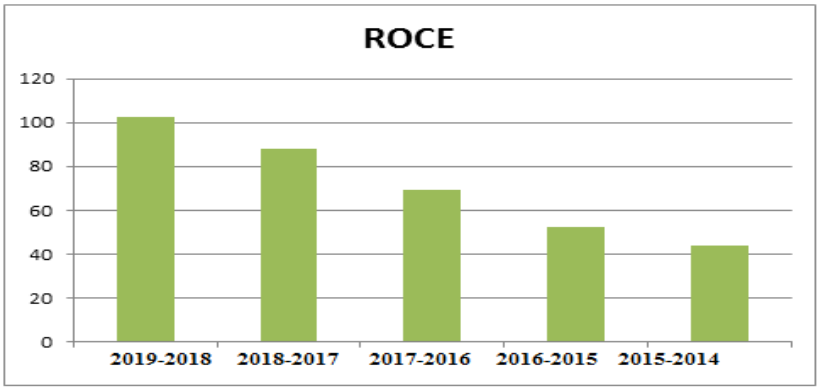
Interpretation:

The net income of the organization was in the increasing position and also the equity value for the investors is also in the increasing stage.

- Return on Common Equity (ROCE)

$$\text{Return on Common Equity} = \frac{\text{Net Income}}{\text{Average Common Stockholders' Equity}}$$

Year	Net income	Average Common Stockholders' Equity	ROCE
2018-2019	49055.17	479.81	102.233874
2017-2018	41917.49	475.88	88.0841598
2016-2017	32619.76	469.34	69.5013423
2015-2016	24361.72	465.23	52.3648948
2014-2015	19983.52	457.74	43.6569231



Interpretation:

The net income of the organization was in the increasing position and also the equity value for the shareholders is also in the increasing stage.

VII. CONCLUSION:

The purpose of ALM is not necessarily to eliminate or even minimize risk. The level of risk will vary with the return requirement and entity's objectives. Financial objectives and risk tolerances are generally determined by senior management of an entity and are reviewed from time to time. All sources of risk are identified for all assets and liabilities.

FINDINGS:

1. ALM technique is aimed to tackle the market risks. Its objective is to stabilize and improve Net interest Income (**NII)**.

2. ALM presents a disciplined decision making framework for s while at the same time guarding the risk levels.
3. The company also increased considerably which investors in coming period. The company has taken up a plant expansion program during the year to increase the production activity and to meet the increase in the demand

VIII. SUGGESTIONS:

- They should strengthen its management information system (MIS) and computer processing capabilities for accurate measurement of liquidity and interest rate Risks in their Books.
- In the short term the Net interest income or Net interest margins (NIM) creates economic value of the which involves up gradation of existing systems & Application software to attain better & improvised levels.

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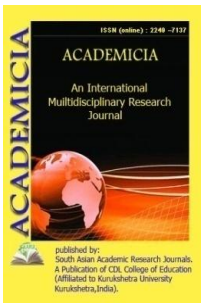

A STUDY ON PERFORMANCE APPRISAL OF EMPLOYEES AT HALCYON TECHNOLOGIES

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ABSTRACT

Performance appraisal is the major measuring instrument provided by the organization to their employees. It helps in setting the goals and objectives of employees and also useful in identifying the strengths and opportunities. Performance of employees has been mainly focused by human resource department. In order to compete in present competitive market environment, performance of employees plays a major role in every organization. Performance appraisal is a fundamental tool for measuring the construction frame which has been set by the organization. It is very helpful in identifying the employee's strengths and weakness for improvising their future performances.

KEYWORDS: *Performance, Employees, Appraisal System, Organization.*

I. INTRODUCTION:

Performance appraisal is a formal structured process evaluating the qualifications of the employees. In this study the evaluation of the employees in their respective job roles and responsibilities can be occurred. Importance of performance appraisal in the organization can be done in this study. Development of the potential in every individual employee can be studied.

II. OBJECTIVES OF THE STUDY:

1. To study various factors influencing employee performance and their job functions and responsibilities at halcyon technologies.

2. To analyse and interpret about various performance appraisal system at halcyon technologies

3. To evaluate employee satisfaction towards performance appraisal system at halcyon technologies

III. REVIEW OF LITERATURE:

1. Work by Ravichandran, Venkataraman and Banumathy

Ravichandran, Venkataraman and Banumathy (2011) express that the province of Tamil Nadu with 37 operational sugar plants is a noteworthy sugar creating condition of the nation, contributing around 9-10 percent to the national sugar creation. The sugar business has consumed around 5 lakh country individuals in the state. This paper examined the exhibition evaluation framework followed in an agreeable sugar plant with an example size of 75 workers. The examination has discovered that the sugar plant had received a decent evaluation framework and takes the examination at the hour of probation period and further during the vocation advancement. The investigation has likewise discovered that there is a hole between the genuine and wanted exhibition. Consequently, it was proposed to lead yearly execution evaluation to improve the productivity of the workers and give preparing on constancy, correspondence ability and aptitude advancement to improve the representative's administration quality

2. Work by Vasset

His article which is titled Employees perceptions of justice in performance appraisal expresses that of the considerable number of assignments attempted by human resource directors, execution evaluations (PAs) are one of the most disliked among workers (Meyer 1991, Murphy and Cleveland 1995, Holbrook 2002, Jack man and Strober 2003). As performance appraisal guidelines (Fletcher 2004, Impetus One 2010), PAs can be executed in comparable routes in associations all through Europe and created nations somewhere else. This study only concerned about the employee’s performance appraisal system should be conducted fairly and trustworthy

3. Work by Brutus, Fletcher and Baldry

Brutus, Fletcher and Baldry (2009) in their article titled, "The impact of autonomous self-translation on rater self-viability in performance appraisal" broaden current information on the utilization of execution assessments in associations by exploring the impact of self-interpretation on rater self adequacy. Results from an overview finished by 105 experienced supervisors demonstrate that free self-understanding is identified with different elements of rater self-viability. In addition, involvement in examinations was found to direct these connections. The ramifications of these discoveries for the examination and the act of execution evaluation are talked about**.**

4. Work by Bollen and Whaley

Bollen and Whaley (2009) in their article titled "Hedge Fund Risk Dynamics: Suggestions for performance appraisal" express that precise evaluation of support investments execution must perceive the opportunity with which

directors move resource classes, systems, and influence because of changing economic situations and exchange openings. The standard proportion of execution is the strange return characterized by a fence stock investments' introduction to chance variables. In the event that exposures are expected steady when, truth is told, they change through time, assessed strange returns might be wrong. They utilized an ideal change point relapse that permits hazard exposures to move, and show the effect on execution evaluation utilizing an example of live and dead assets during the period from January 1994 through December 2005.

5. Work by Wilson and Jones

Wilson and Jones (2008)58 in their article titled "Reducing job irrelevant bias in performance appraisals: compliance and beyond" express that activity insignificant segregation appears as omnipresent as the presentation evaluations in which it is regularly recognized. This paper investigates both consistence based and progressively proactive methodologies that manage the different potential wellsprings of segregation in execution examination evaluations. The recommendations lead to a code of training for execution the executives in firms across societies and national limits.

IV. RESEARCH METHODOLOGY:

Research Approach is the procedure of methodical examination of any administration issue it manages explores structure, information assortment strategy, inspecting plan, testing technique.

METHODS OF DATA COLLECTION

PRIMARY DATA: Data is collected from employees through questionnaire and other discussions.

SECONDARY DATA

Secondary data is collected from research publications, websites, journals, books.

SAMPLE SIZE:

A Sample of 100 employees are taken

RESEARCH TOOLS:

The research tool which is used for the research is a prepared questionnaire

STATISTICAL TOOLS:

ANNOVA

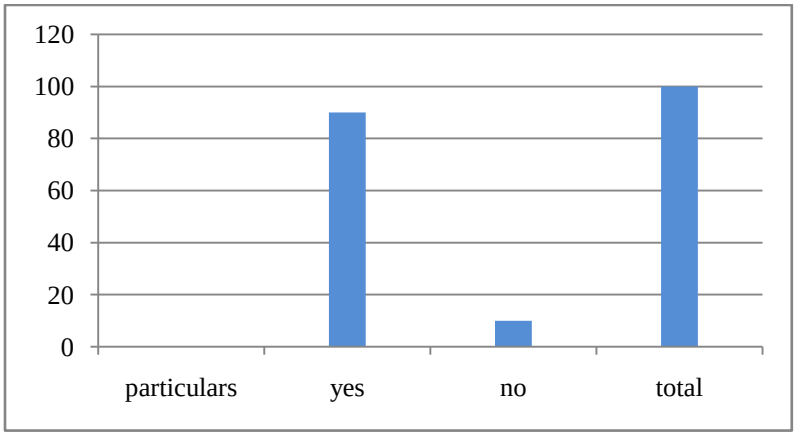
Variables: Independent variable- Performance appraisal

Dependent variable- Employee satisfaction

V. DATA ANALYSIS AND INTERPRETATION:

TABLE 1: THE APPRAISER IS THE RIGHT PERSON TO APPRAISE YOUR PERFORMANCE?

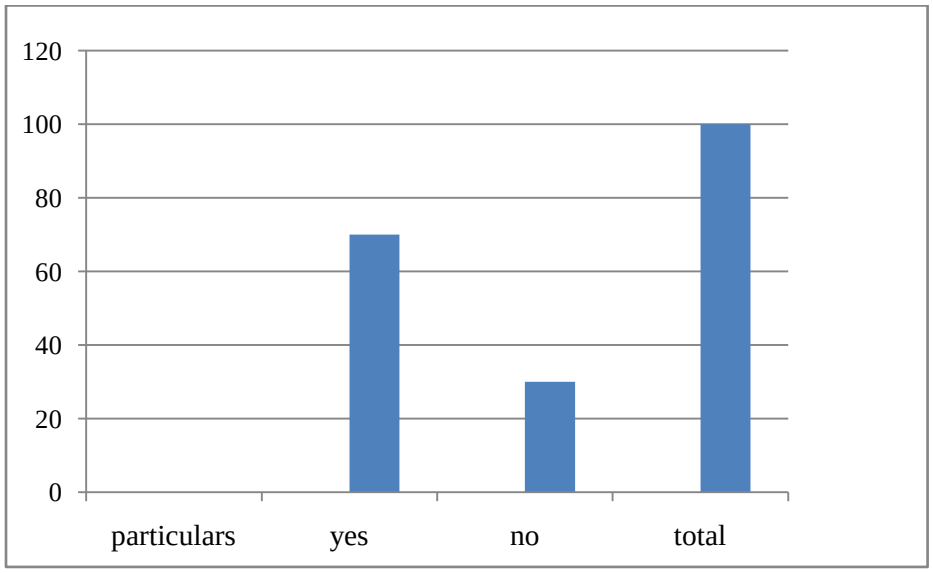
Particulars	No. of respondents	% of respondents
Yes	90	90
No	10	10
Total	100	100



INTERPRETATION: 90% of the employees are agreed on the statement that appraiser is the right for your performance

TABLE 2: IS THERE ANY CHANGES IN THE WORKING EFFICIENCY OF EMPLOYEES BY IMPLEMENTING PERFORMANCE APPRAISAL?

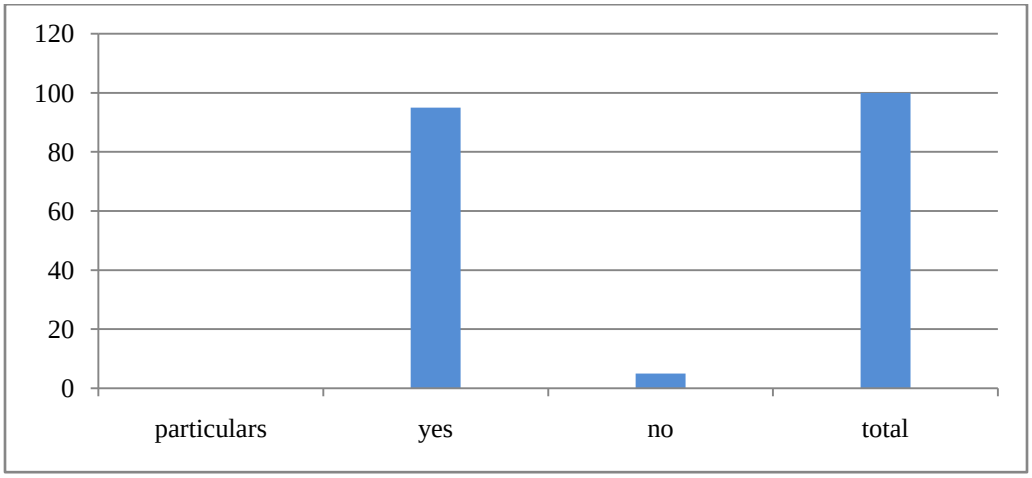
Particulars	No. of respondents	% of respondents
Yes	70	70
No	30	30
Total	100	100



INTERPRETATION: It is observed that 70% of the employees are seeing the changes in working efficiency after the appraisal, while 30% of employees are unable to observe the changes after the appraisal.

TABLE 3: IS THERE ANY BEHAVIOURAL CHANGES OCCUR IN THE EMPLOYEES AFTER PERFORMANCE APPRAISAL

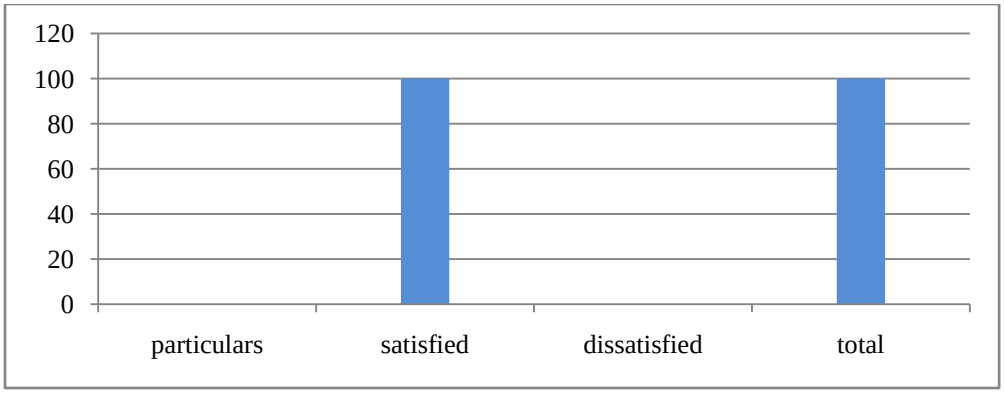
Particulars	No. of respondents	% of respondents
Yes	95	95
No	5	5
Total	100	100



INTERPRETATION: 95% of employees are showing the behavioural changes after the appraisal and 5% of employees are not showing the behavioural changes after the appraisal.

TABLE 4: SATISFIED WITH THE CURRENT PERFORMANCE APPRAISAL SYSTEM

Particulars	No. of respondents	% of respondents
Satisfied	100	100
Dissatisfied	0	0
Total	100	100



INTERPRETATION: 100% of the employees are satisfied with current appraisal system.

VI. STATISTICAL ANALYSIS:

HYPOTHESIS:

- H0: There is no significant relationship between the effectiveness of appraisal & development programme and satisfaction of present appraisal system done by organization
- H1: There is a significant relationship between the effectiveness of appraisal & development programme and satisfaction of present appraisal

Calculation

Correction Factor (C.F) = T^2/N

$= 100^2/25$

$= 10{,}000/25$

$= 400$

Sum of square of Total Variance: (SST)

= sum of squares of all items-C.F

$= [10^2+15^2+10^2+20^2+15^2+5^2+5^2+5^2+5^2+5^2+5^2] - 400$

$= 1200 - 400$

$= 800$

Sum of square between rows (SSR)

$= [(25^2/5) + (50^2/5) + (10^2/5) + (5^2/5) + (10^2/5) - 400$

$= 670 - 400$

$= 270$

Sum of squares between columns (SSC)

S.NO	Effectiveness	SATISFACTION OF APPRAISAL DONE BY ORGANIZATION					
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
1	Highly effective	-	-	-	10	15	25
2	Effective	10	20	15	-	5	50
3	Neutral	5	5	-	-	-	10
4	Ineffective	-	5	-	-	-	5
5	Highly Ineffective	5	-	-	-	5	10
	Total	20	30	15	10	25	100

$= [(25^2/5) + (30^2/5) + (15^2/5) + (10^2/5) + (25^2/5)]$

$= 475 – 400$

$= 75$

Error sum of squares = SST-(SSR+SSC)

= 800 - (270+75)

= 455

ANNOVA TABLE

SOURCE OF VARIANCE	SUM OF SQUARES	DEGREE OF FREEDOM	VARIANCE	F
Between rows	270	5-1 = 4	270/4 = 67.5	67.5/28.4375 = 2.3736
Between columns	75	5-1 = 4	75/4 = 18.75	18.75/28.475 = 0.6593
Residual	455	4*4 = 16	455/16 = 28.4375	

Calculated value:

F1 = 2.736

F2 = 0.6593

Table Value: Critical value: The table value of ANOVA at 5% and the degree of freedom is (4, 16) = 3.01

INTERPRETATION:

The table value of F1 at 0.05 level of significance is 3.01. Calculated value is 2.3736. Therefore the calculated value is less than the table value we accept H0 and reject H1

The table value of F2 at 0.05 level of significance is 3.01. Calculated value is 0.6593. Therefore the calculated value is less than the table value we accept H0 and reject H1

VII. FINDINGS

1. The area where employees are facing problems are taken care by the training department
2. Promotion of employees is one of the main criteria among both management and employees

VIII. SUGGESTIONS:

Awareness level of employees during the performance appraisal should be increase. Providing a good communication between management and staff so that the future goals of the organization can be easily achieved Providing appraisal rewards regularly improves the employee's performance

IX. CONCLUSION:

Employees are satisfied with the present performance appraisal system. The present appraisal technique is prevailing fair in the organization. For effective results some more modern future oriented appraisal technique s should be implemented.

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A STUDY ON PERFORMANCE OF MUTUAL FUNDS

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ABSTRACT

The research article titled as performance of mutual funds at kotakmahindra bank. The open-end fund Industry may be a one among the rapidly growing industries within the stock market market where it attracts investors with the diversified nature. the most purpose of study is evaluate the performance of mutual funds and facilitate by the retail investors in deciding . Data collected by the NSE, Money control, Kotak mahindra and value research on online data sources. the most tools employed by this project is beta, variance , correlation and variance. the info was collected from feb 1,20202 to March 1 2020 Day wise net asset values of selected mutual funds schemes are collected to calculate the return and return of these schemes and to match with same benchmark index. during this study, NSE sensex is taken into account because the benchmark return. The research revealed the all schemes are outperformed the benchmark index when the scheme returns are compared with the sensex returns. It indicates that the performance of fund schemes is way better than the market risk.

KEYWORDS: *Net Asset Values, Mutual Funds, Market Returns, Market Risk, Fund Performance, Risk Investment.*

1.INTRODUCTION

A open-end fund may be a security that pools the saving of variety of investors who share a standard financial goal. the cash thus collected is then invested during a capital market instrument like shares, debentures and therefore the other securities.

A open-end fund may be a clean intermediary which performs a basic purpose of shopping for and selling securities on behalf of its unit-holders, which latter can also perform but not easily, conveniently, economically, and profitably. The investors within the open-end fund are given the share in its total funds which is proportionate to their investments, and which is evidenced by the unit certificates. one among the main features of the operations of this type of organization of quite organization to holds. Unlike other financial institutions, whose liabilities and assets differ sharply in their nature, unit investment trust issues claims (units)which have, like its assets (equity stock), claim on a proportionate a part of the portfolio.

Thus open-end fund is that the best suited investment for the overall man because it offers a chance to take a position during a diversified, professionally managed basket of securities at a comparatively low cost.

Investments in securities are spread across a good cross-section of industries and sectors and thus is that the reduced. Diversification decreases the danger because all stock might not move within the same direction within the same proportion at an equivalent time. open-end fund issue units to the investors in accordance with quantum of cash invested by them.

Mutual funds are one among the investment alternatives playing a big role in investment techniques due to its diversification nature and minimum earnings. There are many investment alternatives like bank deposits, insurance, shares, debentures, bonds, commodities, land and far more but mutual funds are one among the sources of investment, gaining rapid increase when matched to the opposite sources of investment alternatives.

This study evaluates the performance of the mutual funds by risk and returns and associating an equivalent with NSE-SENSEX. This study examines the 4 open-ended, growth-oriented equity fund schemes in India. Open-ended funds are that funds don't have any fixed maturity period. they provide the new unit of funds purchasable and prepared to shop for at any period.

2.REVIEW OF LITERATURE

Dr. K. Veeraiah and Dr. A. KishoreKumar (Jan 2014), conducted an enquiry on Comparative Performance Analysis of Select Indian mutual fund Schemes. This study analyzes of the performance of Indian owned mutual funds and compares their performance.

B. Raja behavior and Dr. B. Ramachandra Reddy (Oct 2012), assessment and act of first-class Mutual means Operated By concealed Sector Banks.

Dr.S. Vasantha, Uma Maheswari and K.Subashini, (Sep 2013), Evaluating the execution of a little chosen initiate ruined fair play diversified open-end sponsor in Indian open-end savings account Industry

Dr. B. Saritha, (Feb 2012) has studied open-end fund Investment Decisions by Using Fama Decomposition Models**.**

Dr.S.M.Tariq Zafar, Dr.D.S.Chaubey and Syed Imran Nawab Ali, (Feb 2012), have done An Empirical Study on Indian Mutual Funds Equity Diversified Growth Schemes and Their Performance Evaluation.

3.OBJECTIVES OF THE STUDY

To analyses the danger and return of the chosen fund schemes and compare the same with NSE-SENSEX.

To Examine the scheme on the by performance compared with the market index whether or not they're outperforming or underperforming the benchmark.

To evaluate the performance of selected fund schemes by using several performance evaluation techniques.

4.RESEARCH METHODOLOGY

Any research methodology is consists of primary information and secondary data. Primary data is that the info collected directly by knowing the facts. Primary data wasn't taken within the research. Whereas secondary information is that the choice source from the third parties. This study is taken on the secondary information where it includes the analysis of 10 growth-oriented mutual fund schemes.

Primary Data

The information which we collects directly from the company and moulds it in useful information isknown as primary data.

Secondary Data

which is collected from journals, books, and websites is known as secondary data.

5.HYPOTHESIS

H0 - there's no relationship between the performance of the mutual funds and market index.

H1 - there's relationship between the performance of the mutual funds and market index.

6.SAMPLE DATA

This study is mainly focused on the following samples.

Kotak Gold Fund – Growth

SBI Magnum Midcap Fund

Sundaram Select Focus Fund

Mirae Asset Emerging Bluechip Fund

Axis Small Cap Fund Direct Plan

LIC Mf Equity Hybrid Fund

Nippon India Income Fund Direct Plan

Invesco India Treasury Advantage Fund

BOI AXA Liquid Fund

ICICI Prudential Bluechip Fund

7.STAISTICAL TOOLS USED

Return,Correlation,Risk and Beta

8.RESULTS AND ANALYSIS

Returns, beta, risk and correlation of selected schemes:

Below tables represents the results of the return, risk and beta of determination of selected schemes. The same is compared with the benchmark index (NSE-Index) .

TABLE-1 SUMMARY OF RETURN, RISK, AND BETA OF SELECTEDSCHEMES

SCHEMES	SCHEME RETURN	SCHEME RISK	BETA
Kotak Gold Fund	0.002715555	0.013236651	-0.047872023
LIC Mf Equity Hybrid Fund	-0.001425436	0.007583843	0.202079519
SBI Magnum Midcap Fund	-0.002012608	0.008181959	0.124388458
Sundaram Select Focus Fund	-0.002000473	0.34392317	0.34392317
Mirae Asset Emerging Bluechip Fund	-0.005522446	0.010584001	0.021910875
Axis Small Cap Fund Direct Plan (G)	0.000173958	0.000879344	0.136427279
Nippon India Income Fund Direct Plan (G)	0.016055605	0.001705252	0.022992223
Invesco India Treasury Advantage Fund (G)	0.000247439	0.000362166	-0.15752
BOI Axa Liquid Fund	0.000183036	0.000125883	0.003022
ICICI Prudential Bluechip Fund	-0.002359672	0.011684632	0.351957443
Average	0.000605496	0.03982669	0.100130894
NSE SENSEX INDEX(Benchmark)	0.03968797	0.06982669	1

INTERPRETATION:

SCHEME RETURNS

From table 1, it is clear that 10 schemes performed the market returns. In this analysis, the average market returns are 0.039. The minimum returns are from Mirae asset Emerging Bluechip Fund and highest returns are from Nippon India Income Fund with 0.016055605. All the schemes are performing well when they are compared with the market returns with an average return of 0.000605496.

RISK

From table 1, it is clear that 10 schemes performed the market returns. Sundaram Select Focus Fund is having more risk with 0.34392317 and BOI Axa Liquid Fund ishaving less risk 0.000183036. The average market risk with selected schemes is ICICI Prudential Bluechip Fund with 0.011684632.

BETA

When it comes to beta it is noticed that 10 schemes having beta value is 0. Hence, these funds having less risk category. Kotak Gold Fund having -0.047872023 and Invesco India Treasury Advantage Fund (G) having -0.15752. Thus 10 projects having beta values less than 1 it means these 10 schemes are performing better in managing the systematic risk.

TABLE -2 SUMMARY OF CORRELATION

SCHEMES	CORRELATION
Kotak Gold Fund	-0.03723303
LIC Mf Equity Hybrid Fund	0.274320115
SBI Magnum Midcap Fund	0.156511941
Sundaram Select Focus Fund	0.096703728
Mirae Asset Emerging Bluechip Fund	0.021312508
Axis Small Cap Fund Direct Plan (G)	0.162938417
Nippon India Income Fund Direct Plan (G)	0.138358
Invesco India Treasury Advantage Fund (G)	-0.370652
BOI Axa Liquid Fund	0.247182
ICICI Prudential Bluechip Fund	0.310098602
Average	0.058488431

INTERPRETATION

From table 2, it is clear that total 10 schemes are outperformed that market correlation kotak Gold Fund is having more related with the market index -0.03723303 and Nippon India Income Fund Direct Plan (G) having -0.370652.

9.FINDINGS:

From this analysis, it's clear that total 10 schemes are performed the benchmark returns. It shows the success of mutual funds. The very best returns from Nippon India Income Fund Direct plan scheme and therefore the less returns are Mirae Asset Emerging Blue chip fund Direct plan.

When it involves risk, ICICI Prudential Blue chip fund scheme has high risk and Invesco India Treasury Advantage Fund has less risk.

In the beta calculation, it's observed that 10 funds having beta value is a smaller amount which suggests these 10 schemes are performing well in managing the systematic risk. Later these funds are having less risk.

10.SUGGESTIONS

Beta value for all the ten schemes are but one. So, they have to continue the beta value. Correlation values for 8 schemes are zero and a couple of schemes are but zero. So, invest within the schemes which are having zero. they need less risk.

11.CONCLUSION

From this study, we will assume that some evaluation may have higher returns and a few with higher risk. regardless of the combination, investors always search for the mixture of maximum revenues and minimum risk. Alongside this, it's to look at the correlation of these schemes. Based abreastof the correlation H1 is accepted.From my study I even have concluded that the danger related to the chosen open-endfund schemes is lesser with minimum returns. Hence the beta value is additionally minimum and therefore the levels of systematic risk is minimum to all or any the chosen open-end fund schemes.

Hence I conclude that investors can invest in any of the chosen mutual funds to urge returns and obtain benefited.

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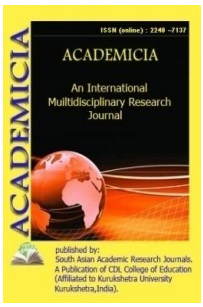

A STUDY ON COMPARATIVE ANALYSIS OF MUTUAL FUND SCHMES

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ABSTRACT

The mutual fund industry is one of the fast growing industries in the stock exchange market. This industry attracts the investors with its diversification nature. In this study 10 open-ended, growth oriented funds are considered for the study. The data was collected for the period of March 2015 to December 2019(five years) where quarterly net asset values of the selected funds are collected to calculate the risk and return of those schemes and to compare the same with the benchmark index. In this study, BSE-Sensex is considered as the benchmark index. The study revealed that 7 out of 10 schemes are outperformed the benchmark Sensex when the scheme returns are compared with the Sensex returns. It indicates that the performance of the fund schemes is far better than the market returns. When it comes to risk all the schemes are underperformed than the market risk. It means the market had a lower risk when compared to all the selected schemes in the study.

KEYWORDS: *Mutual Funds, Comparative Analysis, Market Returns, Portfolio Risk, Market Risk.*

INTRODUCTION

In recent decades, investment alternatives are gaining more significance when compared to the old methods of investing the income. As we know, investment is all about to earn income over the income. We are having a plenty of investment alternatives such as deposits, shares, debentures, insurance, bonds, commodities, gold and other precious ornaments, real estate and many more but mutual funds are one of the sources of investment alternatives.

Mutual funds are the group of equities attracting the investors to invest in the fund where the investment is diversified among all the units of equity shares in mutual fund. They hire a fund manager and appoint a trustee to supervise the fund manager. Mutual funds are the best

alternative because of its less risk and best alternative for long term investment with moderate returns. Mutual fund industry was set up with the existence of unit trust of India in 1963.

A study on mutual funds came into existence because of the advantages of mutual funds attracting many investors daily. The investors need to analyse the risk and return factors involved in mutual funds before investing in it. The study of mutual funds helps the investors to understand the concept of mutual funds and analyse the mutual fund schemes

NEED FOR THE STUDY

- Mutual funds are one of the best investment alternatives with less risks and returns, it is important to analyse the mutual fund schemes for the better knowledge of fund management and improve the returns from the mutual funds. It is possible only when you completely analyse the mutual fund schemes, having knowledge regarding the risk and the return involved in the mutual funds along with the best ways to invest in the funds to gain more returns in less time.
- The study focusses on the conceptual knowledge regarding the mutual funds, risk and return involved in the funds and performance evaluation techniques to analyse the mutual funds.

OBJECTIVES OF THE STUDY

- To understand the subjective concept of mutual funds.
- To analyse the performance of selected mutual fund schemes on the basis of risk and return and compare with benchmark index.
- To compare the mutual fund Indices with benchmark index.
- To evaluate the performance of the selected mutual fund schemes by using several technique of performance evaluation.

SCOPE OF THE STUDY

- The scope of the study is limited to only equity funds. Four categories of equity funds are selected from which 10 mutual fund schemes are randomly selected for the analysis. The time limit for this analysis is limited to 45 days.

RESEARCH METHODOLOGY

Research methodology consists of primary and secondary data. Primary data is a data collected directly by knowing the facts. Secondary data is the alternative source collected from the third parties.

Primary data: In this study no primary data is used

Secondary data: Most of the data is gathered through Share khan limited and other necessary data is collected from moneycontrol.com and bseindia.com

HYPOTHESIS

H0 - there is no relationship between performance of the mutual funds and performance of the market.

H1- there is a relationship between performance of the mutual funds and performance of the market.

STATISTICAL TOOLS

In this study, the following statistical tools are used to analyse the performance of the mutual funds:

- Average return
- Standard deviation
- Beta
- Correlation

1.1 SAMPLING

This study is mainly focused on the following samples:

1. Axis mid cap fund
2. Sundaram mid cap
3. Franklin india mid cap
4. Inveskoindia multi cap
5. Sbi magnum multi cap
6. Adityabirla sun life equity fund multy cap
7. Adityabirla sun life small cap
8. Kotak small cap fund growth
9. Hdfc equity capital large fund
10. Indianbullsbluechip fund large cap

LIMITATIONS OF THE STUDY

1. The main limitation of this study is time where due to the short span of time it is highly impossible to evaluate the performance of whole industry.

2. The study is limited to only equity funds.

3. Most of the data used in this study is secondary data where it may or may not be accurate.

4. The study is limited to only four categories of equity funds and 10 mutual fund schemes.

RESULT AND ANALYSIS

TABLE 1 SUMMARY OF RETURN, RISK AND BETA OF SELECTED SCHEMS

COMPANIES	RETURN	STANDARD DEVATION	BETA
Axis mid cap fund	0.027816	0.057	0.64
Sundaram mid cap	0.020914	0.07034	0.98
Franklin india mid cap	0.0211	0.06218	0.81
Inveskoindia multi cap	0.01847	0.07265	1.15
Sbi magnum multi	0.02571	0.05292	0.84

cap			
Adityabirla sun life equity fund multy cap	0.02601	0.06283	0.94
Adityabirla sun life small cap	0.0914	0.10087	1.31
Kotak small cap fund growth	0.02269	0.07316	1.01
Hdfc equity capital large fund	0.02226	0.07208	1.29
Indianbullsbluechip fund large cap	0.0278	0.06612	0.8
Average	**0.025577**	**0.0689367**	**0.977**
BSE-Sensex index(Benchmark)	**0.02178**	**0.0474**	**1**

From the table 1, it is clear that 7 out of 10 schemes are outperformed the market returns. In this analysis, the average market return is 0.02178. The minimum returns are from the Invesco India multi cap (0.01847) and the highest return from Aditya Birla sun Life equity fund multy cap (0.0914).

When it comes to the risk Aditya Birla sun life small cap is having more risk with 0.10087 and SBI Magnum multi cap fund is having less risk with 0.05292. The market risk is 0.0474. All the schemes are underperformed the market risk with an average scheme risk of 0.06893 where the risk factor is comparatively more.

In the context of beta, it is observed that 4 out of 10 funds having the beta value greater than 1 and 6 schemes are having less than 1. Thus, 4 schemes are having beta values more than one and 6 with less than one that means 6 schemes are performing well in managing the systematic risk.

TABLE 2

COMPANIES	**COREELATION**
Axis mid cap fund	0.535
Sundaram mid cap	0.661
Franklin india mid cap	0.614
Inveskoindia multi cap	0.751
Sbi magnum multi cap	0.750
Adityabirla sun life equity fund multy cap	0.712
Adityabirla sun life small cap	0.614
Kotak small cap fund growth	0.654
Hdfc equity capital large fund	0.850
Indianbullsbluechip fund large cap	0.573
Average	**0.671**

From the table 2, Correlation of the HDFC equity capital large fund is more related with the market index with 0.850 followed by Invesco India multi cap with 0.751 and SBI magnum multi fund with 0.750. Axis mid cap fund is less related with the correlation value of the 0.535

FINDINGS

1. It is observed that the average returns 7 out of 10 schemes are outperformed thebenchmarkindex.
2. It is also observed that the standard deviation all the schemes are underperformed when compared to the rate of return.
3. Beta value for the 6 schemes is less than one. So, we can say they are less volatile than the market index and remaining 4 are highly volatile in the market.
4. Schemes are having higher coefficient of determination which indicates its performance on diversification.

SUGGESTIONS

1. When it comes to the standard deviations all the schemes are underperformed when compared to the rate of return. They need to control the risk factor.
2. Beta value for the 4 schemes is more than one. So, we can say that they are highly volatile than the market index and they need to decrease the beta value.
3. Schemes are underperforming than the market benchmark return; they need to be performed well.

CONCLUSION

From this study, we can conclude that some schemes may have higher returns and some with higher risk. Whatever the combination, investor's always look for the combination of maximum returns and minimum risk. Along with this, it is important to examine the fund diversification in the schemes. It can be concluded that returns are not only the only factor to examine at the time of investment where an investor needs to analyze all the factors affecting the fund's performance for the better results.

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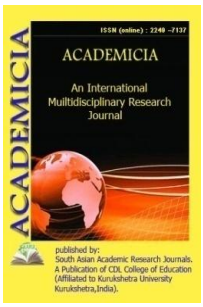

A STUDY ON EQUITY ANALYSIS OF TELECOM SECTOR

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ABSTARCT

The study on equity analysis on Telecom sector proved to be unavoidable to understand the association or relation between returns and risk of investment on telecommunications. The super motive of every investor is to have maximum returns with less risk, The ability of the investor returns can be estimated based on the risk taking caliber. Statistical methods like Correlation, Variance, Beta and Standard Deviation helps in knowing the association of risk and returns in telecom sector. For making good financial and investment decisions the research of stock market is compulsory.

KEYWORDS: *Unavoidable, Association, Caliber.*

INTRODUCTION

LITERATURE REVIEW

R. Naraayanaswamy And R. Thirugnansoundari (2016): By the research they have done, they explained that the relation between the security market return and average rate of return is in a positive way during the period of the study. They gave a suggestion to the investors to take appropriate decisions before investing in the shares. According to the study they have done the IT companies like Oracle and Infosys which are having high and good growth rate and also the investors those who are interested in the short investment can prefer the Wipro Company because it gives profits in short term investment. The Indian market exhibiting a positive relationship among risk and return is their final conclusion.

Dr. Shyam Vashistha And Rajesh Kumar (2011): This research explains that the equity volatility analysis is said to be an effective analysis for the measurement of risk factor. The volatility analyzes the securities based on the fluctuations in price so this study helps in investment decision to the investors by forecasting the volatility in the share price. There are different factors like internal information which influence the actual price of shares so the

concluded it as the investment decisions cannot be done only on the equity volatility analysis basis.

OBJECTIVES

1. To understand and analyze the equity analysis concept and also to gain a practical knowledge.
2. To know the selective 5 Telecom sector companies present scenario.
3. To suggest the investors for gaining the appropriate profits in the telecom industry.
4. To analyze the risk and return which is involved in the selected 5 telecom sector companies.

RESEARCH METHODOLOGY

Primary Data: Primary data is defined as the information which is directly collected from the company and processed in a required manner. The information is gathered from the first hand sources like interview, direct mail or the telephonic conversations with the company management.

Secondary Data: Secondary data is defined as the information related to the organization collected from various sources like Books, Journals, BSE and NSE Official websites and Portals of telecommunications. This study is totally based on secondary data.

PERIOD OF STUDY

This study includes the period of previous 5 years, 2015-2019 and its data which is used for the analysis of equity share price volatility of selected 5 telecommunications companies.

METHOD OF SAMPLING

This study includes the random sampling of 5 companies in the telecom sector. The selection is totally based on the trading platforms of BSE and the information which is available in other reliant sources.

Bharati Airtel: Bharati Airtel limited is also called as airtel. It is one of the most important global telecommunications services company which is headquartered New Delhi. Airtel provides various mobile services like 3G, 4G LTE, 4G+, GSM. It operates in 18 different countries across South Asia and Africa, and in the channel Islands with 411.42 million subscribers. Airtel is recognized as the 3nd largest mobile network operator in the India.

Tata Teleservices: Tata Teleservices Limited (TTSL) is an Indian telecommunications and broadband service provider. The headquarters of Tata Teleservices is located in Mumbai, Maharashtra. Tata Teleservices is a subsidiary of the Tata Group which is an Indian conglomerate company. It has 1.78 million subscribers and 8.51% market share. It is one of the important wireline operators in telecom sector.

Reliance Communications: Reliance Communications Limited is popularly known as R.Comm which provides voice, 2G, 3G and 4G data services. Reliance communications has 0.55 million subscribers and 2.64 market share. It is the fixedline operator which is headquartered in Navi Mumbai.

Vodafone Idea: Vodafone Idea Limited is said to be the Indian telecom operator which is headquartered in Mumbai, Maharashtra and Gandhinagar, Gujarat. Vodafone Idea is known as a

pan-India integrated GSM operator which is offering 2G, 3G and 4G Volte mobile services under two brands called Vodafone and Idea. Vodafone Idea Limited is India's 2nd largest telecommunications network and world's 5th largest mobile telecommunications network. It has 332.65 million subscribers as of December 31st 2019.

MTNL: Mahanagar Telephone Nigam Limited (MTNL) is a subsidiary of Bharat Sanchar Nigam Limited (BSNL) which is headquartered in New Delhi, India. MTNL is known as a state owned telecommunications service provider. 57% of stock in the company is owned by the Government of India. MTNL has subscribers of 6.71 million.

TOOLS OF ANALYSIS

MEAN: Mean is defined as the average of the numbers. It is calculated by adding all the values taken and dividing it by the number of values. Mean is used most commonly and it is the general purpose for the calculation of the midpoint of a set of values. The following is the formula of Mean.

$\bar{X} = \sum x/N$

Where, $\bar{X}$ = Mean

$\sum x$ = Summation of the values

N = Number of values.

Standard Deviation: To reveal the historical volatility of an investment standard deviation is applied to the annual rate of returns of that investment. The variance between each price and mean is greater with the greater standard deviation. The following is the formula which is used for the calculation of standard deviation.

$\sigma = sqrt[\Sigma(Xi - \mu)2 / N]$

Where

σ = Standard deviation

Xi = Each value

μ = Mean

N = Number of values

BETA: Beta is known as a statistical method which is used for the measurement of the systematic risk or volatility of an individual security in comparison to the unsystematic risk of the entire market. The calculation of Beta is done with the help of the following formula.

$\beta = (N \Sigma XY - \Sigma X \Sigma Y) / (N \Sigma X2 - (\Sigma X)2)$

HYPOTHESIS

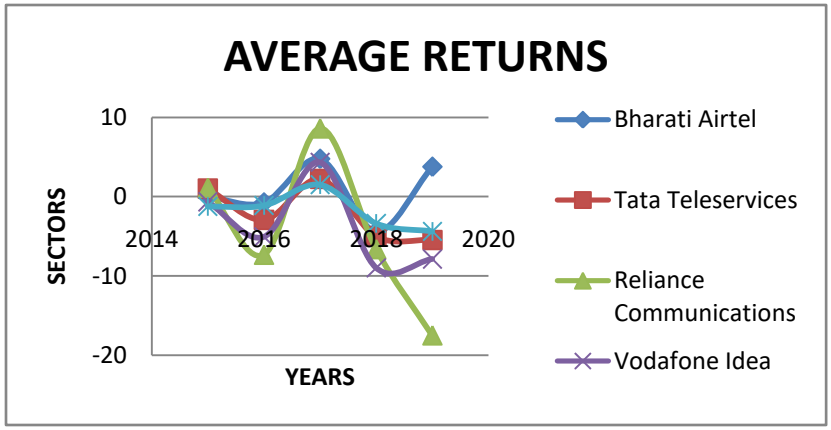
H0: There is no significance association between return and risk in telecom sector.

H1: There is a positive significance association between return and risk in telecom sector.

AVERAGE RETURNS

TABLE 1

YEAR	Bharati Airtel	Tata Teleservices	Reliance Communications	Vodafone Idea	MTNL
2015	0.02554	0.98597	1.11999	-0.646	-1.2303
2016	-0.7489	-2.9218	-7.3329	-5.065	-1.1151
2017	4.75662	2.21285	8.60609	4.34012	1.51529
2018	-4.3816	-4.9799	-6.6228	-8.9719	-3.3746
2019	3.759639	-5.45244	-17.5028	-7.86316	-4.38

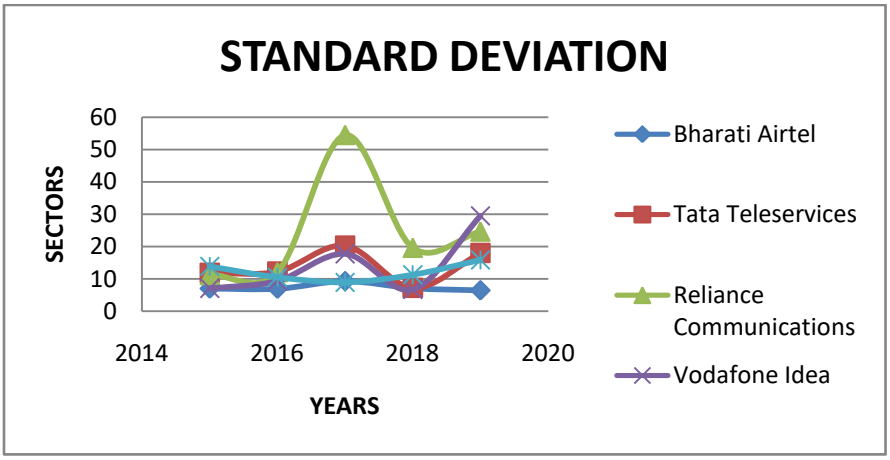


Interpretation: From the above graph we can know the highest and lowest average returns of Bharati Airtel are 4.75662 and -4.3816 in the years 2017 and 2018. For Tata Teleservices they are 2.21285 and -5.45244 in the years 2017 and 2019. For Reliance Communications they are 8.60609 and -17.5028 in the years 2017 and 019. For Vodafone Idea they are 4.34012 and -8.9719 in the years 2017 and 2018. And for MTNL they are 1.51529 and -4.38 in the years 2017 and 2019.

STANDARD DEVIATION

TABLE 2

YEAR	Bharati Airtel	Tata Teleservices	Reliance Communications	Vodafone Idea	MTNL
2015	7.01062	11.878	11.2297	7.068	13.8603
2016	6.94876	12.2687	12.0785	9.39466	10.4975
2017	9.26926	20.2956	54.4752	17.7302	8.92207
2018	7.13021	7.2568	19.6347	6.7577	11.276
2019	6.45765	18.02001	24.65324	29.45214	15.8771

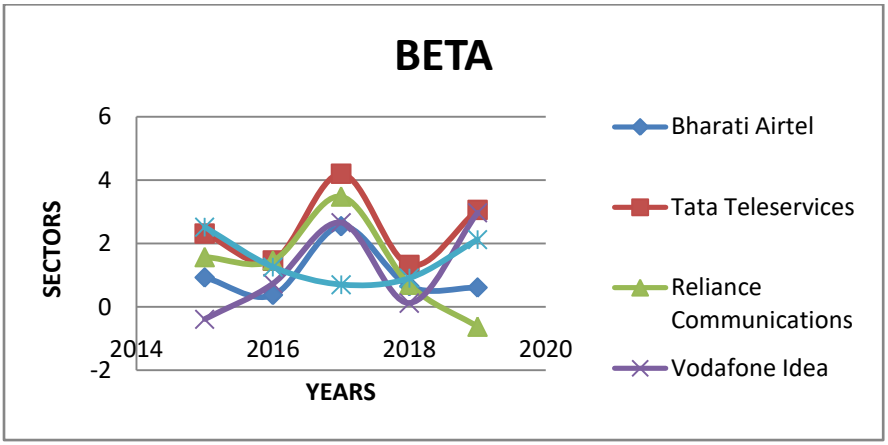


Interpretation: From the above graph we can say the highest and lowest standard deviation values of Bharati Airtel are 9.26926 and 6.45765 in the years 2017 and 2019. For Tata Teleservices they are 20.2956 and 7.2568 in the years 2017 and 2018. For Reliance Communications they are 54.4752 and 11.2297 in the years 2017 and 2015. For Vodafone Idea they are 29.45214 and 6.7577 in the years2019 and 2018. And for MTNL they are 15.8771 and 8.92207 in the years 2019 and 2017.

BETA

TABLE 3

YEAR	Bharati Airtel	Tata Teleservices	Reliance Communications	Vodafone Idea	MTNL
2015	0.928896	2.31157	1.5735	-0.3861	2.51398
2016	0.37617	1.46025	1.46867	0.73336	1.25486
2017	2.547022	4.20041	3.4814	2.6544	0.70343
2018	0.65512	1.32575	0.70241	0.11969	0.9067
2019	0.61085	3.06244	-0.6196	2.96496	2.12319



Interpretation: From the above graph we can say that the highest and lowest Beta values of Bharati Airtel are 2.547022 and 0.37617 in the years 2017 and 2016. For Tata Teleservices they

are 4.20041 and 1.32575 in the years 2017 and 2018. For Reliance Communications they are 3.4814 and -0.6196 in the years 2017 and 2019. For Vodafone Idea they are 2.96496 and -0.3861 in the years 2019 and 2015. And for MTNL they are 2.51398 and 0.70343 in the years 2015 and 2017.

Consolidated Sample Analysis

TABLE 4

Name	Average Returns	Standard Deviation	Beta
Bharati Airtel	0.6822598	7.3633	1.023612
Tata Teleservices	-2.031064	13.943822	2.472084
Reliance Communications	-4.346484	24.414268	1.321276
Vodafone Idea	-3.641188	14.08054	1.217262
MTNL	-1.7169	12.0866	1.500432

Interpretation: From table 4 we can say that the highest and lowest average returns are 0.6822598 and -4.346484 for the companies Bharati Airtel and Reliance Communications. The highest and lowest standard deviation values are 24.414268 and 7.3633 for the companies Reliance Communications and Bharati Airtel. And the highest and lowest Beta values are 2.472084 and 1.023612 for the companies Tata Teleservices and Bharati Airtel.

CORRELATION

TABLE 5

Companies	Market returns	Bharati Airtel	Tata Teleservices	Reliance Communications	Vodafone Idea	MTNL
Market returns	1					
Bharati Airtel	0.694104242	1				
Tata Teleservices	0.151638468	0.410200249	1			
Reliance Communications	0.198907705	0.169633171	0.922983194	1		
Vodafone Idea	0.363697336	0.575495579	0.972594781	0.88850039	1	
MTNL	0.31371493	0.362252956	0.901924077	0.909475072	0.924766591	1

Interpretation: From the above study we can conclude that the average calculated value of telecommunication sector is 0.653 where the critical or tabulated value of correlation degrees of freedom with (v=5) and 5% (0.05) level of significance is r=0.754. As the calculated value is less than that critical value, it is not significant and we failed to reject the hypothesis H0 at 0.05. Hence H0 may be accepted at 0.05 level of significance i.e., there is no impact of returns on telecommunications sector on selected companies.

FINDINGS

- From the above study it has been discovered that the returns of the above selected 5 companies started reducing from the year 2015 and started increasing in the year 2017 but it continued for 2019 due fall in the market price this is because of other telecom companies like Jio which gave a strong competition to these companies.

- From this study we can say that the entry of Jio in the market reduced the returns of these companies by increasing its returns.

CONCLUSION

From the above study we can conclude that the equity analysis is the most appropriate method for measuring the volatility, risk and return, and the relation between market returns and telecom sector returns. The study of equity analysis also helps the investors in ascertaining the risk involved in the selected companies with respect to market returns. This study also helps in analyzing the price fluctuations in order to determine the returns. As the period of study is specified, it has not undertaken the internal policy changes of selected companies so it is necessary to the investors to consider both internal and external factors while taking the investment decisions.

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A STUDY ON EQUITY ANALYSIS ON FMCG SECTOR LISTED IN BSE

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ABSTRACT

FMCG sector is the 4th largest sector in the economy. This analysis was done to check the trend within the shares of the highest FMCG companies. The parameter used for this studyis Equity Analysis. The equity analysis contains Ratio's which are want to calculate actual returns, beta and standard deviation of the businesses. In Technical Analysis we studied the opening price and shutting price of the shares, and therefore the trends of those companies, where it can help us to understand in which company we need to invest. The present study focuses on the relationship between top 5 FMCG companies and BSE. At last we have seen that HUL has the most upward trend in its share price and if any investor wants to invest in this company, he can get the long-term benefit. The outlook of Indian fast-moving consumer goods is positive due to growing strong financials of leading players, growing sales and increasing urbanization. Equity analysis is the most important measurement technique used to measure the moments in share markets which helps the investor to take decision either to buy or sell.

OBJECTIVES OF THE STUDY: -

1. To analyse the risk involved in selected FMCG companies share price listed in BSE.
2. To know the preferences of the consumers towards FMCG products.
3. To identify the share price fluctuations of fast-moving consumer goods in BSE.

HYPOTHESIS: -

- H0: There is no significant correlation between systematic risk and unsystematic risk.
- There is no significant correlation between average return and risk (systematic and un systematic).

INTRODUCTION: -

Fast Moving consumer goods(FMCG) may be a sector within which the products are often sold quickly and at relatively low cost and deals with production, distribution and marketing of their products. The FMCG alternatively called as CPG (consumer packed goods).They are normally consumable at regular interval.The FMCG term was given by MR. Neil H. Borden in the concept of marketing mix in the year 1965. FMCG has a shorter life span which leads to high consumer demand because the product deteriorates rapidly. The profit margin made by FMCG products is relatively small so they are generally sold in large quantities to the producers or suppliers. The cumulative profits on these products can be substantial.So, the FMCG sector is probably the most unique case of low margin and high-volume business.It is the 4th largest sector in Indian economy with household and personal care accounting for their 50% of FMCG sales in Indian economy. It is the key contribution sector to Indian economy. It provides 3.5 million people for employment which means 6% in overall factory employment rate of India.

REVIEW OF LITERATURE: -

Rural market is one of the best opportunities for the FMCG sector. In some sense we can say that rural market is future of FMCG.As per research of Purba Basu, (facultyof ICFAI business school), the lifestyle of rural consumers is changing. Rural Indian market and the marketing strategy have become the latest marketing buzzword for most of the FMCG majors. She added the strategies of different FMCG companies for capturing rural market like Titan's Sonata watches, Coco Cola's 200ml bottle, different strategies of HUL and Marico etc. She takes into consideration the study of National Council for Applied Economic Research (NCAER). According to the NCAER projections, the number of middle and high-income households in rural area. India is expected to grow from 80 million to 111 million by 2007. In urban India, the same is expected to grow from 46 million to 59 million. Thus, the absolute size of rural India is expected to be double that of urban India.

According to Pradeep Togantta, (former vice president of LG) The economic growth inIndia's agricultural sector in last year was over 7%, compared with 3% in the industrial sector.This implies a huge market potentiality for the marketer to meet up increasing demand. Factors such as village psyche, strong distribution network and market awareness are few prerequisites for making a dent in the rural markets. The model is of the stolid Anglo-Dutch conglomerate UnileverGroup, which has enjoyed a century-long presence in India through its subsidiary Hindustan Unilever Ltd. It was Hindustan Lever that several years ago popularized the idea of selling itsproducts in tiny packages. Its sachets of detergent and shampoo are in great demand in Indian villages. Britannia with its low-priced Tiger brand biscuits has become some of the success storyin rural marketing.

Rajesh K Aithal of IIM(L) had done his research on rural telecom in India.He explain that Rural markets are an important and growing market for most products and services including telecom. The characteristics of the market in terms of low and spread out population and limited purchasing power make it a difficult market to capture. The Bottom of the pyramid marketing strategies and the 4 A's model of Availability, Affordability, Acceptability and Awareness provide us with a means of developing appropriate strategies to tackle the marketing issues for marketing telecom services in rural areas. Successful cases like the Grameen Phone in

Bangladesh and Smart Communications Inc in Philippines also provide us with some guidelines to tackling the issue.

RESEARCH DESIGN & METHODOLOGY: -

This research has been carried purely on the premise of secondary data. The topic matter of this study is to pertain to the financial and technical analysis of the 5 FMCG companies over the years (2019-2015). To review the expansion and investment perspective and to conclude with conviction, this secondary data is been taken from money control.

PERIOD OF THE STUDY: -

Current study has taken previous 5 years of data(2015 – 2019) of desired companies to analyse the volatility of equity shares of fast-moving consumer goods.

METHODS OF SAMPLING: -

Five BSE FMCG's are selected from the study. The selection is based on the mostly traded in BSE and availability of data. Top five sampling technique is used in this study.

SCOPE OF THE STUDY: -

With a population of 1 billion people, India is a big market for FMCG companies. Around 70% of the total households in India reside in the rural areas. The total number of rural households is expected to rise from 135 m in 2002 to 153 m in 2010, which represents the largest potential market in the world.

TOOLS OF ANALYSIS: -

Mean: -

Mean is the average of the no. It is the most common and best general purpose for the midpoint of a set of values. Mean is calculated by below formula

$$\text{Mean } (\bar{X}) = \Sigma x / N$$

Where $\bar{X}$ = Mean

Σx= Symbol for summation scores.

N = No of scores.

Standard deviation (SD): -

It is a statistical tool that measures the dispersion of a dataset relative to its mean and is calculated as the square root of the variance.

$$\text{Standard deviation}(\sigma) = \text{sqrt}\,[\Sigma\,(Xi - \mu)2 / N]$$

Where σ = Standard deviation

X = each value in population

μ =mean

N = Number of values

Beta (β): -

A beta co-efficient is a measure of systematic risk, or volatility, of an individual stock or market in comparison to the unsystematic risk of the entire market. In statistical terms β represents the slope of the line through a regression of data points from an individual stock's return against those of the market or stock.

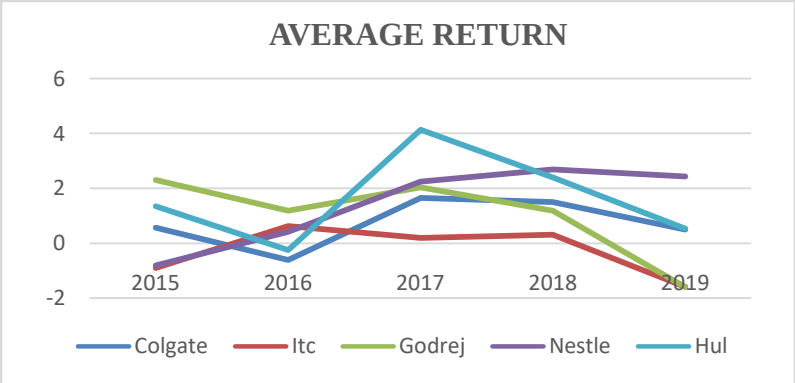
$$\beta_p = \frac{Cov(r_p, r_b)}{Var(r_b)}$$

COREELATION: -

Companies	Market returns	Colgate	Itc	Godrej	Nestle	Hul
Market return	1					
Colgate	0.515753309	1				
Itc	0.033466385	0.023475708	1			
Godrej	-0.23900342	0.219611236	0.5804871	1		
Nestle	0.733258376	0.576157394	0.0498587	-0.492509135	1	
Hul	0.606843709	0.917795468	0.2421861	0.459342599	0.42546665	1

AVERAGE RETURN: -

Year	Colgate	Itc	Godrej	Nestle	Hul
2015	0.57154	-0.9018	2.30437	-0.8026	1.3452214
2016	-0.6128	0.62502	1.18603	0.42156	-0.2534
2017	1.65367	0.19235	2.03072	2.24462	4.13589
2018	1.50672	0.30633	1.18217	2.68604	2.39198
2019	0.497154	-1.58946	-1.60464	2.434075	0.527067

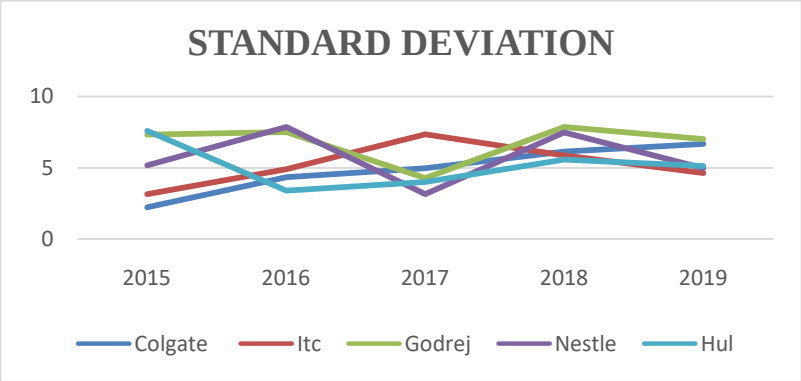


Interpretation: From the above graph we can know the lowest and highest average returns of Colgate are -0.6128 and 1.65367 in the years 2016 and 2017. For ITC they are -1.58946 and 0.62502 in the years 2019 and 2016. For Godrej -1.60464 and 2.30437 in the years 2019 and

2015. For Nestle they are -0.8026 and 2.68604 in the years 2015 and 2018. And for HUL they are -0.2534 and 4.13589 in the years 2016 and 2017.

STANDARD DEVIATION: -

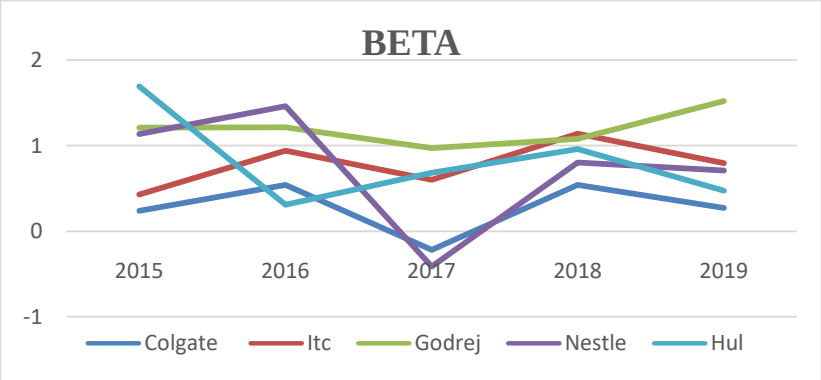
YEAR	Colgate	Itc	Godrej	Nestle	Hul
2015	2.22344	3.14812	7.33816	5.16652	7.60363
2016	4.33692	4.8942	7.50786	7.86508	3.38726
2017	4.96729	7.33981	4.26559	3.1487	4.00685
2018	6.13437	5.8509	7.87133	7.48058	5.57062
2019	6.679974	4.6236	7.013763	4.958304	5.133816



Interpretation: From the above graph we can know the lowest and highest Standard deviation values of Colgate are 2.22344 and 6.679974 in the years 2015 and 2019. For ITC they are 3.14812 and 7.33981 in the years 2015 and 2017. For Godrej 4.26559 and 7.50789 in the years 2017 and 2015. For Nestle they are 3.1487 and 7.86508 in the years 2017 and 2016. And for HUL they are 3.38726 and 7.60363 in the years 2016 and 2015.

BETA: -

YEAR	Colgate	Itc	Godrej	Nestle	Hul
2015	0.23615	0.42877	1.21107	1.13806	1.69505
2016	0.54025	0.94178	1.21636	1.46374	0.3083
2017	-0.2193	0.60229	0.97401	-0.4111	0.68249
2018	0.53916	1.1415	1.08227	0.80543	0.96208
2019	0.27243	0.79784	1.52198	0.71175	0.47451



Interpretation: From the above graph we can know the lowest and highest Beta values of Colgate are -0.2193 and 0.54025 in the years 2017 and 2016. For ITC they are 0.42877 and 1.1415 in the years 2015 and 2018. For Godrej 0.97401 and 1.52198 in the years 2017 and 2019. For Nestle they are -0.4111 and 1.46374 in the years 2017 and 2016. And for HUL they are 0.3083 and 1.69505 in the years 2016 and 2015.

CONCLUSION: -

Equity analysis is the one of the important techniques used to measure the moment of share market, it helps the investor weather to buy or sell. From this analysis that HUL ltd has the returns when compared to other fast-moving consumer goods which are taken for the study. FMCG products like food services, soft drinks, personal care and household products are now more demanded in the market and their availability is made through online also by that it is easy to purchase and beneficial in reduction of cost and time for the customer and consumer. Through online method there is more opportunities for workers in trading and delivering the products to the customers.

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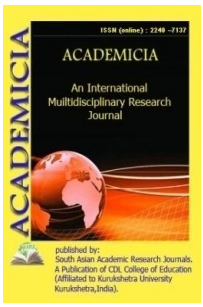

PAYROLL MANAGEMENT SYSTEM AT PRABHU GLOBAL MANAGEMENT

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ABSTRACT

Payroll management is one of the key operational aspects of a business. It involves the financial records of employee salaries, wages, bonuses, net pay, and deductions. Appraisal Module Employee Management System the name suggests, this module helps keeping a record of winnings of the important achievements of employees over a specified period, thus helping the management to decide increases in their salary. The main objective is to know the payroll software's used in the organization and the roll of HR in payroll. The secondary objectives of this study are , to understand the HR roll in Payroll, to review the effectiveness of the Payroll process of PGM, To find about the software's used in Payroll process and satisfactory level of employees using this software's ,To analysis whether these software's are user friendly, to suggest the Latest Software's in achieving organizational objective.

KEYWORDS: *Employees Recruitment, Selection, Recruitment Policy, Enterprise Weather, Ethical Values.*

I. INTRODUCTION

Payroll management system plays vital role in a business organization. In a company, payroll is the sum of all financial records of salaries for an employees, wages, bonuses and deductions. In accounting, payroll refers to the amount paid to employees for services they providing during a certain period of time. Payroll plays a major role in a company for several reasons. The primary mission of the payroll department is to ensure that all employees are paid accurately and timely with the correct with holdings and deductions, and to ensure the with holdings and deductions are remitted in a timely manner. This includes salary payments, tax with holdings, and deductions from a paycheck.

Employee Viewpoint:

From the employee viewpoint, the purpose of software used to calculate payroll process in four-fold:

(1) Tell me what you want me to do
(2) Tell me how well I have done it with software used in the organisation
(3) Help me improve my software skills
(4) Reward me for doing well.

Organizational Viewpoint

1) From the organization's viewpoint, one of the most important reasons for having a software is to establish and uphold the principle of accountability.

2) For decades it has been known to researchers that one of the chief causes of organizational failure is "non-alignment of responsibility and accountability." Non-alignment occurs where employees are given responsibilities and duties, but are not held accountable for the way in which those responsibilities and duties are performed. What typically happens is that several individuals or work units appear to have overlapping roles.

II. OBJECTIVES OF THE STUDY

PRIMARY:

To know the roll of HR in payroll and the payroll software's used in the organization.

SECONDARY:

- To understand the HR roll in Payroll.
- To review the effectiveness of the Payroll process of PGM.
- To find about the software's used in Payroll process and satisfactory level of employees using this software.
- To analysis whether these software's are user friendly.
- To suggest the Latest Software's in achieving organizational objective.

III. LIMITATIONS OF THIS STUDY

- The respondent attitude did not allow me to get their true feelings.
- Most of the respondent feared to give their name.
- Most of the employees were busy with their tight work and they don't want tobe disturbed.
- Employees are very limited and duration will be 45 days.

RESEARCH DESIGN:

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.

EXPLORATORY RESEARCH:

Exploratory research focuses on collecting data using an unstructured format or informal procedures to capture data and to interpret them. It is often used to classify the problems or opportunities and it is not intended to provide conclusive information from which a particular course of action can be determined.

SAMPLING DESIGN:

A sample design is a definite plan for obtaining a sample from a given population

POPULATION:

The employees of PGM will constitute the entire population. Here the entire population is considered for my study because the population is limited.

DATA COLLECTION:

Data is recorded measure of phenomena. While deciding about the method of data collection, the researcher should keep in the mind about two types of data. They are, Primary Data and Secondary Data

Primary Data:

Primary data represent the first-hand raw data that have been specifically collected for the current research problem. Primary data are raw, unprocessed and yet to receive any type of meaningful interpretation. Sources of primary data tend to be the output of conducting some type of exploratory, descriptive or casual research.

DATA COLLECTION:

Directness of the observation

Based on the directness of observation, it can be grouped as direct or indirect. Direct observation happens when the observer is physically present and monitors while the event is taking place. This is highly flexible as the observer can decide what to observe, how much time to spent on observation of an aspect, when to shift focus etc. The observer may feel bored or frustrated by constantly being on the watch and may tend to lose focus. This might reduce the accuracy and completeness of the observation.

Secondary Data

The secondary data can be obtained from the libraries, website, published as well as unpublished documents etc.

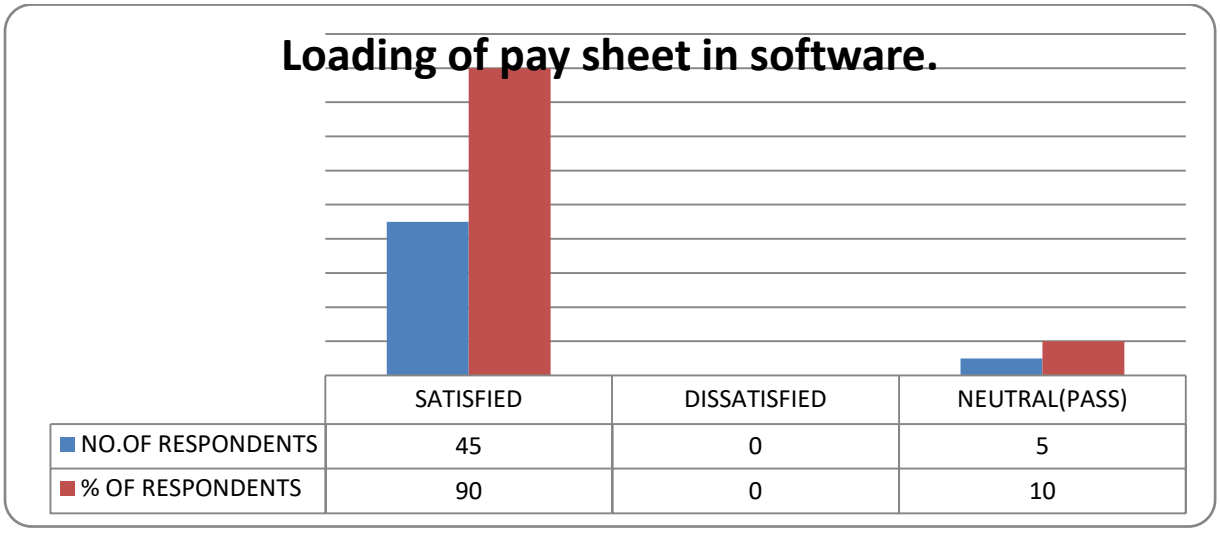
IV. ANALYSIS AND INTERPRETATIONS

Simple Average Analysis:

TABLE NO.4.1 REASONS FOR SATISFACTION/DISSATISFACTION LEVEL TOWARDS THE MEASUREMENT OF COMPLAINTS REGARDING LOADING OF PAY SHEET IN SOFTWARE.

LEVEL OPTIONS	NO.OF RESPONDENTS	% OF RESPONDENTS
SATISFIED	*45*	*90*
DISSATISFIED	*0*	*0*
NEUTRAL	5	10

CHART NO.4.1.1
SOURCE: PRIMARY DATA



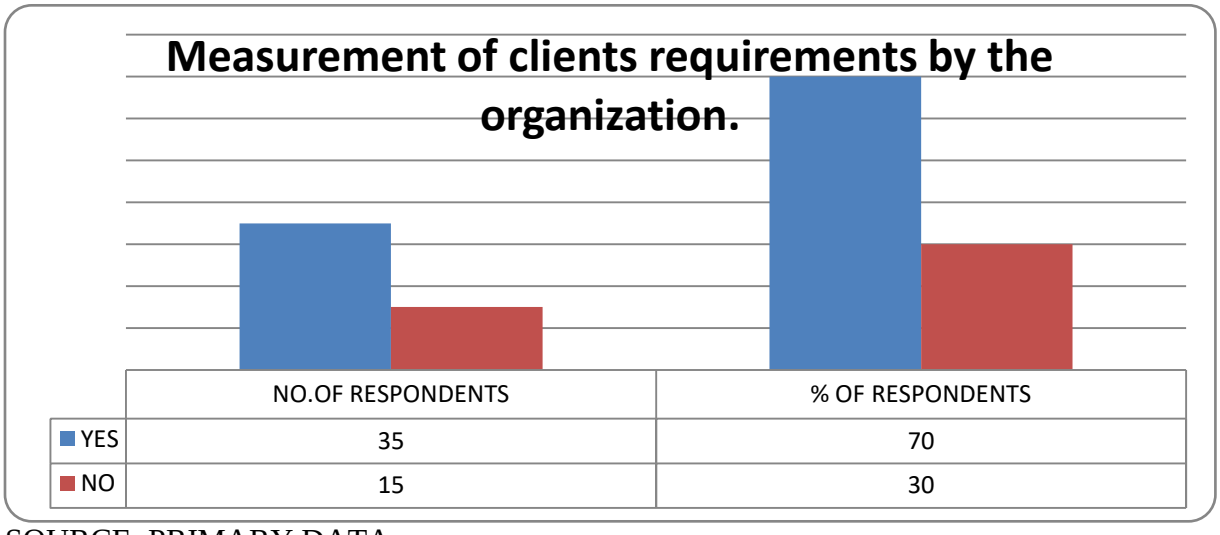
	SATISFIED	DISSATISFIED	NEUTRAL(PASS)
NO.OF RESPONDENTS	45	0	5
% OF RESPONDENTS	90	0	10

SOURCE: PRIMARY DATA

90% of the Employees are satisfied by the software and we need to more focus on 10% not yet responded.

Table No.4.2 Reasons for satisfaction/dissatisfaction level towards the Measurement of client's requirements by the organization.

CHART NO:4.2.1
SOURCE:PRIMARY DATA



	NO.OF RESPONDENTS	% OF RESPONDENTS
YES	35	70
NO	15	30

SOURCE: PRIMARY DATA

70% of the Employees are satisfied to meet the clients requirements and we need to more focus on 30% of employee.

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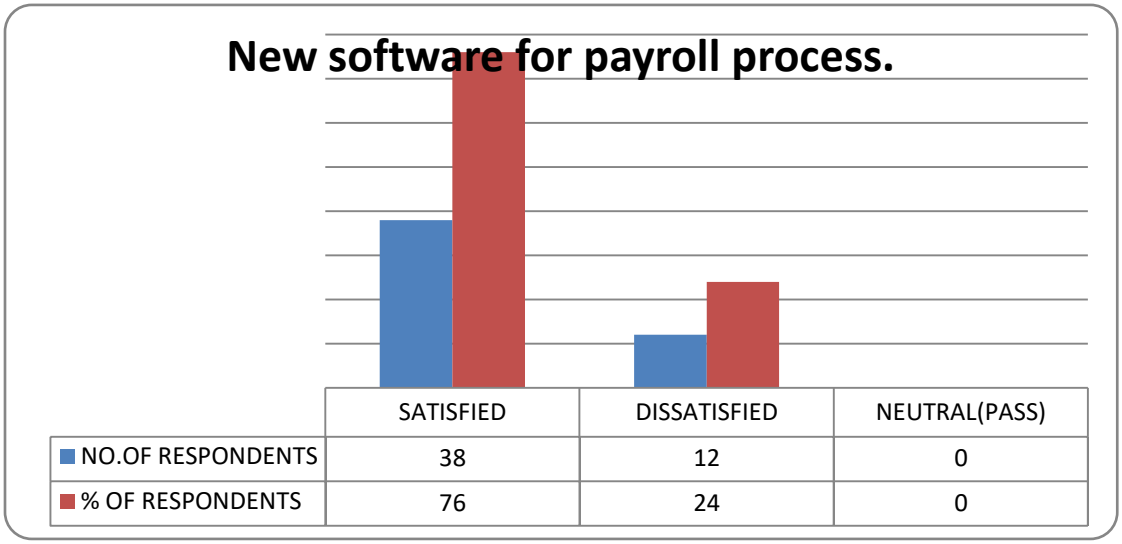
TABLE NO.4.3 REASONS FOR SATISFACTION/DISSATISFACTION LEVEL TOWARDS THE USAGE OF NEW SOFTWARE FOR PAYROLL PROCESS.

LEVEL OPTIONS	NO.OF RESPONDENTS	% OF RESPONDENTS
SATISFIED	38	76
DISSATISFIED	12	24
NEUTRAL	0	0

CHART NO.4.3.1



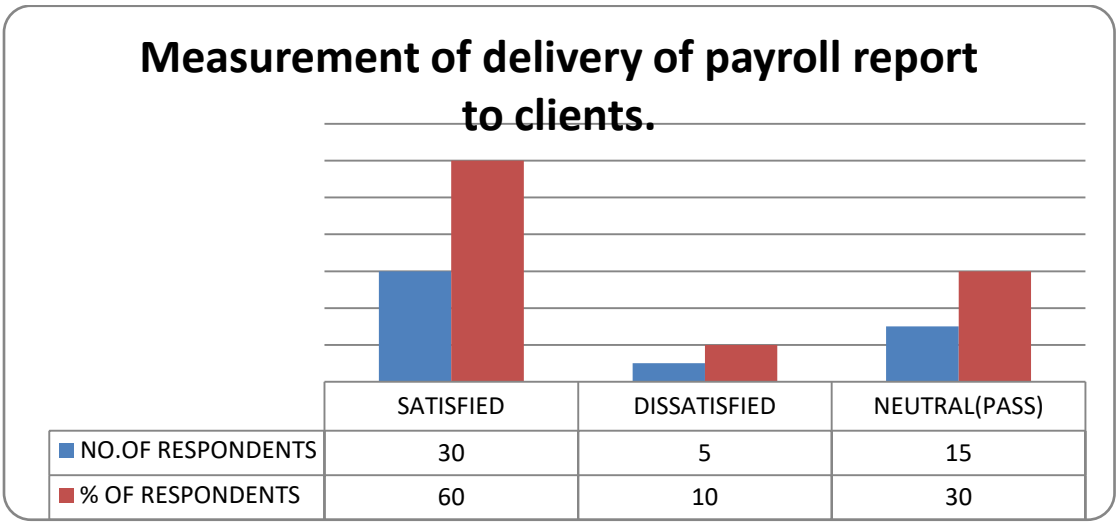
SOURCE: PRIMARY DATA

76% of the Employees are satisfied with the calculation and we need to more focus on 24% of employees dissatisfied

TABLE NO.4.4 REASONS FOR SATISFACTION/DISSATISFACTION LEVEL TOWARDS THE MEASUREMENT OF DELIVERY OF PAYROLL REPORT TO CLIENTS.

LEVEL OPTIONS	NO.OF RESPONDENTS	% OF RESPONDENTS
SATISFIED	***30***	***60***
DISSATISFIED	***5***	***10***
NEUTRAL	***15***	***30***

CHART NO.4.4.1

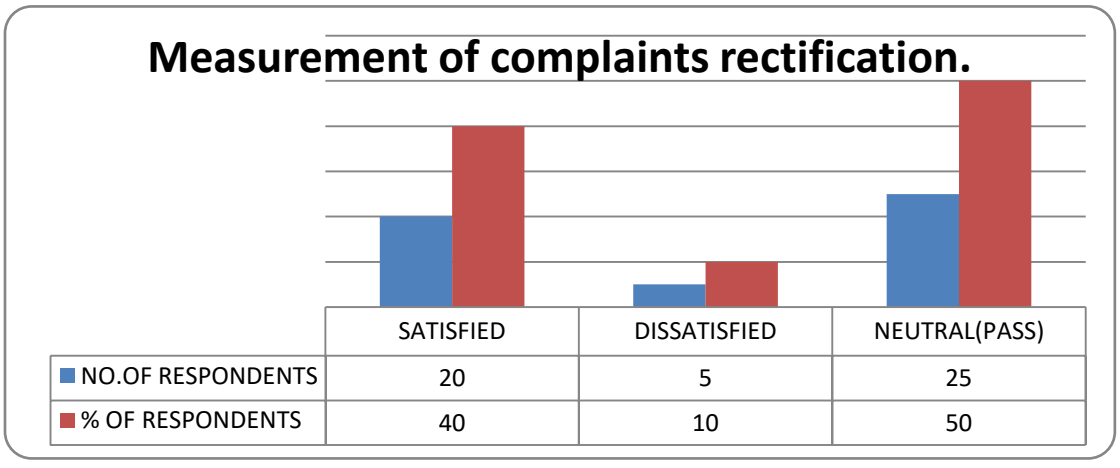


SOURCE: PRIMARY DATA

60% of the Employees are satisfied by the delivery and we need to more focus on the 10% dissatisfied and 30% not yet responded. Table No.4.5 Reasons for satisfaction/dissatisfaction level towards the Measurement of complaints rectification.

LEVEL OPTIONS	NO.OF RESPONDENTS	% OF RESPONDENTS
SATISFIED	***20***	***40***
DISSATISFIED	***5***	***10***
NEUTRAL	***25***	***50***

CHART NO.4.5.1



SOURCE: PRIMARY DATA

40% of the Employees are satisfied by the software version and we need to more focus on the 10% dissatisfied and 50% not yet responded.

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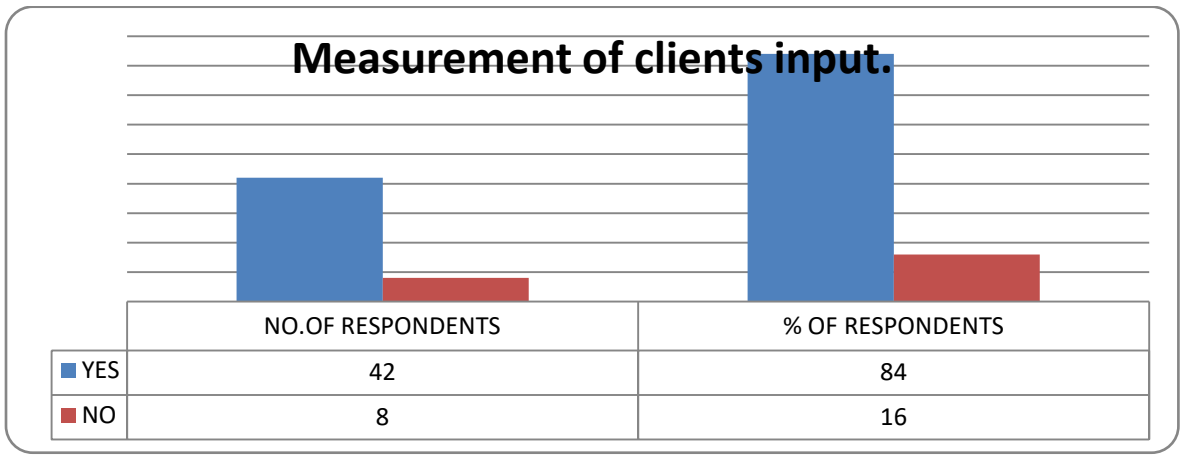
TABLE NO.4.6 REASONS FOR SATISFACTION/DISSATISFACTION LEVEL TOWARDS THE MEASUREMENT OF CLIENTS INPUT.

LEVEL OPTIONS	NO.OF RESPONDENTS	% OF RESPONDENTS
YES	***42***	***84***
NO	***8***	***16***

CHART NO.4.6.1



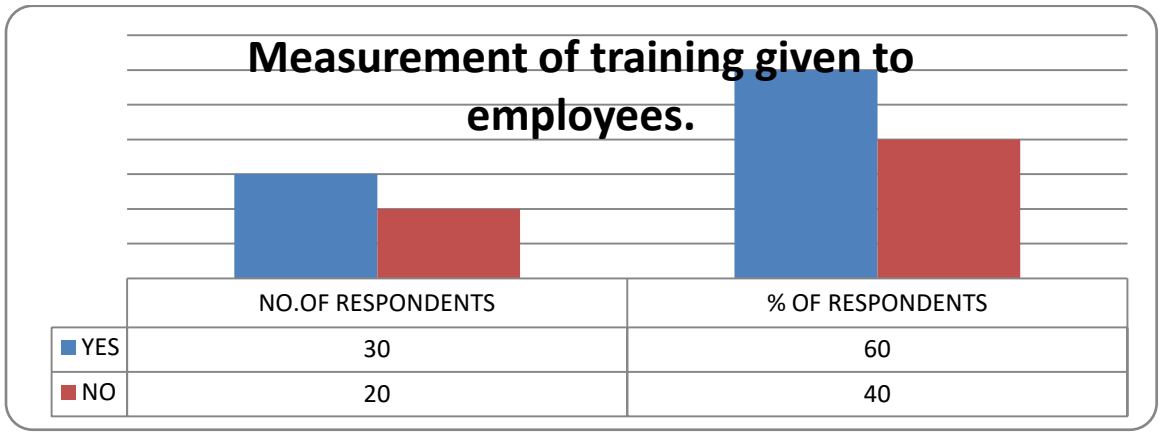
SOURCE: PRIMARY DATA

84% of the Employees are satisfied by the clients input records and we need to more focus on the 16 % dissatisfied.

TABLE NO.4.7 REASONS FOR SATISFACTION/DISSATISFACTION LEVEL TOWARDS THE MEASUREMENT OF TRAINING GIVEN TO EMPLOYEES.

LEVEL OPTIONS	NO.OF RESPONDENTS	% OF RESPONDENTS
YES	***30***	***60***
NO	***20***	***40***

CHART NO.4.7.1



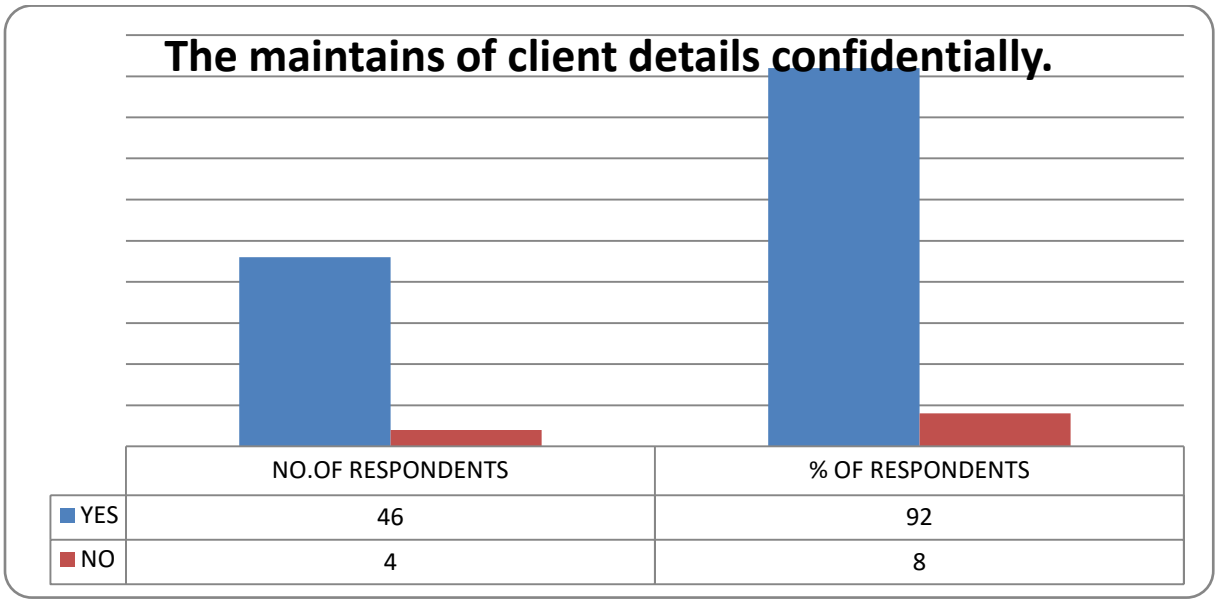
SOURCE: PRIMARY DATA

60% of the Employees are satisfied by the software training and we need to more focus on the 40% dissatisfied with training.

TABLE NO.4.8 THE MAINTAINS OF CLIENT DETAILS CONFIDENTIALLY.

LEVEL OPTIONS	NO.OF RESPONDENTS	% OF RESPONDENTS
YES	***46***	***92***
NO	***4***	***8***

CHART NO: 4.8.1



SOURCE: PRIMARY DATA

92% of the Employees are satisfied by the maintains of client inputs and we need to more focus on the 8 % dissatisfied

TABLE NO.4.9 THE WAY IN WHICH THE EMPLOYEE'S INTERFACE WITH HR DEPARTMENT FOR PAYROLL PROCESS OF CLIENTS.

LEVEL OPTIONS	NO.OF RESPONDENTS	% OF RESPONDENTS
YES	***32***	***64***
NO	***18***	***36***

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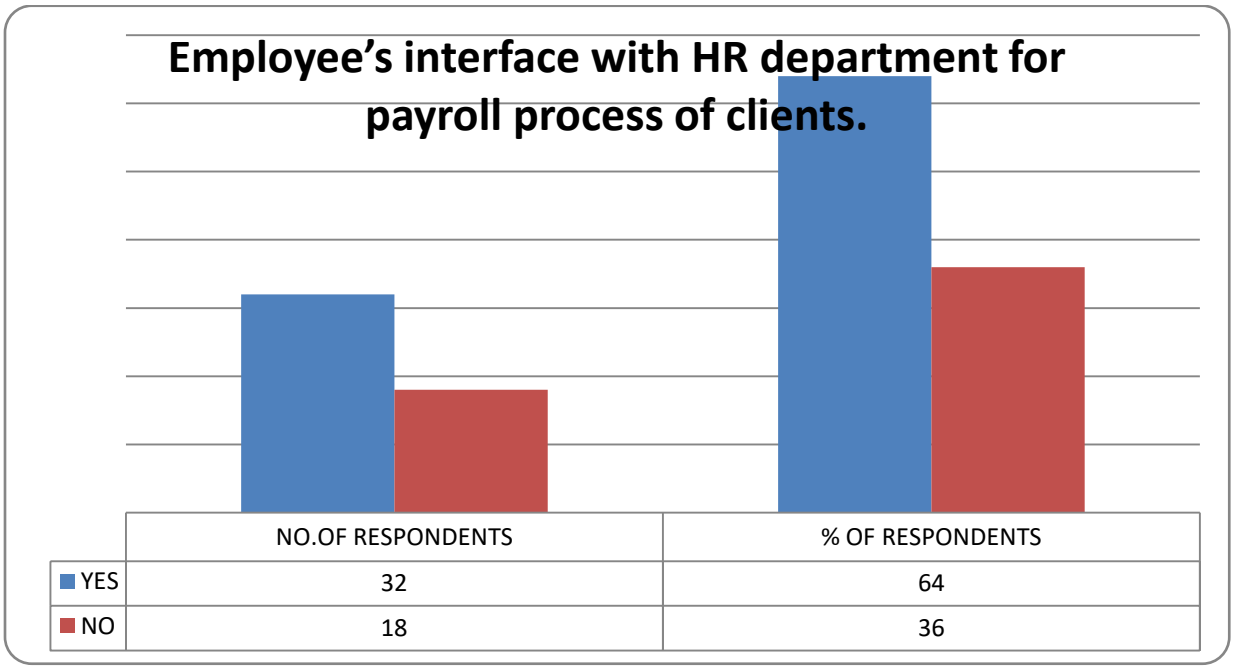
CHART NO.4.9.1



	NO.OF RESPONDENTS	% OF RESPONDENTS
YES	32	64
NO	18	36

SOURCE: PRIMARY DATA

64% of the Employees are satisfied by the clients HR and we need to more focus on the 36% dissatisfied.

V. FINDINGS

The effectiveness of the existing software system in PRABHU GLOBAL MANGEMENT is measured by using the following variables,

- Software (sap)
- Import of data in software
- Software calculation
- Accept & implement change
- Flexibility
- Company policies
- Education &Computer Skills
- Client Relation.

- 90 % of the Employees are satisfied by the software and we need to more focus on 10% not yet responded.
- 70 % of the Employees are satisfied to meet the client's requirements and we need to more focus on 30% of employee
- 76 % of the Employees are satisfied with the calculation and we need to more focus on 24% of employees dissatisfied.

- 60 % of the Employees are satisfied by the delivery and we need to more focus on the 10% dissatisfied and 30% not yet responded.
- 40 % of the Employees are satisfied by the software version and we need to more focus on the 10% dissatisfied and 50% not yet responded.
- 84 % of the Employees are satisfied by the clients input records and we need to more focus on the 16 % dissatisfied.
- 60 % of the Employees are satisfied by the software training and we need to more focus on the 40% dissatisfied with training.
- 90 % of the Employees are satisfied by the re-engineering and we need to more focus on the 10 % dissatisfied.
- 92% of the Employees are satisfied by the maintains of client inputs and we need to more focus on the 8 % dissatisfied.
- 64% of the Employees are satisfied by the clients HR and we need to more focus on the 36% dissatisfied

VI. SUGGESTIONS

1.In order to improve the Software skills of employees the organization should create more awareness and to provide feedback regularly to the employees about software system.

2.Proper training should be given to the employees, in order to increase their knowledge about the usefulness of the software system.

3.Top management shall continually review the software according to the client requirements, which shall be seen as positive support to the system by the employees as well as clients.

4. After software testing, if there is any changes, the employees should be informed by the software technology team.

5. The delivery of clients output should be on time.

6. Latest software should be implemented in future to fight with the competitors and retain their clients.

VII. CONCLUSION

- The study had confirmed that the company is having a good Software System.
- From this study, it is found that majority of the workers were satisfied with Software used.
- To make the software system more efficient and excellent, the company should give importance to the clients and create awareness among employees and it shall consider some of the ways and means suggested by the employees like addition of parameters such as short cut for calculation PF,ESI,TAX,Etc,. Dependability and conducting regular training program on the software usage.
- I hope that the suggestion given in the report may be implemented in future course for the benefit of the employees and the company.

- The company should conduct the similar type of research at regular interval to know the changing software's and to know about the latest technology like ban software etc.

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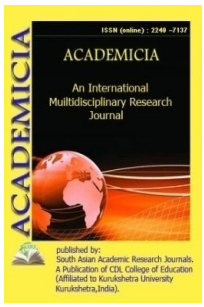

PORTFOLIO MANAGEMET WITH REFERENCE TO BANKING SECTOR

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ABSTRACT

A portfolio refers to the collection of investments in which an investor can invest to maximize his returns. Whereas, a portfolio management is described as an art of selecting the best portfolio which gives the maximum return with less risk. Now a day, most of the peoples are showing interest to make an investment on various portfolios such as Shares, Debenture, Bonds. But, they are unable to manage them effectively. so this article is prepared with an intention of providing suggestions to manage the portfolio in an effective way by suing some statistical tools like returns, standard deviation, portfolio returns and portfolio weights. So the study concentrates on empirical approach towards measuring portfolio performance of the companies operating under one of the most dynamic sector i.e banking sector in Indian economy.

KEYWORDS: *Portfolio Management, Analysis Of Portfolio Risks And Portfolio Return.*

INTRODUCTION:-

Portfolio refers to combination of securities like shares, debentures, commodities etc. Portfolio Management refers to diversification of investment with a view to minimizing chances of risk and maximizing the returns. It is platform for the investors to diversify their portfolio among various investment sources. Portfolio manager is the individual who control, monitor and provide suggestions to the individual investor.

NEED OF THE STUDY:-

1. This study helps to learn the best investment plan which is available to the individuals as per their income, budget, age and ability to undertake risks.
2. It helps to analyze the chances of profits from investments.
3. It helps in comparing the portfolio performance of the selected companies.
4. To helps to learn the relationship between risk and return from the securities.

OBJECTIVES OF THE STUDY:-

1. To study the investment patterns of the selected companies.
2. To determine the risk and return of the selected banking portfolio.
3. To analyze the portfolio which offers the maximum return and minimum risk
4. To compare the risk and returns involved in each firm so that best portfolio is selected.

RESEARCH METHODOLOGY: -

Research is a process of careful consideration of study regarding a particular concern or a problem using scientific methods. "It is an art or technique of work undertaken to increase the knowledge in respective field." Research methodology is the set of procedures or techniques used to identify, select, process, and analyze information about a topic.

DATA COLLECTION:-

1. **Primary Source:-**

No primary data is used in my project of portfolio management in banking sector.

2. **Secondary data: -**

The secondary data is collected from websites, journals, past year annual reports, etc.

SAMPLE SIZE:-

Total 5 companies are selected from both public and private sectors banks. (SBI, Punjab National Bank, Andhra Bank, HDFC, ICICI).

TOOLS AND TECHNIQUES:-

The statistical tools which are used for this study are Variance, Covariance, Correlation, Standard Deviation, t-test.

Statistcial Tools:-

Standard Deviation (SD) $=\sqrt{\text{variance}}$

Variance (Var) $=\frac{1}{n}(R-\bar{R})^2$

Co-variance (COV ab) $=\frac{1}{n}(RA-\overline{RA})(RB-\overline{RB})$

Correlation Coefficient (co-coef) $=\frac{COV\ ab}{\sigma a*\sigma b}$

weights of portfolio:

$Wa=\frac{\sigma b[\sigma b-(nab*\sigma a)]}{\sigma a^2+\sigma b^2-2nab*\sigma a*\sigma b}$

Wb=1-Wa

Portfolio risk: $\sigma_{p} = \sqrt{(\sigma a * Wa)2 + (\sigma b * Wb)2 + 2 * \sigma a * \sigma b * Wa * Wb * nab}$

Portfolio return: Rp=(RA*WA) +(RB*WB)

HYPOTHESIS OF THE STUDY:-

H0: There is no significant relationship between the portfolio risk and portfolio return.

H1: There is a significant relationship between the portfolio risk and portfolio return.

REVIEW OF LITERATURE:-

S.M.Tariq Zafar, D.S.Chaubey, and Shruti Nagar (2013) in their study stated that every investor has different thinking to invest in stock which may give them maximum return with minimum or no risk. So, they want a portfolio which provides maximum return with less risk. The main purpose of this paper is to identify the relationship between risks, return, and diversification effect on portfolio risk with composite of market and non-market risk.

Ravi kiran(2012) in his study highlighted the volatility which are influencing the various portfolio's and stock market movements. His article revealed that mutual funds, and stocks are most preferred financial avenue but needs some innovation and added quality dimensions in existing services.

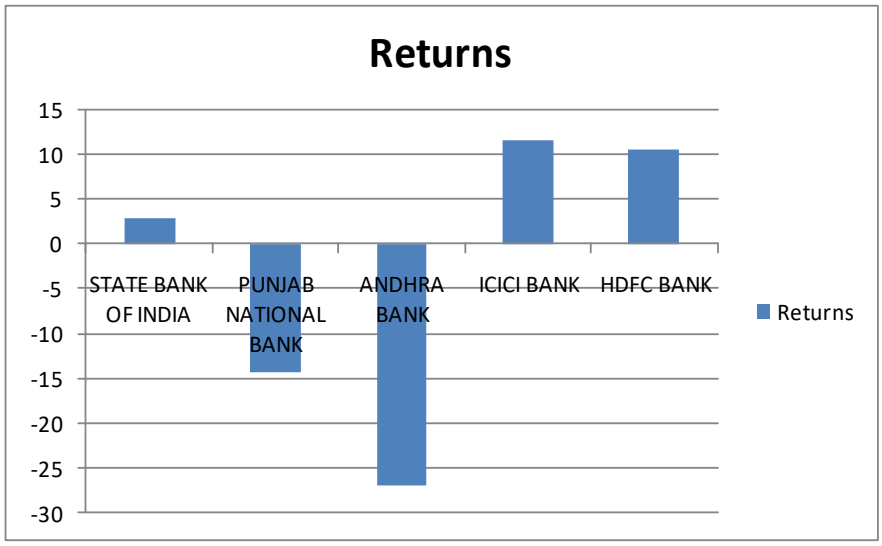
Singh(2012) conducted an empirical study of Indian investors and noticed that the maximum of his respondents don't have much awareness about the varied function of mutual funds, bonds, and debentures etc., . And they are bit confused regarding investment in various investment alternatives. His study found that some demographic factors like gender, income and level of education have their significant impact over the attitude towards various portfolio alternatives. On the contrary age and occupation haven't been found influencing the investor's attitude. He in his study noticed that portfolio return and liquidity are seemed to be most profitable benefits of investment in mutual funds,bonds etc.

Devasena S (2006) made an attempt to identify the "Risk perception and portfolio management of equity investors". She in her study says that the investors are not aware of portfolio which would minimize risk and maximize the return. And also it is clear that the investors have low level of understanding about risk and the importance of portfolio management as they are not aware of the portfolio management proper steps to be taken so as to enhance the notice level within the minds of the investors.

DATA ANALYSIS:-

Calculated values of average Returns: -

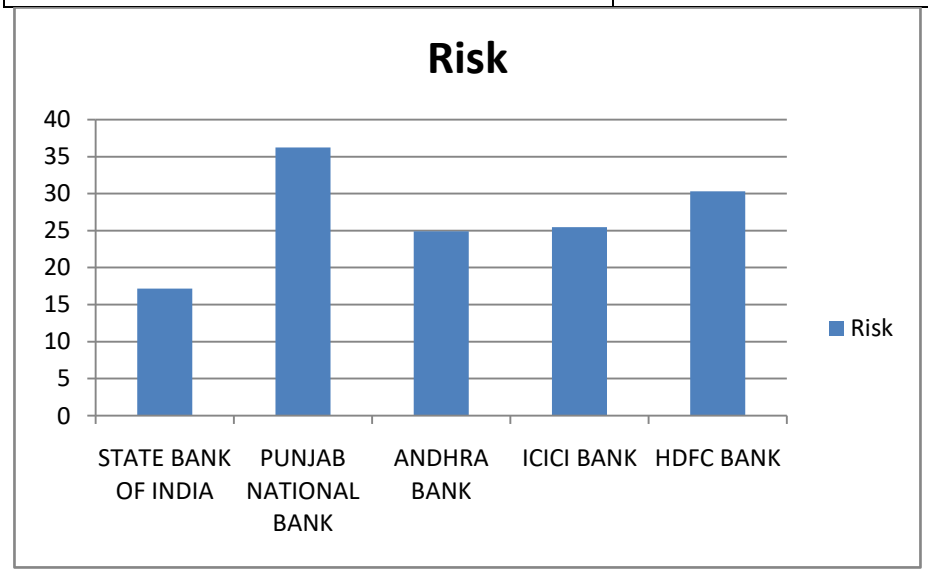
BANK	**Returns**
STATE BANK OF INDIA	2.89
PUNJAB NATIONAL BANK	-14.23
ANDHRA BANK	-26.86
ICICI BANK	11.47
HDFC BANK	10.50



Interpretation: From the above graph, ICICI BANK is having higher returns i.e., (11.47) than all the other selected companies and the ANDHRA BANK is having lesser returns i.e., (-26.86) than all the selected companies.

Calculated values of Standard Deviation: -

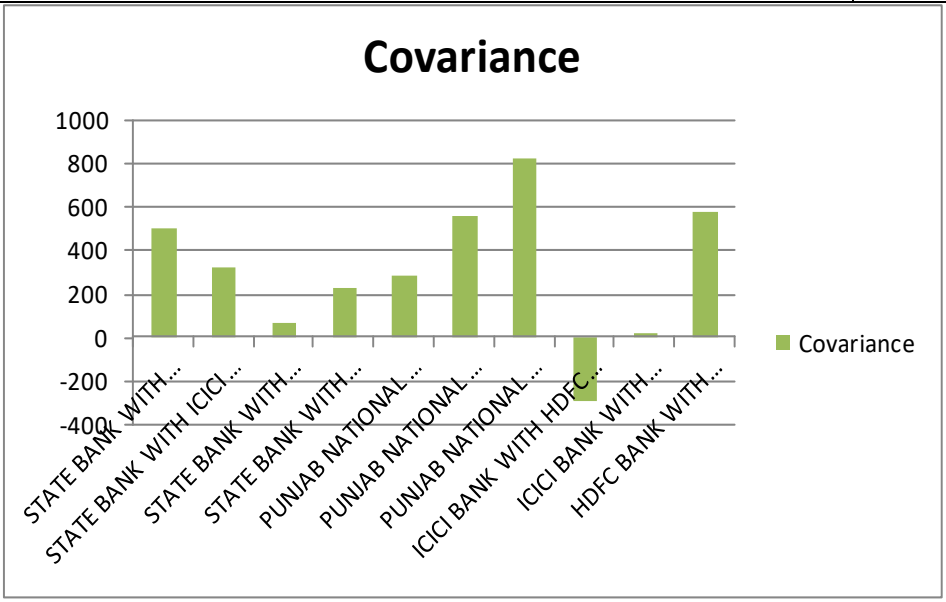
BANK	Risk
STATE BANK OF INDIA	17.15
PUNJAB NATIONAL BANK	36.25
ANDHRA BANK	24.91
ICICI BANK	25.46
HDFC BANK	30.32



Interpretation: From the above graph, we can see that the PUNJAB NATIONAL BANK is having the high risk i.e., (36.25) whereas STATE BANK OF INDIA is having the low risk i.e., (17.15) when compared with the other selected companies.

Calculated values of covariance: -

BANKS	Covariance
STATE BANK WITH PUNJAB NATIONAL BANK	499.24
STATE BANK WITH ICICI BANK	317.6
STATE BANK WITH HDFC BANK	63.03
STATE BANK WITH ANDHRA BANK	222.79
PUNJAB NATIONAL BANK WITH ICICI BANK	282.76
PUNJAB NATIONAL BANKWITH HDFC BANK	554.81
PUNJAB NATIONAL BANK WITH ANDHRA BANK	820.09
ICICI BANK WITH HDFC BANK	-293.28
ICICI BANK WITH ANDHRA BANK	14.9
HDFC BANK WITH ANDHRA BANK	571.158

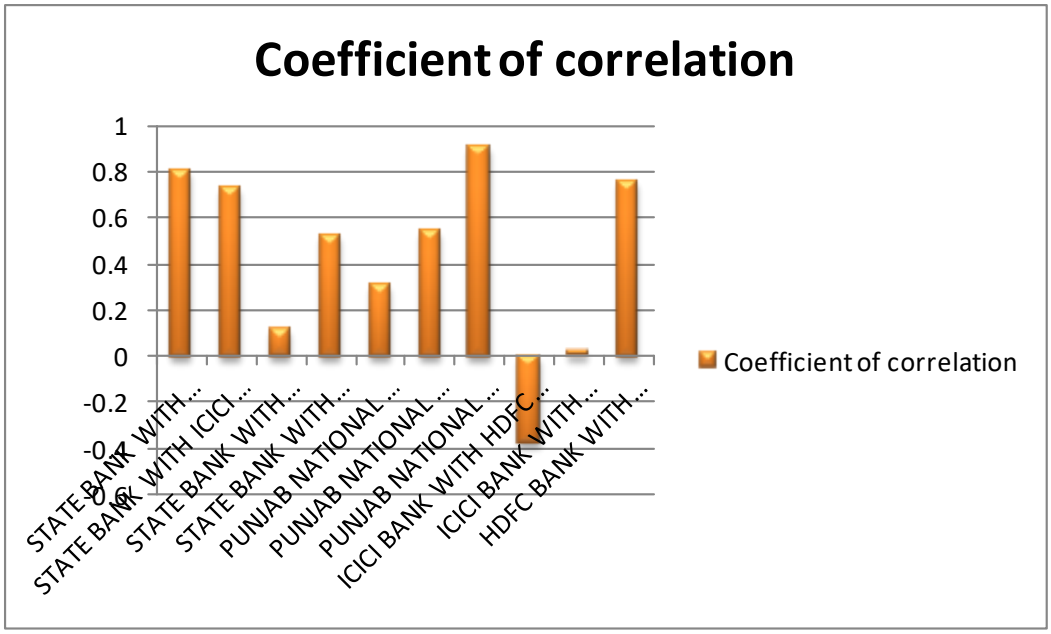


Interpretation: From the above graphs it is shown that covariance is greater for PUNJAB NATIONAL BANK with ANDHRA BANK i.e., (820.09) and lesser for. ICICI BANK with HDFC BANK i.e., (-293.28) when compare to other selected companies.

Calculated values of coefficient of correlation: -

BANKSZ	Coefficient of Correlation
STATE BANK WITH PUNJAB NATIONAL BANK	0.8
STATE BANK WITH ICICI BANK	0.73
STATE BANK WITH HDFC BANK	0.12
STATE BANK WITH ANDHRA BANK	0.52
PUNJAB NATIONAL BANK WITH ICICI BANK	0.31
PUNJAB NATIONAL BANK WITH HDFC BANK	0.54
PUNJAB NATIONAL BANK WITH ANDHRA BANK	0.91

ICICI BANK WITH HDFC BANK	-0.38
ICICI BANK WITH ANDHRA BANK	0.02
HDFC BANK WITH ANDHRA BANK	0.76



Interpretation:- From the above graphs it is shown that correlation of coefficient is greater for PUNJAB NATIONAL BANK with ANDHRA BANK i.e., (0.91) and lesser for ICICI BANK WITH HDFC BANK i.e., (-0.38) whencompare to other selected companies.

Calculated values of portfolio risk and portfolio return:

BANKS	Portfolio Risk	Portfolio Return
STATE BANK WITH PUNJAB NATIONAL BANK	15.06	8.54
STATE BANK WITH ICICI BANK	17.09	2.2
STATE BANK WITH HDFC BANK	15.65	4.49
STATE BANK WITH ANDHRA BANK	16.83	-1.57
PUNJAB NATIONAL BANK WITH ICICI BANK	23.53	4.79
PUNJAB NATIONAL BANK WITH HDFC BANK	28.6	2.83
PUNJAB NATIONAL BANK WITH ANDHRA BANK	21.94	-35.58
ICICI BANK WITH HDFC BANK	15.39	11.04
ICICI BANK WITH ANDHRA BANK	17.98	-8.08
HDFC BANK WITH ANDHRA BANK	24.8	-22.38

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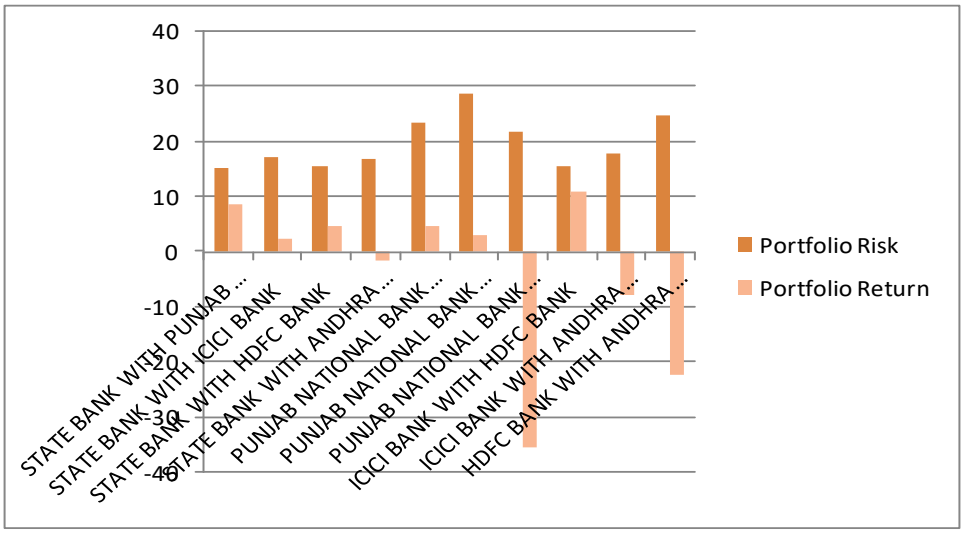

Interpretation:- From the above graph it is shown that the portfolio risk of PUNJAB NATIONAL BANK with HDFC BANK has high portfolio risk i.e., (28.6) and their portfolio return is 2.83. STATE BANK OF INDIA with PUNJAB NATIONAL BANK has the lowest portfolio risk i.e., (15.06) and their portfolio return is 8.54 when compared to other selected companies.

HYPOTHESIS TEST: -

t-Test: Paired Two Sample for Means		
	Portfolio Risk	**Portfolio Return**
Mean	19.687	-3.372
Variance	22.15782333	219.0682844
Observations	10	10
Pearson Correlation	-0.38829029	
Hypothesized Mean Difference	0	
Df	9	
t Stat	4.243123279	
P(T<=t) one-tail	0.001082149	
t Critical one-tail	1.833112923	
P(T<=t) two-tail	0.002164299	
t Critical two-tail	2.262157158	

Since the calculated value is more than the table value we accept the h_1. Which means there is a direct relationship between the portfolio risk and portfolio return.

FINDINGS: -

- The average returns of SBI portfolio is 2.89 and this is very low when compared to other banks. This is due to the recent announcement of the government of India regarding the recapitalization of Public sector banks.
- The scam in the Punjab National Bank in the year 2018 had showed its impact on the shares of this bank which resulted in the down fall of its shares.
- Andhra bank merging with the union bank resulted in the downfall of its shares.

- Risk factors is more with the HDFC shares.
- SBI is highly correlated with the Punjab National Bank.

SUGGESTIONS: -

- The investors who are willing to earn maximum returns with minimum risk in necessary to have a clear understanding of their investment objectives, tax status and risk tolerances.
- Even though the amount of returns from SBI is low it the best investment source for the invidual to invest as it is the India's largest bank.
- The investor who are seeking for high returns with less risk can invest in the ICICI portfolios.
- The investment should be carefully done based up on the previous performance of the portfolios and present prevailing market conditions.
- Investors who are prefering for less risk and and low retuns can invest in Andhra Bank.

CONCLUSION:-

This study concentrated on the risk and return relationship of various company portfolios. From this study we can say that portfolio functioning is depended on the market situations so it is better for the investor to take the guidance and help of the portfolio manager in order to reduce the risk on investment sources. It can be concluded that the investors should be updated with latest information on the market trends and on the respective company profile in which they are invested.

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ACADEMICIA
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A STUDY ON QUALITY OF WORK LIFE AT AMAZON, HYDERBAD

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ABSTRACT

In present scenario the importance of quality of work life has being increasing day to day. It classifies about human values and professional environment that are reduced to some extent. As professionals are facing problems to balance their professional and personal life. This modification has made an organization to implement new policies; which finally leads to enhance job satisfaction and performance of employees. The performance level has been referred to quality of work life. This method improves the employees active participation and effective work process. The present study focuses on performance of employees. The measures are taken place to observe the QWL in this study are economic factors training, social factors and to develop of the employees performance. The main aim of this study is to consider about the different factors determines the QUALITY OF WORK LIFE at Amazon. The sample size had taken for this modern study is 100 samples of the procedure followed for taking sample is questionnaire method in AMAZON in Hyderabad. Correlation is used for this technique in this scenario. The techniques used in this test are quality of work life is an single variable and performance of the employee is conditional variable.

KEYWORDS: *Job Security, Job Performance, Employee's Satisfaction.*

I. INTRODUCTION

Quality of Work Life mentions about the level of satisfaction performance and commitment those who observed with respect to their lives at work. The Quality of labor Life is that measures

the degree of people squares and ready to satisfy their basic personal wants by the firm. Companies look after in enhancing employees Quality of Work Life of employees the feelings of security, equity, pride, internal democracy, ownership, autonomy, responsibility and flexibility. They treat workers with a polite manner, good communication at all the levels and allow them to participate in decision making process and complete their works efficiently. It has also been related with organizational changes which are aimed at increasing the levels of job enrichment. Quality of life concept studies about job satisfaction, organizational climate and acquiring of new concepts. Quality of labor life may be overviewed because the environment at the work place provided to the individuals on the task given. QUALITY OF WORK LIFE program is another proportion in which organization has the control to provide working conditions where employees can perform excellent working as well organization economic wealth.

II. OBJECTIVES

1. To study and understand the quality of work life at AMAZON..
2. To find out the infrastructure facilities of the organization.
3. To find out the satisfaction levels in each and every one with regard to remunerations they are getting.

HYPOTHISIS

H0- Quality of work life doesn't impact on performance of the employee

H1- Quality of work life has impact on performance of the employee

III. REVIEW OF LITERATURE

Gary (1989) tested the specific hypothesis regarding apprenticeship socialization strategy, using sample of new insurance company employees. He found that perceived quality of intern-assignment managers work relationship to have important direct and moderating effect on intern work outcomes. Quality of work relationship was significantly positively related to intern meet expectations, role, clarity, organizational commitment, and performance.

Pederson (1965). Ego-Strength is a person's ability to deal with reality. He observed that subject with high Ego-Strength will have greater unconscious concern for achievement than subject with low Ego- Strength.

Singh (2002) conducted a study on Ego-Strength among tribal and non-tribal males and female. The finding of the data reveals that non-tribal males and females have higher Ego-Strength as compared to tribal and females respectively.

IV. RESEARCH METHODOLOGY

RESEARCH METHODOLOGY is the scientific way to resolve the research problem. This includes discovering all possible means of solving research problem; study the different methods one by one and arriving at the best conceivable method considering the resources at the clearance of the researcher.

DATA COLLECTION METHOD

PRIMARY DATA: The primary data is gathered through questionnaire in AMAZON distributed among the employees to gather information

SECONDARY DATA: The secondary data has been composed from books, websites, digital libraries, journals, and online database

RESEARCH TOOLS

A prepared questionnaire has been set to get the collected information from the respondents. The questionnaire covers of a change of questions obtainable to the respondents for their response. The types of questions are used in this survey are:

1. Multiple choice questions

2. Closed ended questions

SAMPLE SIZE: 100

RATIO: 2:1

STATISTICAL METHODS USED

1. Bars &charts

2. Percentage analysis

STATSTICAL TOOLS USED:

VARIABLES:

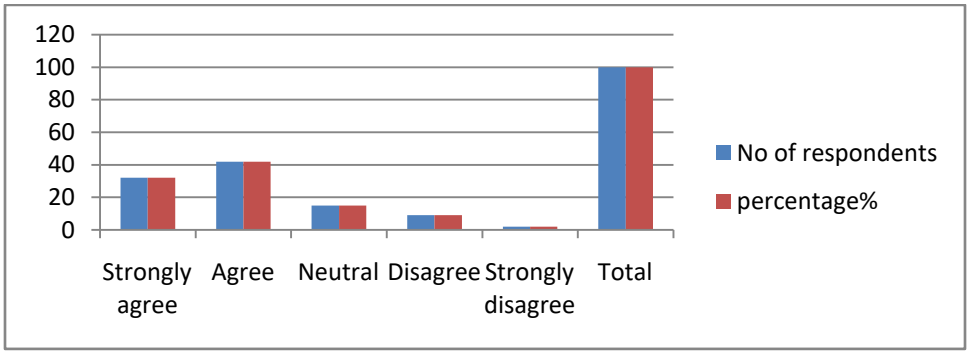
Independent variable: Quality of work life is an independent variable

Dependent variable: Performance of the employee is dependent variable

V. DATA ANALYSIS AND INTERPRETATION

TABLE1: HOW CAN RATE YOURSELF THAT YOU ARE BEST SUITED FOR THE JOB?

Particular	No of respondents	percentage%
Strongly agree	32	32
Agree	42	42
Neutral	15	15
Disagree	9	9
Strongly disagree	2	2
Total	100	100



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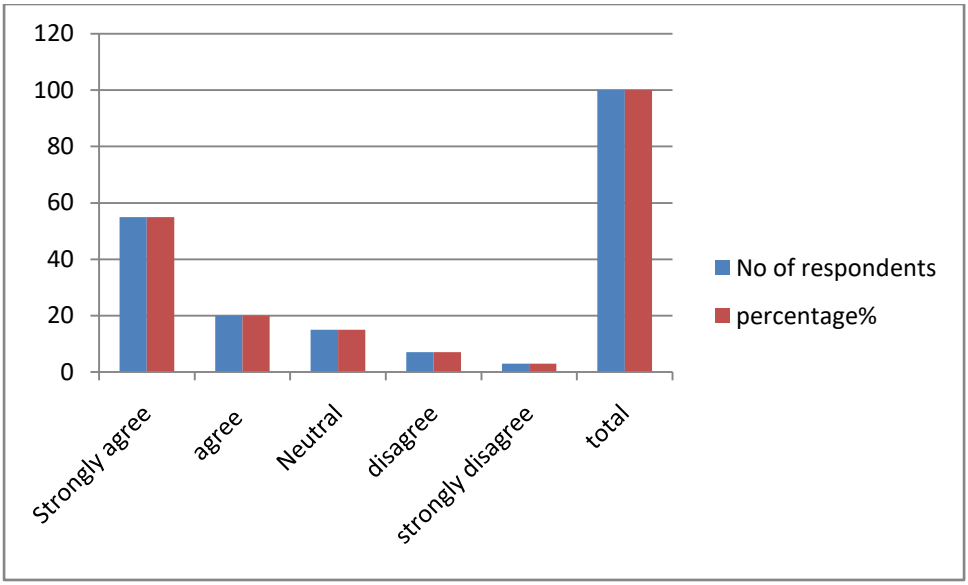
Interpretation: The employees agree (32%) and strongly agree for developing their skills and abilities in their job, and some of the employees are disagree (18%) for developing their skills & abilities.

TABLE2: HOW DOES PAY AND COMPENSATION PACKAGE IS ADEQUATE WHEN COMPARED TO PERFORMANCE?

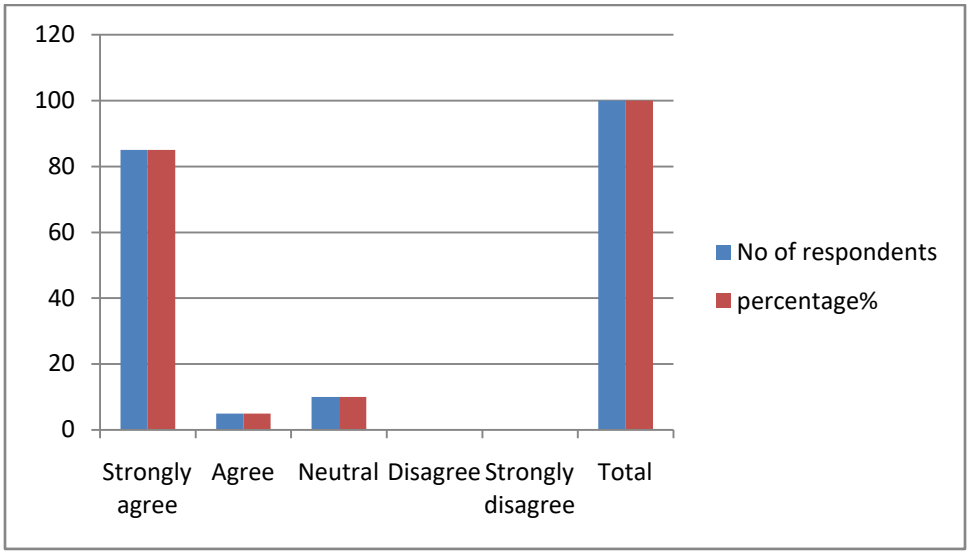
Particular	No of respondents	percentage%
Strongly agree	55	55
agree	20	20
Neutral	15	15
Disagree	7	7
strongly disagree	3	3
Total	100	100



Interpretation: some of the employees are strongly agree (55%) that there would be fair unbiased pay and some of them are neutral (15%).

TABLE3: BASED ON EMPLOYEE PERFORMANCE REWARD & RECOGNITION ARE GIVEN?

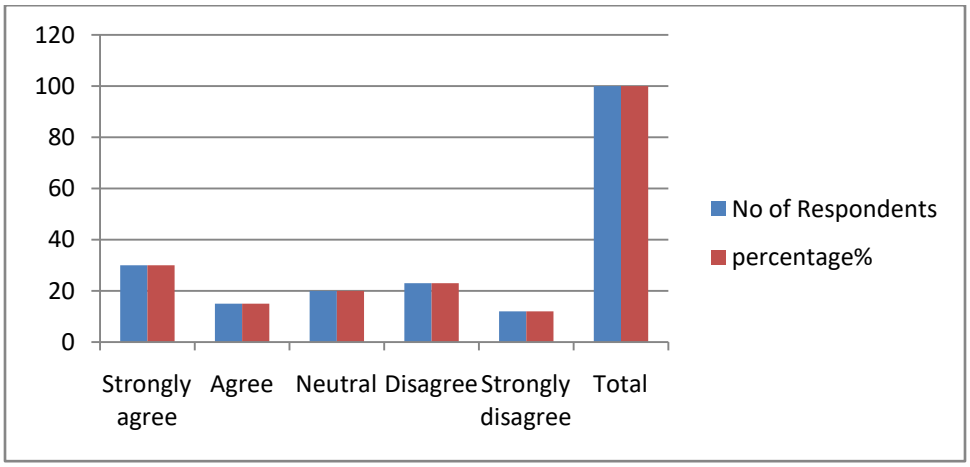
Particular	No of respondents	percentage%
Strongly agree	85	85
Agree	5	5
Neutral	10	10
Disagree	0	0
Strongly disagree	0	0
Total	100	100



Interpretation: most of the employees are strongly agree (85%) that there will be rewards and recognition in AMAZON.

TABLE 4: IS THE ORGANIZATIONAL ATMOSPHERE IS BASED ON FAIRNESS, INTEGRITY, AND TRUST

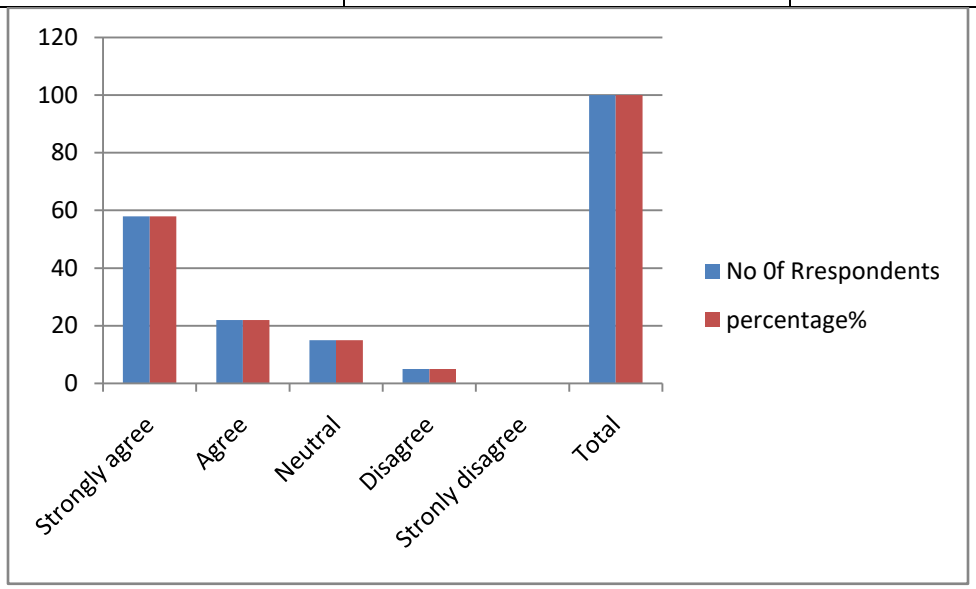
particular	No of Respondents	percentage%
Strongly agree	30	30
Agree	15	15
Neutral	20	20
Disagree	23	23
Strongly disagree	12	12
Total	100	100



Interpretation: here many of the employees strongly agree (30%) that the administrative atmosphere based on trust, and integrity, fairness and some of them are disagree (12%) the atmosphere in the organization.

TABLE 5: DOES THE MEDICAL FACILITIES PROVIDED BY THE ORGANIZATION ARE HELPFUL FOR YOUR HEALTH NEEDS?

Particular	No 0f Respondents	percentage%
Strongly agree	58	58
Agree	22	22
Neutral	15	15
Disagree	5	5
Strongly disagree	0	0
Total	100	100



Interpretation: Here many of the employees strongly agree(58%) and agree(20%) the hospitals facilities that are assumed by the organization suitable for their healthy needs, and few persons are neutral(15%).

FINDINGS

1. Most of the employees strongly agree and agree for practice their skills and abilities in their job.
2. The majority of the employees strongly agree that there would be fair pay and compensation
3. The employees believe that there will be rewards and reorganization in AMAZON.
4. Now employees strongly agree that the organizational atmosphere is based on trust, fairness and integrity.
5. The majority of the employees strongly agrees and agrees for the reason of the hospitals facilities provided by the organization which suits their health needs, and little are disagree.

SUGGESTIONS

Work should be distributed among employees uniformly. There should be Transparent in communication both ways (Top level to Low Level vise versa) more motivational classes on the attitudinal of the employee towards a job. Suggestion schemes should improve in the organization so that employees will be effective towards work.

CONCLUSION

After conducting an intense study on quality of work life in AMAZON following conclusions are derived. Organization ought to specialize in the profit that are aimed to words self improvement of the workers. Organization should maintain appropriate balance of work. Opportunity for career growth should improve. Benefits provided by the organization are excellent to satisfy the worker personal desires. Organization ought to specialize in the coaching sessions so as to encourage the workers. Organizations have to be compelled to give scope for the worker development. There is no discrimination at work place. The relationship with superior at workplace is good. On the total the standard of labor life smart**.**

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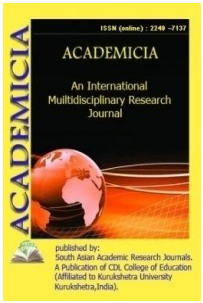

AN EMPIRICAL ANALYSIS ON NON-PERFORMING ASSETS OF PUBLIC AND PRIVATE SECTOR BANKS

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ABSTRACT

The banking sector plays a crucial role in the growth of every nation in the world. Nowadays Indian banking industry is in a very bad position,due to the continuous decrease in the profitability and liquidity of the banks. It became very important to analyzing the banking sector (Public sector and Private sector banks) whether it can be in statistical analysis or comparative analysis. This paper is an attempt to analyze how efficiently the banks are working in India. Nowadays Non- Performing Asset is a serious problem faced by the Indian banking in both Public sector banks and Private sector banks. NPA is also reflectedin the efficiency of the banks where the increase in the NPA will lead to decreases the profitability and liquidity of banks. Net worth and value of assets of banks also depend on the Non- Performing Assets. In this study, we will compare the Advances, Gross Advances, Gross NPAs, Gross NPA Percentage, Net NPAs, Net NPA Percentage, YoY growth of all aspects. The data is about all Public sector banks and Private sector banks are compared in terms of Column charts, Pie charts, Line charts.

KEYWORDS: *Banking Sector, Public Sector, Private Sector, Non Performing Assets*

INTRODUCTION

India is considered as the independent largest democracy and also emerging power in the economy due to that it needs huge support from the government and systematic banking structure which brings huge changes in different sectors of India. In the olden days, the main functions of the banking industry are accepting deposits from the public and lending whenever they need it. Even banks lend money to the person or organizationthat needs them which are deposits by the public. Now a day'sbasic functions of banks are accepting deposits and lending loans for priority sectors and non-priority sectors (agriculture, industry, personal loans, housing loans, etc.,). Due to the development of the nation,the Indian banking sector is lending the loans mostly due that

there is gradually increasing in the Non-Performing Assets in the banking sector. This NPA concept is restricted to Investments, Loans and advances. As long as the asset which does not show any unusual which only showsthe commercial risk is called a performing asset and when it fails to generate the expected income it becomes a "Non-Performing Asset".

KEYWORDS: NPA- Non-Performing Assets, GNPA- Gross Non-Performing Assets, NNPA- Non-Performing Assets.

Concept

Bank:- A bank is a financial institution licensed to receive deposits and make loans. Banks may also provide financial services such as wealth management, currency exchange, and safe deposit boxes, credit card, online banking.

Public sector bank:

Public sector banks are the financial institution where the highshares are owned by Government. There are 18 Public sector banks until the end of February 2020.

Private sector bank:

The private sector banks in India are the most percentage of equity and shares are owned byprivate shareholders. Private sector banks are divided into two categories: i) Old Private banks (Nationalized before 1969) ii) New Private banks (Got license since 1990). There are 22 private sector banks until the end of February 2020.

Non-Performing Asset:

Mainly Non-Performing Assets are considered when the given Loans and Advances not repaid within the 90days of maturity period. Assets that do not generate income are called Non-Performing Assets.

Classification of Non-Performing Assets are:

Banks should classify their NPA into these categories, viz-

i. Standard Assets
ii. Sub-standard Assets
iii. Doubtful Assets
iv. Loss Assets

Types of Non-Performing Assets:

i. Gross NPA
ii. Net NPA

Objective of the study:

- To study the trends of Non-Performing Assets of Private sector banks and Public sector banks.
- To compare the Non-Performing Assets of private and public sector banks.
- To compare theGross NPA & Net NPA, Ratios of Gross NPA and Net NPA.
- To highlight the trend of Gross NPA and Net NPA in both the Banks.

Need for study:

- The comparative analysis of NPA based on secondary data taken from Annual report of the public and private sector banks.
- This study will help to take control on NPAs.
- This study can be used for comparing the performance of the bank with another banks.
- This study improves the economical conditions and to increase the liquidity and profitability of banks.

Limitations

- This present data is not considered complete Indian banking sector. It only considered study on Public sector and Private sector banks.
- This figures that we are analyzing is not accurate. It is nearest value which is considered the nearest decimal value.
- This study is done on the present value of the statistics so it cannot consider in future development.
- This study is only done until the year 2019 and on secondary data only.

RESEARCH METHODOLOGY

Tools for data collection

The data considered is secondary data which is taken from the bank annual reports from its official websites, money control and RBI.

Tools for data analysis

Comparative analysis with the tool of Pie chart and Column chart.

Sample size

The study covered only one year of data of complete Public and Private banking industry.

REVIEW OF LITERATURE

Dr. Raj Kumar Mittal and Ms. Deeksha Suneja (2017) examined **"The Problem of Rising Non-performing Assets in Banking Sector in India"** and also made a **"comparative analysis of public and private sector banks"** using the secondary data collected from RBI publications journals, reports and websites of public and private sector banks in India which was analyzed using graphs and figures. The study revealed that the extent of NPA was more in public sector compared to private sector which can be recovered by government policies. The suggestions given was to consider ROI before lending loans and credit worthiness is to be considered.

Dr. Ujjwal M. Mishra and Jayant R Pawaskar (2017) made a **"A Study of Non-Performing Assets and its Impact on Banking Sector"** that analyzed sector-wise NPA, recovery channel and impact of NPA on Indian Banking Sector using secondary data which mainly constitute information from annual reports of banks. The data analysis tools used were ratio analysis, tables

and pie diagrams which revealed that banks need to maintain a proper credit appraisal system to reduce NPA.

Vivek Rajbahadur Singh(2016)titled **"A Study of Non-Performing Assets of Commercial Banks and it's recovery in India"** in his research study he stated that NPA has been always been a huge problem not only to the banks but also to the economy.The capital or money which is locked up in NPAs will have a direct impact on the profitability and liquidity position of the banks as the Indian banks are highly dependent on the income that is generated through interest earned through funds lent to the customers. His study also indicated that the extent of NPA is comparatively very high in public sector banks.

N. Rajput, A. P. Arora and B. Kaur (2012) in their research study titled **—"Management of Non-Performing Assets a Study of Indian Public Sector Banks"** provided an empirical approach to the analysis of profitability indicators on NPA. In their research study, they also emphasized the importance of inclusion of various methods to control the trend of NPA which proves to be an effective and efficient solution to the existing problem about the concept of NPA in the banking sector.

Hypothesis

H0: Comparatively Non-Performing Assets are more in the Public sector banks Compare to Private Sector Banks.

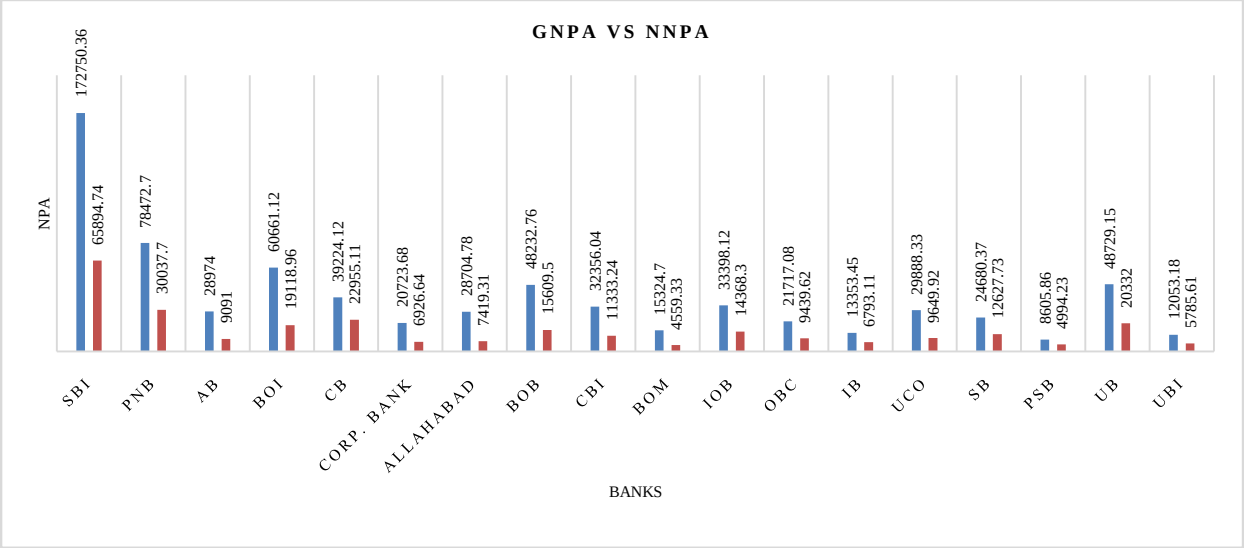
H1: Comparatively Non-Performing Assets are more in the Private sector banks Compare to Public Sector Banks.

Data Analysis and Interpretation

PUBLIC SECTOR BANKS	Advances	Gross Advance	GNPA	GNPA %	NNPA	NNPA %
State Bank of India	2185877	2293454	172750.4	7.53	65894.74	3.01
Punjab National Bank	458249	506194.3	78472.7	15.5	30037.7	6.56
Andhra Bank	158822.7	178690	28974	16.21	9091	5.73
Bank of India	341005.9	409154.2	60661.12	15.78	19118.96	5.59
Canara Bank	428114.8	444216	39224.12	8.83	22955.11	5.37
Corporation Bank	121251.2	155782.9	20723.68	15.35	6926.64	5.71
Allahabad Bank	142212.2	163552.3	28704.78	17.55	7419.31	5.22
Bank of Baroda	468818.7	501706.2	48232.76	9.61	15609.5	3.33
Central Bank of India	146525.4	167728.9	32356.04	19.29	11333.24	7.73
Bank of Maharashtra	82666.21	93466.7	15324.7	16.4	4559.33	5.52
Indian Overseas Bank	132597.6	151996.4	33398.12	21.97	14368.3	10.81
Oriental Bank of Commerce	159284.8	171549.5	21717.08	12.66	9439.62	5.93
Indian Bank	181261.9	187896.1	13353.45	7.11	6793.11	3.75
UCO Bank	99313.01	119573	29888.33	25	9649.92	9.72
Syndicate Bank	205044.4	217148.9	24680.37	11.37	12627.73	6.16
Punjab and Sind Bank	69175.53	72747.47	8605.86	11.83	4994.23	7.22

Union Bank of India	296932.2	325391.8	48729.15	14.98	20332	6.85
United Bank of India	66955.1	73123.41	12053.18	16.48	5785.61	8.67

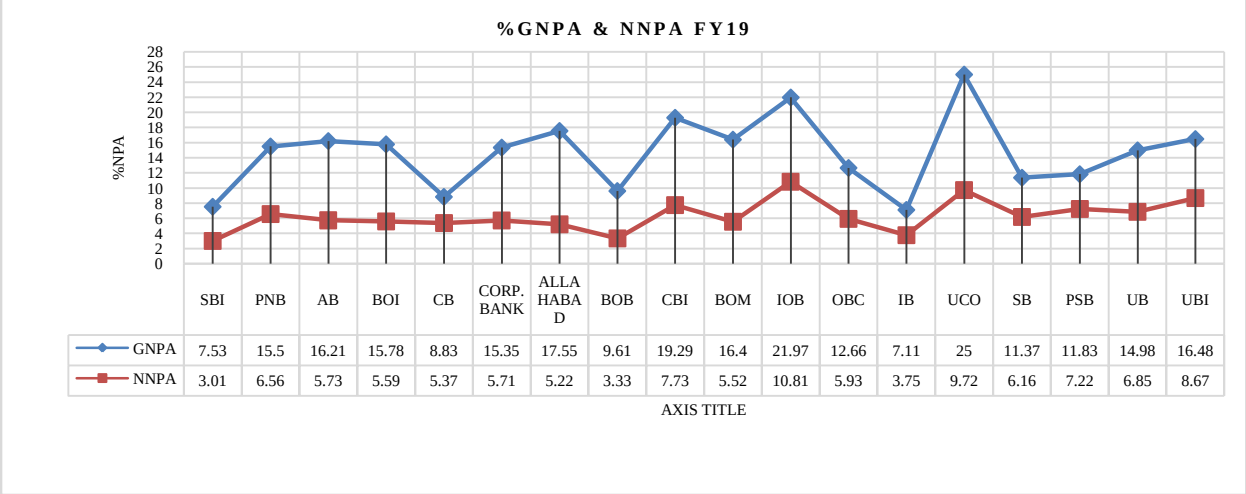
Chart: Public sector Banks GNPA Vs NNPA



Interpretation:

From above figure, we analyzed that the Banks are using the provisions to avoid increasing Gross NPA there is huge difference between the GNPA and NNPA.

Chart: GNPA and NNPA Ratio FY-19



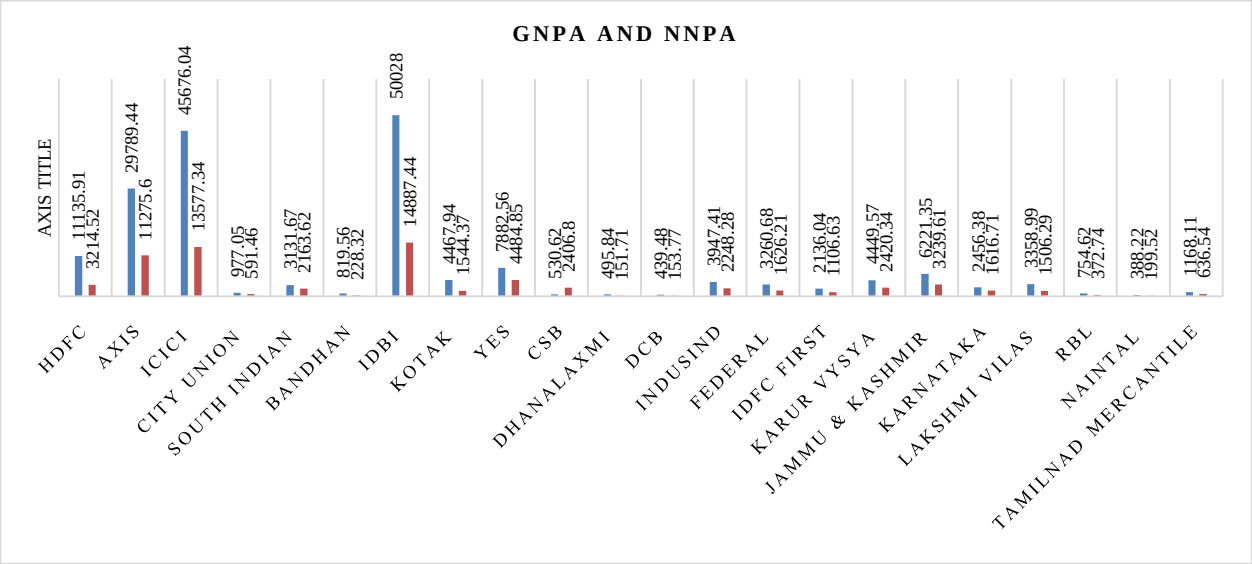
Interpretation:

From above chart we can analyze the Asset quality of the Banks with the help of both Gross and Net Non-Performing Assets ratios. We know that less the Gross and Net NPA ration greater the performance level of the Banks. So, govt. always introduces to decrease the NPA.

ii. Private Sector Banks

PRIVATE SECTOR BANK	Advances	Gross Advances	GNPA	GNPA %	NNPA	NNPA %
HDFC Bank	819401.2	827334.9	11135.91	1.36	3214.52	0.39
Axis Bank	494798	511096.4	29789.44	5.26	11275.6	2.06
ICICI Bank	586646.6	618985.2	45676.04	7.38	13577.34	2.06
City Union Bank	32673.34	33065.25	977.05	2.95	591.46	1.81
South Indian Bank	62693.74	63635.92	3131.67	4.92	2163.62	3.45
Bandhan Bank	39643.39	40234.63	819.56	2.04	228.32	0.58
IDBI Bank	146790.4	182097	50028	27.47	14887.44	10.11
Kotak Mahindra Bank	205694.8	208632.2	4467.94	2.14	1544.37	0.75
Yes Bank	241499.6	244897.3	7882.56	3.22	4484.85	1.86
CSB Bank	10615.24	10905.48	530.62	4.87	2406.8	2.27
Dhana Laxmi Bank	6289.28	6636	495.84	7.47	151.71	2.41
DCB Bank	23568	23858.69	439.48	1.84	153.77	0.65
IndusInd Bank	186393.5	188092.6	3947.41	2.1	2248.28	1.21
Federal Bank	110223	11829.27	3260.68	2.92	1626.21	1.48
IDFC first Bank	86302	88055.17	2136.04	2.43	1106.63	1.27
Karur Vysya Bank	48580.21	50615.66	4449.57	8.79	2420.34	4.98
Jammu & Kashmir Bank	66271.5	69372.2	6221.35	8.97	3239.61	4.89
Karnataka Bank	54828.2	55692.75	2456.38	4.41	1616.71	2.95
Lakshmi Vilas Bank	20103.26	21955.96	3358.99	15.3	1506.29	7.49

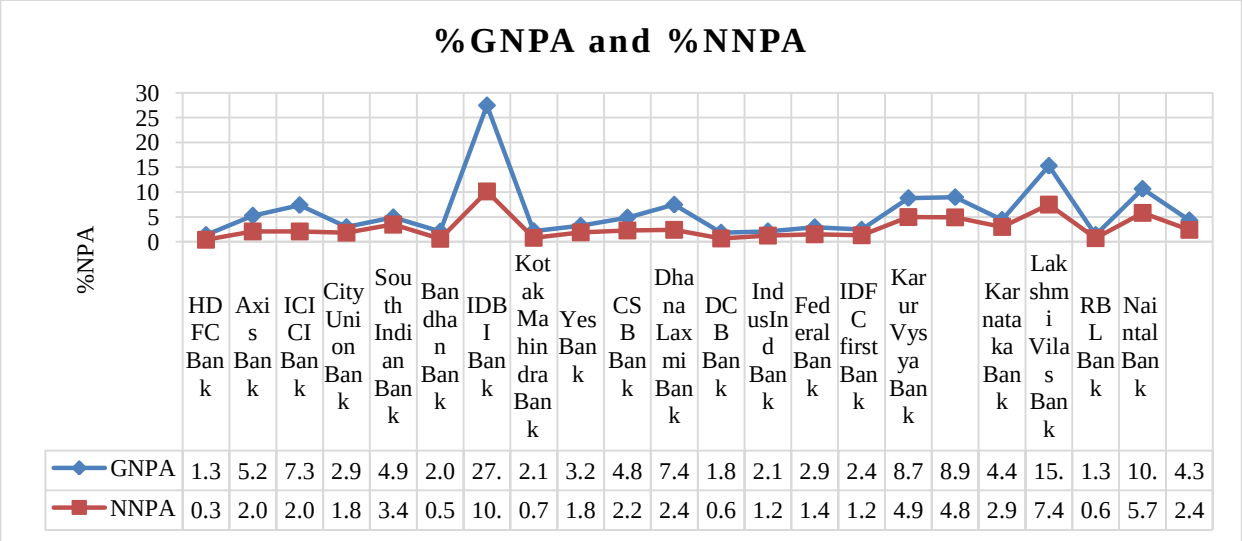
Chart: Comparing GNPA and NNPA



Interpretation:

In above graph we are comparing the GNPA and NNPA values to know the performance of the banks. Some of the banks are issuing a greater number of loans which not repaid within maturity are IDBI Bank, ICICI Bank, Axis Bank, HDFC Bank these banks need to reduce their Non-performing assets to increase the liquidity.

Chart: Comparing of GNPA and NNPA Ratios



	HDFC Bank	Axis Bank	ICICI Bank	City Union Bank	South Indian Bank	Bandhan Bank	IDBI Bank	Kotak Mahindra Bank	Yes Bank	CSB Bank	Dhana Laxmi Bank	DCB Bank	IndusInd Bank	Federal Bank	IDFC first Bank	Karur Vysya Bank		Karnataka Bank	Lakshmi Vilas Bank	RBL Bank	Nainital Bank	
GNPA	1.3	5.2	7.3	2.9	4.9	2.0	27.	2.1	3.2	4.8	7.4	1.8	2.1	2.9	2.4	8.7	8.9	4.4	15.	1.3	10.	4.3
NNPA	0.3	2.0	2.0	1.8	3.4	0.5	10.	0.7	1.8	2.2	2.4	0.6	1.2	1.4	1.2	4.9	4.8	2.9	7.4	0.6	5.7	2.4

Interpretation:

As we know that Non-Performance Asset should be always less. But some banks are facing issues of high NPA it effects the banks and economy of India. Here IDBI bank and Lakshmi Vilas bank facing the problem of high NPA.

Findings

- Public sector banks record the highest AverageGross NPA than the Private sector banks and the average varies by 20.91 percent.
- Public sector banks are recorded the highest sum of Gross NPA than the Private sector banks in the year 2019 and the sum is varied by 25.6%
- Some banks are facing the NPA problem. Some of them are functioning efficiently in both Public and Private sector banks.
- In Public sector banks State bank of India is facing the serious problem of NPA.
- Some of the Public sector banks are performing really well like State Bank of India, Indian Bank with less NPA ratios. Some of banks are in very bad situation like Indian Overseas Bank, UCO Bank.
- From Analysis we found that Gross NPA Ratio is very high for Indian Overseas bank with 21.97 and less for Indian Bank with 7.11. Net NPA Ratio is high for Indian Overseas Bank with 10.81 and less for State Bank of India with 3.01 in Public sector banks.
- From Analysis we found that Gross NPA Ratio is very high for IDBI bank with 27.47 and less for HDFC Bank with 1.36. Net NPA Ratio is high for IDBI Bank with 10.11 and less for HDFC Bank with 0.39 in Private sector banks.

Suggestions

- Properly analyzing the security attached for borrowing the loans.
- A systematic procedure of Analyzing, controlling, and reporting and recovering of NPAs must be followed.
- Bankers should provide insurance for the crop and provide income security for farmers rather giving loans to them.
- Bankers should analyze the Balance sheet and Profit and loss of the company which shows true picture of the organization by that we can decide whether to provide loan or not.

CONCLUSION

As we analyzed the condition of Non-Performing Assets in Both Public sector banks and Private sector banks. Some banks are performing really well in terms of recovering the loan amount from the loanees. Some banks are trying to reduce their Non-Performing Assets that are seen by comparing this year with the previous year. Some banks are not maintaining their liquidity due that banks are looking for merging with the banks which are performing good in the country. Government helping the manipulations that are done by the banks bye grouping or merging with the other banks.

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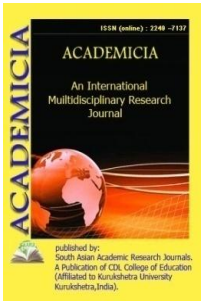

A STUDY ON COMMODITY MARKETS IN ANGEL BROKING LIMITED

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ABSTRACT

Indian markets have provided new course of action for retail investors and also for traders to take part in commodity derivatives. The investors who are willing to modify their portfolios away from shares, real estate, and bonds the commodities will be the right option. Earlier the investment in commodities was no use. For the retail investors, it was very bitty to invest in goods like gold, oilseeds and silver in the futures market. In the year 1875 the very first commodity market was established. The government has banned trading in derivatives in 1960's and it again started in 2000's.The current study will help to get an idea about Indian commodity markets. The markets performance, its development and its present status are discussed in this study.

KEYWORDS: *Commodity Markets, Commodity Exchange, Speculation*

I.INTRODUCTION:

The economic growth of countries globally are majorly dependent on the state of commodity markets. The evolution of commodity trading was in the middle of 19th century. There was a sudden hike in prices of commodities in 2008.Then; there was a slight increase in commodities like rice, wheat and maize day by day. The three major multi commodity exchanges were set up by the government in the country, through the medium of these exchanges the investors can trade in commodity futures without physical stocks. A common platform is recommended for commodity exchange for evolution of active trading, where both demand and supply together can get the best prices for any commodity.

II. OBJECTIVES OF THE STUDY:

1. To seek the knowledge about the major exchanges of trading commodities in the Indian market.

2. To study how the commodities are traded through the trading desk.

3. To study the major impact of spot prices on future prices of commodities.

III. HYPOTHESIS:

H0: There is no impact of spot prices on future prices of commodities.

H1: There is an impact of spot prices on future prices of commodities.

IV. RESEARCH METHODOLOGY:

The present study is conducted to know the detailed information about commodity markets and to know the impact of prices on commodities.

(a) Primary data

Primary data is collected from observation, interviews and survey method.

(b) Secondary data

Secondary data is collected from magazines, reference books, journals various websites and annual reports of company.

V.TOOLS FOR ANALYSIS

1. Mean
2. Standard deviation
3. Beta
4. Variance
5.t- test

VI. REVIEW OF LITERATURE

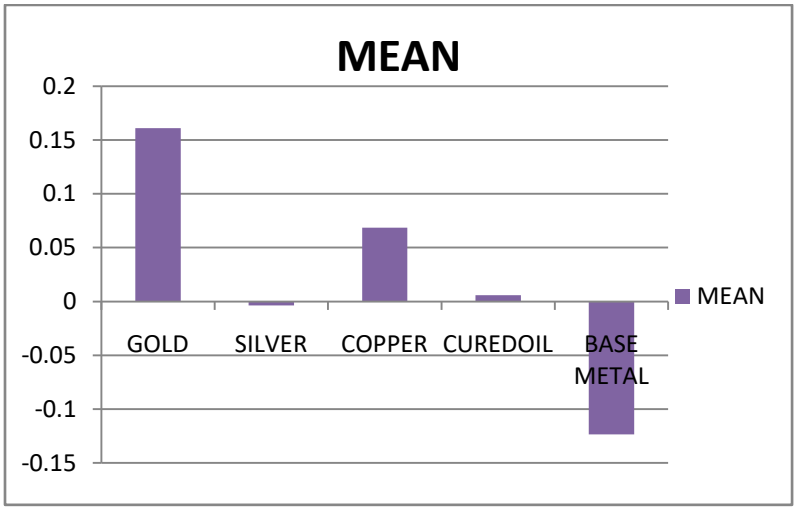
(a) Rahul .k.kapale & karthik b.uttawar (Apr-2016):

In the top producers of variety of commodities, India has become one of them. The supervision of commodity market is needed to make sure that market efficiency. And performs the both economic function of prices discovery and price risk management to a proper mingle the spot and future prices to supply protection against risk of fluctuations in prices. The promotion of free trade in the world will be done by the management of price risk.

(b) Jim Roger (Feb-2012) :The most important investment opportunities will be provided by the commodity markets and have the advantages over the other financial markets while making the note of risk management. The inter connection between spot and future prices and differences in seasonality are the major issues.

TABLE I: CALCULATION OF MEAN:

COMMODITY	MEAN
GOLD	0.161039593
SILVER	-0.003606586
COPPER	0.068594446
CRUDE OIL	0.005964733
BASE METAL	-0.12367745



GRAPHICAL REPRESENTATION OF MEAN

INTERPRETATION:

From the above table we can know the mean values of various commodities. The mean of gold is highest when compared to other commodities i.e. 0.161039596 and the commodity base metal has lowest mean i.e. -0.12367745 in the month of January.

TABLE 2: CALCULATION OF STANDARD DEVIATION:

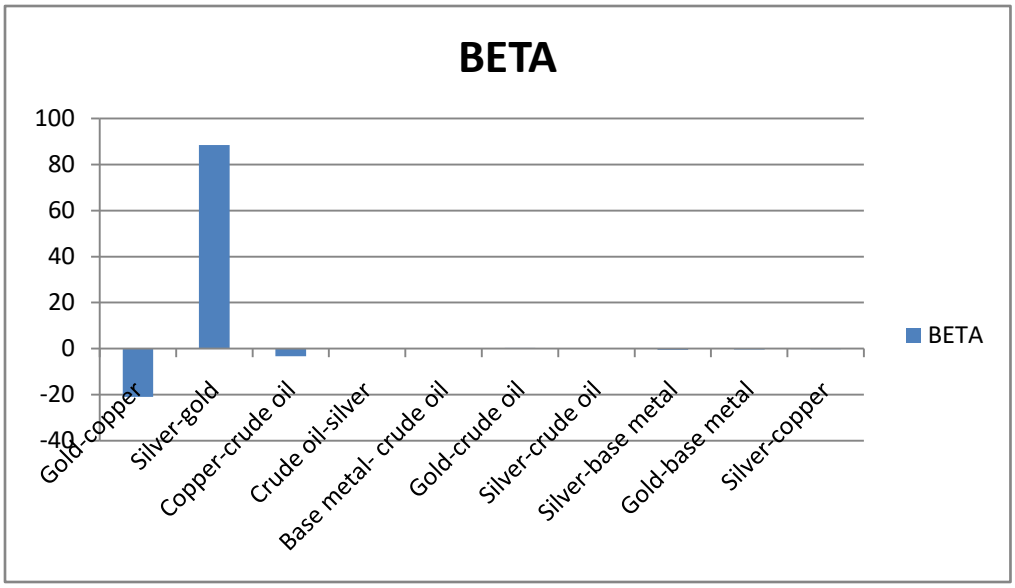
COMMODITY	STANDARD DEVIATION
GOLD	0.707138978
SILVER	1.24659171
COPPER	1.431510091
CRUDE OIL	1.856879584
BASIC METALS	0.658943234

GRAPHICAL REPRESENTATION OF STANDARD DEVIATION

From the above table we can know the standard deviation values of different commodities in the month of January. Crude oil is highest standard deviation when compared to other commodities i.e. 1.856879584 and base metal is having lowest standard deviation i.e. 0.6589432.

TABLR 3: CALCULATION OF BETA

COMMODITIES	BETA
Gold-copper	-20.88388164
Silver-gold	88.43715779
Copper-crude oil	-3.306307571
Crude oil-silver	0.0879862
Base metal- crude oil	0.06128313751
Gold-crude oil	0.266680433
Silver-crude oil	-0.0129630
Silver-base metal	-0.4616239
Gold-base metal	-0.3195032
Silver-copper	-0.269791

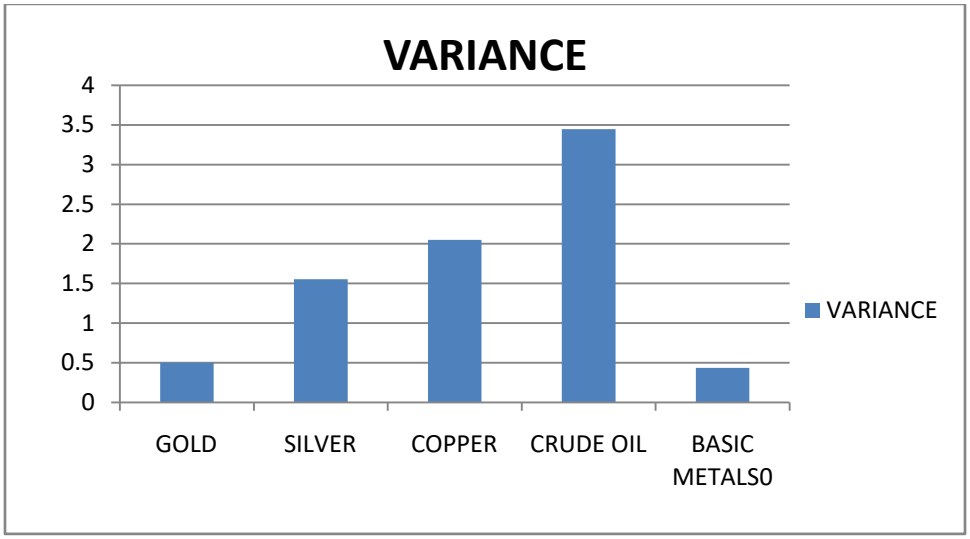


GRAPHICAL REPRESENTATION OF BETA

From the above table we can interpret that silver –gold is higher than other commodities in month of January i.e., 88.43715779. The beta value of gold-copper is negative i.e., -20.88388164.

TABLE4: CALCULATION OF VARIANCE

COMMODITY	VARIANCE
GOLD	0.500045547
SILVER	1.553990892
COPPER	2.049221141
CRUDE OIL	3.448001789
BASIC METALS	0.434206189



GRAPHICAL REPRESENTATION OF VARIANCE

From the above table we can know interpret that the variance of crude oil is higher than all other commodities in the month of January i.e. 3.448001789 and base metal is having the lowest variance i.e. 0.434206186.

TABLE 5: T-TEST WITH GOLD WITH SILVER

t-Test: Paired Two Sample for Means		
	0.418246	*1.008127*
Mean	0.303895	-0.05104
Variance	1.068974	1.576033
Observations	23	23
Pearson Correlation	0.476359	
Hypothesized Mean Difference	0	
df	22	
t Stat	1.434348	
P(T<=t) one-tail	0.082768	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.165536	
t Critical two-tail	2.073873	

Here the calculated value is 1.434348, and the table value is 1.717144

TABLE 6: T-TEST GOLD WITH COPPER

t-Test: Paired Two Sample for Means		
	0.418246	*-0.15197*
Mean	0.303895	0.143796
Variance	1.068974	2.237758
Observations	23	23
Pearson Correlation	-0.07197	
Hypothesized Mean Difference	0	
df	22	
t Stat	0.4087	
P(T<=t) one-tail	0.343356	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.686711	
t Critical two-tail	2.073873	

Here the calculated value is 0.4087, and the table value is 1.717144

TABLE 7:T-TEST GOLD WITH CRUDE OIL

t-Test: Paired Two Sample for Means		
	0.418246	*-1.49033*
Mean	0.303895	-0.65655
Variance	1.068974	3.138849
Observations	23	23
Pearson Correlation	0.36567	
Hypothesized Mean Difference	0	
df	22	
t Stat	2.719777	
P(T<=t) one-tail	0.006255	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.01251	
t Critical two-tail	2.073873	

Here the calculated value is 2.719777, and the table value is 1.717144

TABLE 8: T-TEST WITH BASE METALS

t-Test: Paired Two Sample for Means		
	0.418246	*-0.14682*
Mean	0.303895	-0.24097
Variance	1.068974	0.77605
Observations	23	23
Pearson Correlation	-0.58939	
Hypothesized Mean Difference	0	
Df	22	
t Stat	1.529541	
P(T<=t) one-tail	0.070191	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.140383	
t Critical two-tail	2.073873	

Here the calculated value is1.529541, and the table value is 1.71714

TESTING OF HYPOTHESIS

- There is the impact of spot prices on future prices.
- So, H0 space is accepted.

FINDINGS

- The commodity gold is having higher mean in the month of January. The mean value of gold is considered as risk type of commodity.
- The variance of crude oil is higher in January when compared to other commodities. Therefore risk and return of crude oil is comparatively higher.

- In the month of January standard deviation of crude oil is higher, so it is treated as risky commodity. As risk is increasing return will also increase.
- The Beta of commodities gold and silver is more than 1 in January. It shows that both commodities are having more risk and return and it is also comparatively and simultaneously high.

SUGGESTIONS

1. For trading unit more commodities can be introduced.
2. Every investor before entering in to commodities has to carefully examine the market conditions and risk involved in it.
3. Investors need to know the better contract of the commodities in future and their negotiation before making decision to enter into the contract.
4. While the process of trading is going on there should not be any interference investors because of risk factors.

CONCLUSION

Capital market reached its maturity level. There is a long history of commodity trading, and there are many developments in Indian commodity markets they are: commodity markets are protected by the government policies and implementing of the sector and fetching the necessary protection from the instruments which are based on markets like a commodity futures contract. The strong potential of markets is shown by the increase in the trend of commodity markets and the market is an essential part of the economy.

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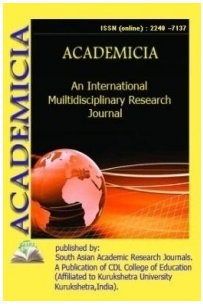

PORTFOLIO MANAGEMET WITH REFERENCE TO AUTOMOBILE INDUSTRY

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ABSTRACT

Portfolio management is often defined and used in other ways. The basic meaning of portfolio management is "combination of various things that remain intact". The purpose of selecting this problem is to understand how to effectively eliminate the management of the incoming portfolio and at the same time know the investors to liquidate the securities that they must insert in their portfolio. This topic deals with how a particular portfolio should be chosen with respect to the individual profitability of all the securities and, therefore, arrive at the overall profitability of the portfolio. This together provides an adequate entry position in the portfolio based on totally different values rather than a single value. Therefore, this article has been prepared to provide tips for effective portfolio management through the use of returns, standard deviation, portfolio returns and portfolio weights.

KEYWORDS: *Portfolio Management, Portfolio Weights, Analysis Of Risk And Return.*

1. INTRODUCTION:

A portfolio can be a variety of investments controlled by an establishment or a non-public entity. In the associate in the nursing investment portfolio, a financial organization can generally perform its own investment analysis, while a non-public individual can take advantage of the services of a monetary adviser or financial organization that offers portfolio management services. By owning many companies, the associated types of risk will be reduced (at specific risk). Assets within the portfolio can incorporate stocks, bonds, options, warrants, gold

certificates, properties, futures contracts, production facilities or the opposite element that is expected to maintain its price. According to the Securities and Exchange Board of India, the Portfolio Manager is defined as: "The portfolio indicates the overall availability of securities belonging to any person".

2. NEED OF THE STUDY: -

- The main aspect of this study i.e. "portfolio management with reference to automobile sector "is to analyse the portfolio performance of the selected companies.
- To Analyse the changes and it's causes in the company portfolio's
- To Compare the results of each company with the other selected companies for effective decision making.
- To have a practical experience of the portfolio management.

3. REVIEW OF LITERATURE:

- **Edward Qian (2012) –** His study supports analytical results on portfolio rebalancing and associated diversification returns for various types of portfolios. It analysed the diversification yields of the risk parity portfolios. Their numerical examples show that diversification performance is, in general, tremendous for leveraged danger parity portfolios when the leverage rate is not too high, furthermore, it shows that low correlations between the various activities are crucial for get a return. of positive diversification and reduction of the turnover of the portfolio for portfolios of equal risk.
- **Richard Grinold (2014):**This study Provides a general framework to describe various aspects of a portfolio that uses a set of things. The work is a cousin to the exposition of the spent argument of attribution of analysis 7, and in this sense it is fairly represented as old wine in new bottles, however the scope is much more general. The first provides a theoretical framework with a model that describes various aspects of the portfolio as an allocation of portfolio variation or as a covariance of two portfolios.

4. OBJECTIVES:

- To analyse the effective portfolio which offers maximum return with minimum risk.
- To frame an optimal portfolio from the selected industries.
- To determine the amount of portfolio risk and portfolio returns involved in the securities of selected industries.

5. HYPOTHESIS:

H0: There is no significant relationship between portfolio risk & portfolio return.

H1: There is a significant relationship between the portfolio risk & portfolio return.

5. Sample size:

5 companies from automobile industry are:

1. HERO MOTOCORP.

2. BAJAJ AUTO LIMITED.

3. MAHINDRA & MAHINDRA LIMITED.

4. TVS MOTORS COMPANY LIMITED

5. MAHARASHTRA SCOOTERS LIMITED.

7. RESEARCH METHODOLOGY:

Research methodology is the procedure which we used to collect the information and data from making decisions. It may include past and present information.

- **Primary Source:**Information gathered from interacting with employees within the organization.
- **Secondary Source:**Daily prices of scripts from newspapers,websites.

8. TOOLS AND TECHNIQUES:

Statistical tools which are used for the study are return, average return, variance, standard deviation, covariance, coefficient of correlation, portfolio risk &portfolio return, T-test.

9. PORTFOLIO ANALYSIS:

Standard Deviation $=\sqrt{\text{variance}}$

Variance $= \frac{1}{n}(R-\bar{R})^2$

Co-variance (COV ab) $=\frac{1}{n}(RA-\overline{RA})(RB-\overline{RB})$

Correlation Coefficient $=\frac{COV\ ab}{\sigma a * \sigma b}$

weights of portfolio:

$Wa=\frac{\sigma b[\sigma b-(nab*\sigma a)]}{\sigma a^2+\sigma b^2-2nab*\sigma a*\sigma b}$

Wb=1-Wa

Portfolio risk:

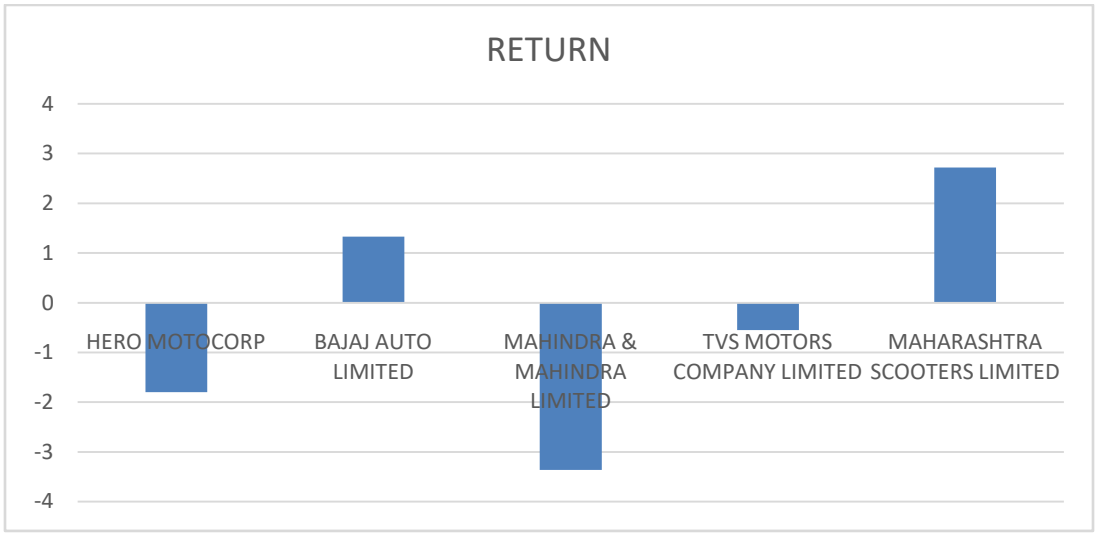
$\sigma_p=\sqrt{(\sigma a * Wa)2+(\sigma b * Wb)2+2*\sigma a*\sigma b*Wa*Wb*nab}$

Portfolio return: Rp=(RA*WA) +(RB*WB)

10. DATA ANALYSIS:

TABLE 1: CALCULATION OF AVERAGE RETURNS:

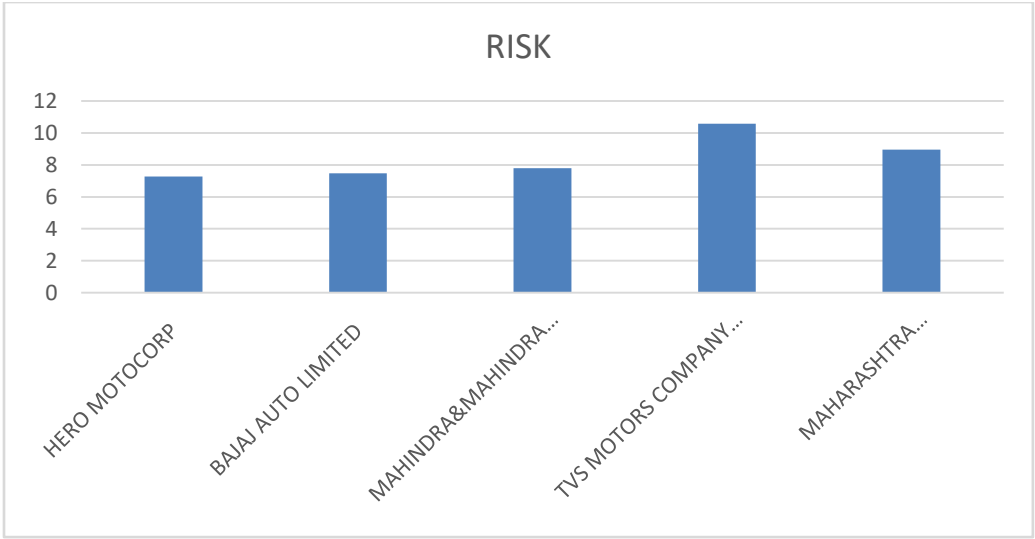
COMPANIES	RETURN
HERO MOTOCORP	-1.80
BAJAJ AUTO LIMITED	1.33
MAHINDRA & MAHINDRA LIMITED	-3.36
TVS MOTORS COMPANY LIMITED	-0.55
MAHARASHTRA SCOOTERS LIMITED	2.72



INTERPRETATION: From the above graph, the returns of Maharashtra Scooters Limited are having higher i.e., (2.72) than all the selected companies and the returns of Mahindra & Mahindra Limited are having lesser i.e., (-3.36) than all the selected companies.

TABLE 2: CALCULATION OF STANDARD DEVIATION:

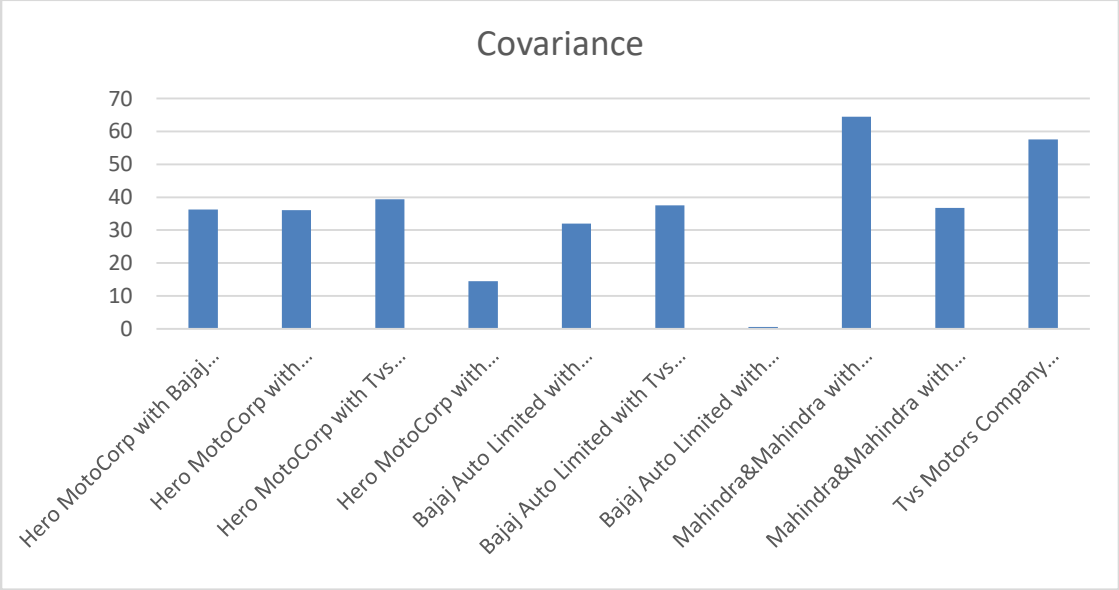
COMPANIES	RISK
HERO MOTOCORP	7.28
BAJAJ AUTO LIMITED	7.48
MAHINDRA&MAHINDRA LIMITED	7.80
TVS MOTORS COMPANY LIMITED	10.57
MAHARASHTRA SCOOTERS LIMITED	8.96



INTERPRETATION: From the above graph, the risk of TVS MOTORS COMPANY LIMITED is having high i.e., (10.57) when compared to other selected companies and HERO MOTOCORP is having low i.e., (7.28) when compared with the other selected companies.

Covariance

Companies	Covariance
Hero MotoCorp with Bajaj Auto Limited	36.31
Hero MotoCorp with Mahindra & Mahindra Limited	36.04
Hero MotoCorp with TVS Motors Company Limited	39.39
Hero MotoCorp with Maharashtra Scooters Limited	14.52
Bajaj Auto Limited with Mahindra&Mahindra Limited	32.02
Bajaj Auto Limited with TVS Motors Company Limited	37.48
Bajaj Auto Limited with Maharashtra Scooters Limited	0.61
Mahindra&Mahindra with TVS Motors Company Limited	64.43
Mahindra&Mahindra with Maharashtra Scooters	36.75
TVS Motors Company Limited with Maharashtra Scooters Limited	57.54

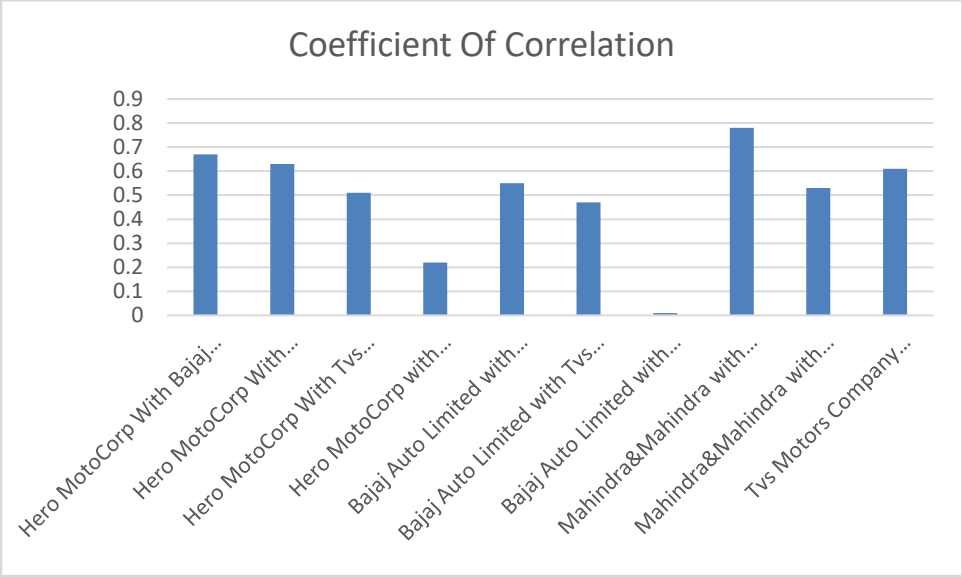


INTERPRETATION: From the above graphs it is shown that covariance is greater for Mahindra&Mahindra with TVS Motors Company Limited i.e., (64.43) and lesser for Bajaj Auto Limited with Maharashtra Scooters Limited I.e., (0.61) when compare to other selected companies.

COEFFICIENT OF CORRELATION:

Companies	Coefficient Of Correlation
Hero MotoCorp With Bajaj Auto Limited	0.67
Hero MotoCorp With Mahindra&Mahindra Limited	0.63
Hero MotoCorp With TVS Motors Company Limited	0.51
Hero MotoCorp with Maharashtra Scooters Limited	0.22
Bajaj Auto Limited with Mahindra&Mahindra Limited	0.55

Bajaj Auto Limited with TVS Motors Company Limited	0.47
Bajaj Auto Limited with Maharashtra Scooters Limited	0.009
Mahindra&Mahindra with TVS Motors Company Limited	0.78
Mahindra&Mahindra with Maharashtra Scooters	0.53
TVS Motors Company Limited with Maharashtra Scooters Limited	0.61

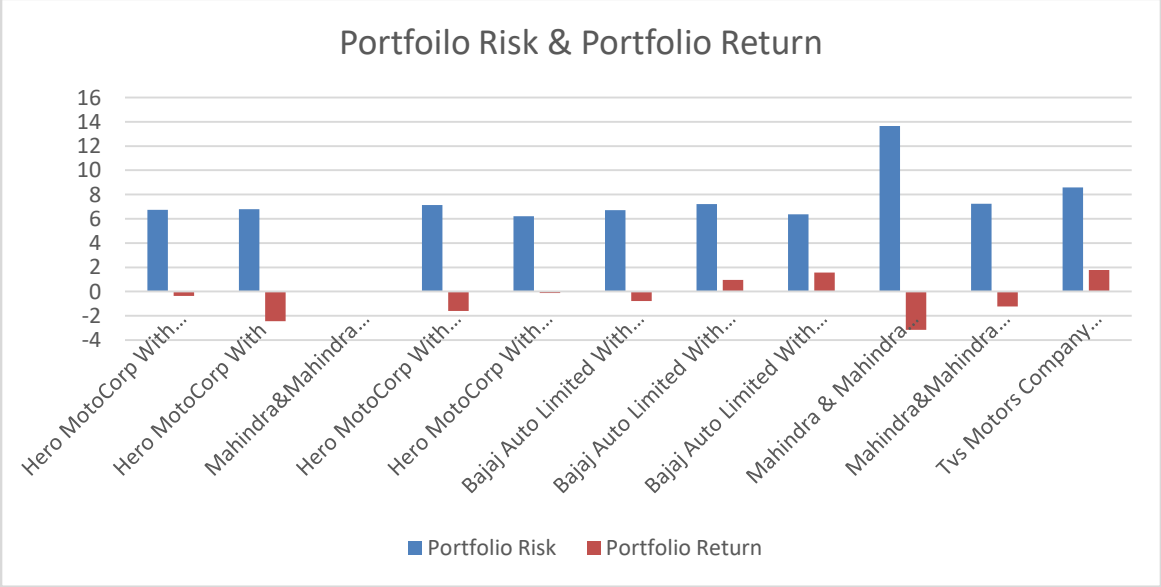


INTERPRETATION:From the above graphs it is shown that correlation of coefficient is greater for Mahindra&Mahindra with TVS Motors Company Limited i.e., (0.78) and lesser for Bajaj Auto Limited with Maharashtra Scooters Limited i.e., (0.009) when compare to other selected companies.

PORTFOLIO RISK AND PORTFOLIO RETURN:

Companies	**Portfolio Risk**	**Portfolio Return**
Hero MotoCorp With Bajaj Auto Limited	6.74	-0.36
Hero MotoCorp With Mahindra&Mahindra Limited	6.78	-2.44
Hero MotoCorp With TVS Motors Company Limited	7.13	-1.6
Hero MotoCorp WithMaharashtra Scooters Limited	6.22	-0.13
Bajaj Auto Limited With Mahindra&Mahindra Limited	6.72	-0.78
Bajaj Auto Limited With TVS Motors Company Limited	7.22	0.95
Bajaj Auto Limited With Maharashtra Scooters Limited	6.36	1.58
Mahindra&Mahindra With TVS Motors Company Limited	13.66	-3.15

Mahindra&Mahindra With Maharashtra Scooters	7.24	-1.23
TVS Motors Company Limited With Maharashtra Scooters Limited	8.58	1.77



INTERPRETATION: From the above graph it is shown that the portfolio risk of Mahindra&Mahindra Limited with TVS Motors Company Limited has high portfolio risk i.e., (13.66) and their portfolio return is -3.15. Hero MotoCorp with Maharashtra Scooters Limited has the lowest portfolio risk i.e., (6.22) and their portfolio return is -0.13 when compared to other selected companies.

11. HYPOTHESIS TEST:

t-Test: Paired Two Sample for Means		
	portfolio risk	**portfolio return**
Mean	7.665	-0.539
Variance	4.862783	2.703388
Observations	10	10
Pearson Correlation	-0.45824	
Hypothesized Mean Difference	0	
Df	9	
t Stat	7.861933	
P(T<=t) one-tail	1.27E-05	
t Critical one-tail	1.833113	
P(T<=t) two-tail	2.54E-05	
t Critical two-tail	2.262157	

Here the calculated value is more than the table value, so we reject $H_0$and accept H_1. Which means there is a significance relation between portfolio risk and portfolio return.

12. FINDINGS:

- Individual returns on the selected stocks including HERO MotoCorp, Bajaj Auto Limited, Mahindra&Mahindra Limited, TVS Motors Company Limited, Maharashtra Scooters Limited are -1.80%,1.33%, -3.36%, -0.55%,2.72% respectively.
- Individual risks on the selected stocks includingHero MotoCorp, Bajaj Auto Limited, Mahindra&Mahindra Limited, TVS Motors Company Limited, Maharashtra Scooters Limited are 7.28, 7.48, 7.80, 10.57, 8.96 respectively.
- Covariance of Mahindra&Mahindra with TVS Motors Company Limited i.e., (64.43) are very high while Bajaj Auto Limited withMaharashtra Scooters Limited i.e., (0.61) are very low when compared to other companies.
- Coefficient of correlation of Mahindra & Mahindra with TVS Motors Company Limitedi.e., (0.78) are very highwhile coefficient of correlation of Bajaj Auto Limited withMaharashtra Scooters Limited i.e., (0.009) are very low when compared to other companies.
- Portfolios Returns of TVS Motors Company Limited with Maharashtra Scooters Limited (1.77) are very high while Mahindra&Mahindra with TVS Motors Company Limited (-3.15) are very low compared to other companies.
- Portfolios Risk of Mahindra & Mahindra with TVS Motors Company Limited (13.66) are very high while Portfolio Risks of Hero MotoCorp with Maharashtra Scooters Limited (6.22) are very low compared to other companies.

13. SUGGESTIONS:

- As Hero Moto Corp, Mahindra & Mahindra Limited, TVS Motors Company Limited are having negative average return so it is better not to invest.
- Comparing the individual risks, TVS Motors Company Limited are risky securities compared to the other securities like Hero MotoCorp, Bajaj Auto Limited, Mahindra &Mahindra Limited, Maharashtra Scooters Limitedand it is suggested that the investors should be careful while investing in these securities.
- Bajaj Auto Limited with Maharashtra Scooters Limited is having low co-variance. So investors better to invest in other selected companies.
- The investors who require minimum return with low risk can invest inMahindra&Mahindra with TVS Motors Company Limited.
- Investors who want high return on their investments so better they can invest in TVA Motors Company Limited with Maharashtra Scooters Limited, because these are having the highest portfolio risk.

13.CONCLUSION:

In case of perfectly correlated securities or stocks, the danger is often reduced to a minimum point. In case of negatively correlative securities the danger is often reduced to a zero. (which is company's risk) but the market risk prevails the same for security or stock in the portfolio. In case of perfect positive co-relation securities or stock, the risk can be reduced to a minimum level, were as within the case of negative correlated securities the danger is often reduced to zero, which is corporate risk but the market risk prevails an equivalent for the safety or stock in portfolio. Positive correlation means both the securities are occupation an equivalent direction

i.e., either upward or downward. Whereas indirect correlation means, the securities are occupation other way, which is more portfolio.

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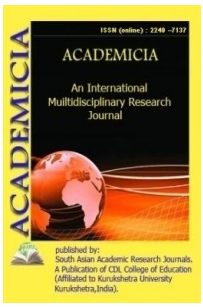

PORTFOLIO MANAGEMENT OF DIFFERENT SECTORS

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ABSTRACT

Portfolio management may be a process encompassing many activities of investment is assets and securities. It is a dynamic and versatile concept and involves regular and systematic analysis, judgment, and action. It is a combination of securities held together will provide a beneficial result if they grouped during a manner to secure higher returns after taking into consideration the danger elements. Portfolio management is an art of choosing right investment policy for the individuals in terms of minimum risk with maximum returns. The main objective is to study the investment decision process. The need of portfolio management is presents the best investment plan to the individuals as per their incomes, budget, age and ability to undertake risks. The Sample size is calculated by taking 5 years of data from 5 different companies. Statistical tools used in this are mean, standard deviation, covariance and correlation coefficient.

KEYWORDS: *Portfolio Management, Expected Return On Portfolio, Portfolio Weights, Analysis Of Risk And Return.*

INTRODUCTION

PORTFOLIO MANAGEMENT

A portfolio is a collection of assets. The assets could also be physical or financial like Shares, Bonds, Debentures, preferred stock etc. The individual investor or a fund manager wouldn't wish to put all his money within the shares of one company that might amount to great risk. He would therefore, follow the age-old maxim that one shouldn't put all the eggs into one basket. By doing so, we are able to do objective to maximize portfolio return and at an equivalent time minimizing the portfolio risk by diversification Portfolio management is that the management of varied financial assets which comprise the portfolio.

1. Portfolio management is a decision support system that is designed with a view to meet the multi-faced needs of investors.

2. According to Exchange Board of India and Securities of Portfolio Manager is defined as "Portfolio means total holdings of securities belonging to any person"

NEED OF THESTUDY

Portfolio management has emerged as a not equally academic discipline in India. Portfolio theory that deals with the rational investment decision-making process has now become an integral a part of financial literature. Investing in securities such as shares, debentures & bonds s profitable well as exciting. It is indeed rewarding but active participate in a great deal of risk & need artistic skill. Investing in financial securities is now considered to be one of the most risky avenues of investment. It is rare to seek out investors investing their entire savings during a single security. Instead they have a tendency to take a position during a group of securities. Such group of securities s called as PORTFOLIO. Creation of portfolio helps to scale back risk without sacrificing returns. Portfolio management deals with the analysis of individual securities also like the idea & practice of optimally combining securities into portfolios.

OBJECTVESOFTHESTUDY

- To Study the investment pattern and its related risk & returns.
- To see whether the portfolio risk is less than individual risk on whose basis the portfolios are constituted.
- To understand, analyse and select the best portfolio.

HYPOTHESIS FORMULATION

H0: There is no significant relation between portfolio risk and portfolio return

H1: There is a significant relation between portfolio risk and portfolio return

Sample size:

We aredealingandstudyingthe securitiesof

- TataMotors(Auto mobiles)
- Ultratechcement(Cement company)
- SunPharma(pharmaceutical)
- Wipro(IT company)
- ICICI bank.(Bank)

Research methodology is the procedure which we used to collect the information and data from making decisions. It may include past and present information**.**

DATA COLLECTION

Primary source

- Information gathered from interacting with employees in the organization.

Secondary source

- Daily prices of scripts from newspapers.

- And the data from the BSE and other magazines

TOOLS&TECHNIQUES:

- Statistical tools which are used for the study are return, average return, standard deviation, covariance, portfolio risk &portfolio return, T-Test.

PORTFOLIO ANALYSIS

- Standard Deviation =$\sqrt{\text{variance}}$
- Variance = $\frac{1}{n}$ (R-$\bar{R}$)^2
- Co-variance (COV ab) =$\frac{1}{n}$ (RA-$\overline{RA}$) (RB-$\overline{RB}$)
- Correlation Coefficient =$\frac{\text{COV ab}}{\sigma a * \sigma b}$
- weights of portfolio:
- Wa=$\frac{\sigma b[\sigma b-(\text{nab} * \sigma a)]}{\sigma a^2+\sigma b^2-2\text{nab} * \sigma a * \sigma b}$
- Wb=1-Wa

Portfolio risk:

- $R_p = \sqrt{(\sigma a * \text{Wa})2 + (\sigma b * \text{Wb})2 + 2 * \sigma a * \sigma b * \text{Wa} * \text{Wb} * \text{nab}}$
- Portfolio return: Rp=(RA*WA) +(RB*WB)

REVIEW OF LITERATURE

Catherine P. Killen, Robert A. Hunt, Elko J. Kleinschmidt 2008 project portfolio management for product innovation Journal of quality of reliable management , Vol.35, No.3 pp.327-342.The purpose of this paper is to form a benchmark and determine best practices for Project Portfolio Management (PPM) for each tangible product-based and repair product-based development project portfolios.

– A questionnaire was developed to collect data to copy the PPM methods used PPM performance, PPM challenges, and resulting new product success measures in 60 Australian organizations during a diverse range of service and manufacturing industries.

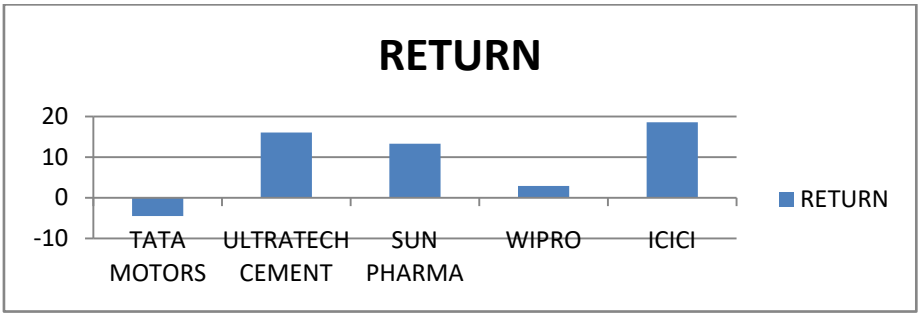
LourenceWormald and Elmarievandermerwe (2014) It deals with the connection between conventional shrinkage approaches to the development of the covariance matrix for portfolio optimization. Here, we use Quadratic constraints on each part of the total risk (variance) measure, such as the systematic or specific risk associated with risk factor. For examine the practical value of this approach, using a well documented set of alphas, we set out the result of 13-year simulation exercise over the Russell 3000 Growth U.S. equity universe. The results shows the effect of constraints on decline on covariance matrix related with span a part of alpha will end in different portfolio allocations.

DATA ANALYSIS

TABLE 1: CALCULATION OF AVERAGE RETURNS:

COMPANY	RETURN
TATA MOTORS	-4.4589
ULTRATECH CEMENT	16.077
SUN PHARMA	13.3256

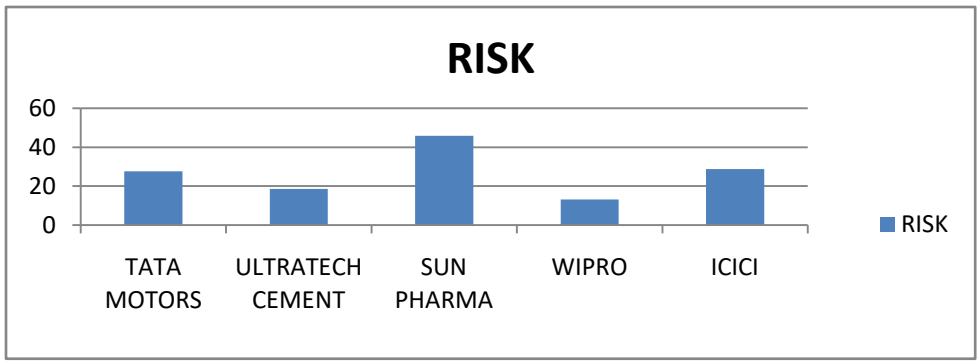
WIPRO	2.9058
ICICI	18.5509



INTERPRETATION: From the above graph, the returns of ICICI Bank are having higher i.e., (18.55) than all the selected companies and the returns Of TATA Motors are having lesser i.e., (-4.45) than all the selected companies

TABLE 2: CALCULATION OF STANDARD DEVIATION:

COMPANY	RISK
TATA MOTORS	27.64
ULTRATECH CEMENT	18.58
SUN PHARMA	45.89
WIPRO	13.23
ICICI	28.70

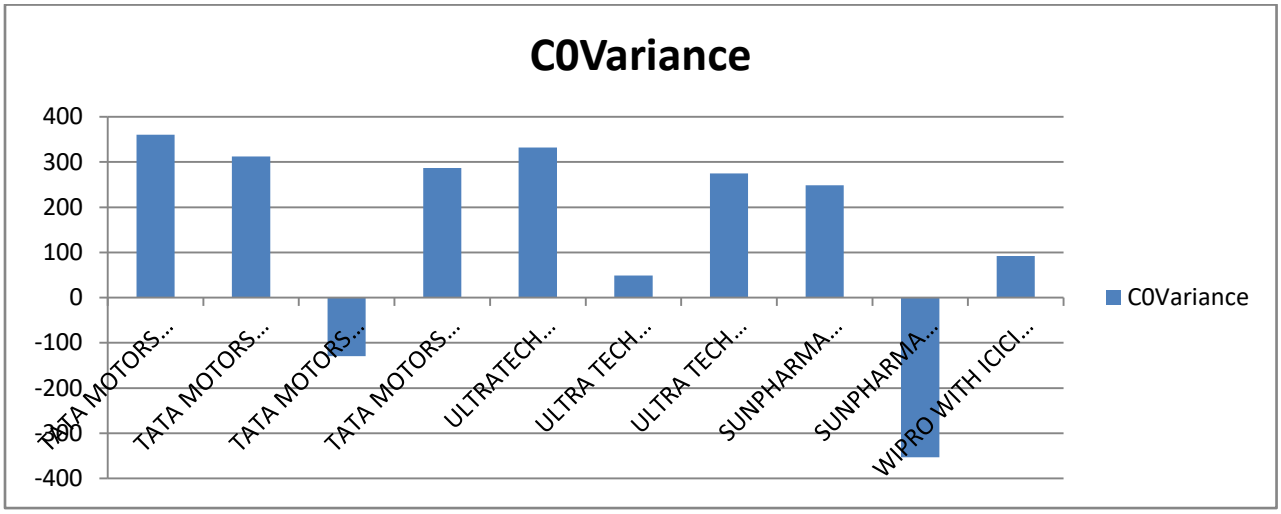


INTERPRETATION: From the above graph, the risk of SUN PHARMA are having high i.e., (45.89) when compared to other selected companies and WIPRO is having low i.e., (13.23) when compared with the other selected companies.

Covariance

COMPANIES	C0Variance
TATA MOTORS COMPANY WITH ULTRA TECH CEMENT	360.3
TATA MOTORS COMPANY WITH SUNPHARMA	312.37
TATA MOTORS COMPANY WITH WIPRO	-129.62
TATA MOTORS WITH ICICI BANK	286.9

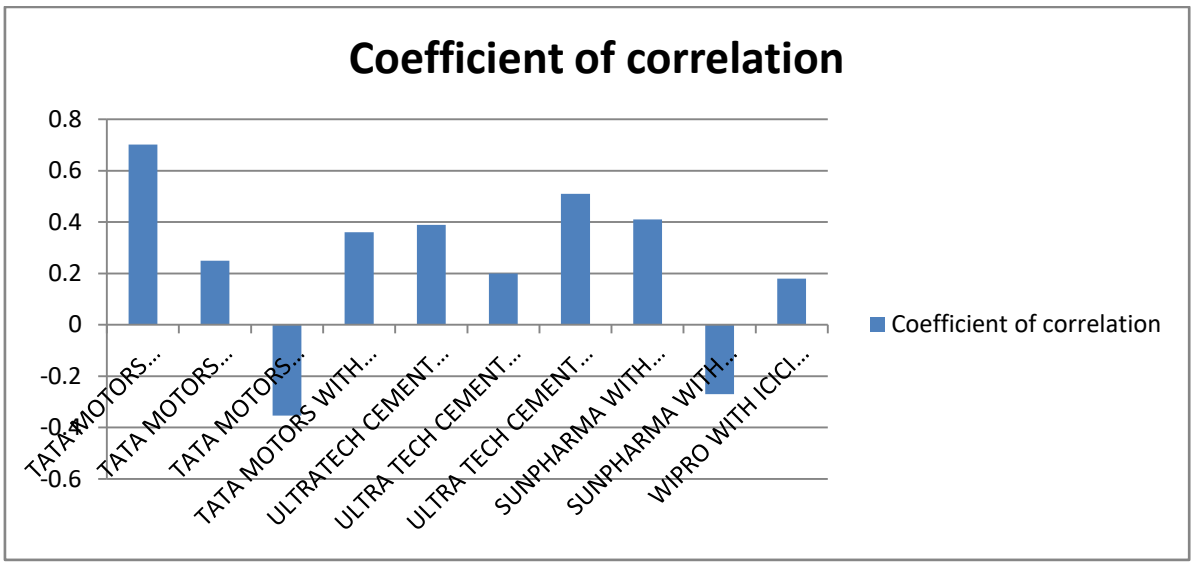
ULTRATECH CEMENT WITH SUN PHARMA	332.27
ULTRA TECH CEMENT WTH WIPRO	48.55
ULTRA TECH CEMENT WITH ICICI BANK	274.48
SUNPHARMA WITH WIPRO	248.24
SUNPHARMA WITH ICICI BANK	-353
WIPRO WITH ICICI BANK	92.13



INTERPRETATION: From the above graphs it is shown that covariance is greater for TATA MOTORS COMPANY WITH ULTRA TECH CEMENT i.e., (360.3) and lesser for SUNPHARMA WITH ICICI BANKI.e., (-353) when compare to other selected companies.

COEFFICIENT OF CORRELATION:

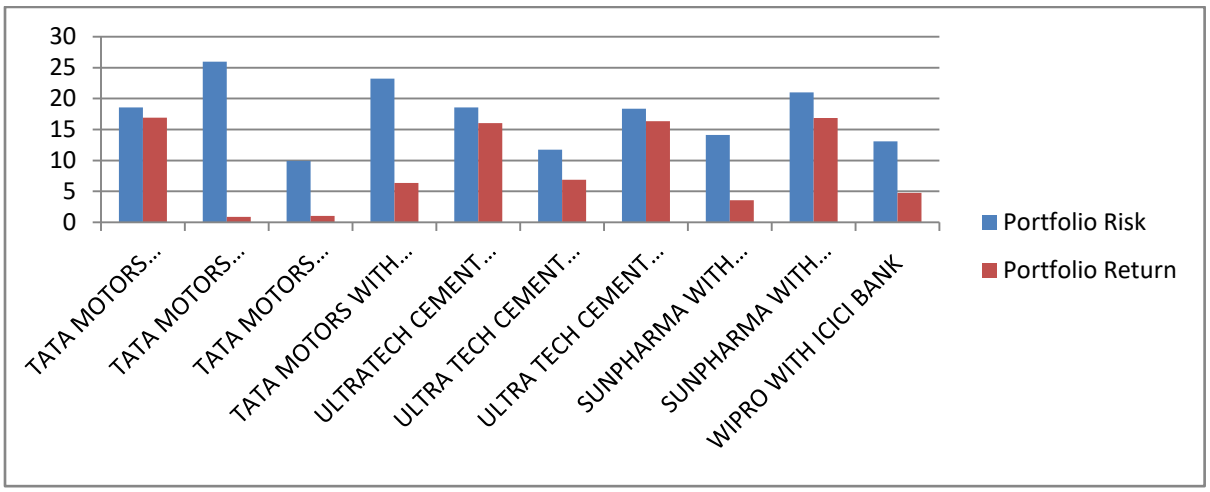
COMPANIES	Coefficient of correlation
TATA MOTORS COMPANY WITH ULTRA TECH CEMENT	0.701
TATA MOTORS COMPANY WITH SUNPHARMA	0.25
TATA MOTORS COMPANY WITH WIPRO	-0.353
TATA MOTORS WITH ICICI BANK	0.36
ULTRATECH CEMENT WITH SUN PHARMA	0.389
ULTRA TECH CEMENT WTH WIPRO	0.2
ULTRA TECH CEMENT WITH ICICI BANK	0.51
SUNPHARMA WITH WIPRO	0.41
SUNPHARMA WITH ICICI BANK	-0.27
WIPRO WITH ICICI BANK	0.18



INTERPRETATION: From the above graph it is shown that correlation of coefficient is greater forTATA MOTORS COMPANY WITH ULTRA TECH CEMENTi.e., (0.701) and lesser forTATA MOTORS COMPANY WITH WIPROi.e., (-0.353) when compare to other selected companies.

PORTFOLIO RISK AND PORTFOLIO RETURN:

COMPANIES	Portfolio Risk	Portfolio Return
TATA MOTORS COMPANY WITH ULTRA TECH CEMENT	18.56	16.89
TATA MOTORS COMPANY WITH SUNPHARMA	25.97	0.902
TATA MOTORS COMPANY WITH WIPRO	9.91	1.06
TATA MOTORS WITH ICICI BANK	23.21	6.35
ULTRATECH CEMENT WITH SUN PHARMA	18.57	16.05
ULTRA TECH CEMENT WTH WIPRO	11.72	6.86
ULTRA TECH CEMENT WITH ICICI BANK	18.35	16.37
SUNPHARMA WITH WIPRO	14.1	3.55
SUNPHARMA WITH ICICI BANK	21.02	16.88
WIPRO WITH ICICI BANK	13.1	4.78



INTERPRETATION:

From the above graph it is shown that the portfolio risk of TATA MOTORS COMPANY WITH SUNPHARMA has high portfolio risk i.e., (25.97) and their portfolio return 0.902. TATA MOTORS COMPANY WITH WIPRO has the lowest portfolio risk i.e., (9.91) and their portfolio return is 1.06 when compared to other selected companies.

10. Hypothesis test:

t-Test: Paired Two Sample for Means		
	portfolio risk	portfolio return
Mean	17.451	8.9692
Variance	26.84877	46.23229
Observations	10	10
Pearson Correlation	0.23938	
Hypothesized Mean Difference	0	
Df	9	
t Stat	3.577403	
P(T<=t) one-tail	0.002977	
t Critical one-tail	1.833113	
P(T<=t) two-tail	0.005955	
t Critical two-tail	2.262157	

Here the calculated value is more than the table value, so we reject H_0 and accept H_1. Which means there is a significance relation between portfolio risk and portfolio return.

FINDINGS

1. Individual returns on the selected stocks including TATA MOTORS, ULTRATECH CEMENT, SUN PHARMA, WIPRO, ICICI BANK are -4.46%, 16.08%, 13.32%, 2.90%, 18.55% respectively.
2. Individual risks on the selected stocks including are TATA MOTORS, ULTRATECH CEMENT, SUN PHARMA, WIPRO, ICICI BANK27.64, 18.58, 45.89, 13.39, 28.70 respectively.

3. Covariance of TATA MOTORS WITH ULTRATECH CEMENT i.e., (360.30) are very high while SUN PHARMA WITH WIPROi.e., (-353.03) are very low when compared to other companies.
4. Coefficient of correlation of TATA MOTORS WITH ULTRATECH CEMENTi.e., (0.701) are very high while coefficient of correlation of TATA MOTORS WITH SUN PHARMA i.e., (-0.353) are very low when compared to other companies.
5. Portfolios Returns ofTATA MOTORS WITH ULTRATECH CEMENT (16.89) are very high while TATA MOTORS WITH SUN PHARMA(-3.15) are very low compared to other companies.
6. Portfolios Risk of TATA MOTORS WITH ULTRATECH CEMENT(25.97) are very high while Portfolio Risks of TATA OTORS WITH SUN PHARMA (9.91) are very low compared to other companies.

SUGGESTIONS

1. TATA MOTORS is having negative returns it should increase its value in the market to get positive returns.

2. It is suggested that the investors who require minimum return with low risk can invest in TATA MOTORS AND SUN PHARMA.

3. It is suggested that the investors who require high risk with high return should invest in SUN PHARMA.

CONCLUSION

Before we invest in shares you should look at the type of shares you want to buy and the way in which you want to deal on the stock market. The different ways for investing in shares are; An investor should invest in a company giving him the highest average return. Investment should be in a company for which standard deviation is high as the return on investment will also be high. Even the risk involved is high.Wipro standard deviation is less when compared to other companies indicating the risk and return involved will also be low.Risk & Return goes hand in hand and they are directly proportional to each other. Invest your capital in a different number of companies (a portfolio of shares). Invest indirectly and spread your risk through collectively investments

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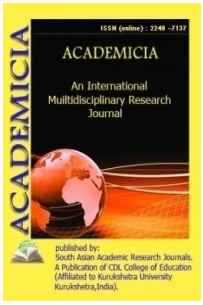

A STUDY ON RECRUITMENT AND SELECTION IN TECH STAR IT SERVICES

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ABSTRACT

From beyond decade the enterprise institutions are all the greater focusing on the human capital given that they are the most esteemed and most loved sources. While selecting the candidates the institutions desires to delineate the reachable HR in view that they make the upper hand for the institutions. The word recruitment has improved closer to turning into as a calculated of human asset capital for the numerous associations. Business institutions are propelling cutting-edge recruiting and determination strategies because of the passage of firm organizations. The point of the paper is to consider the recruitment and selection manner took after at Organisation. The best human capital accessibility in associations makes them top hand and that they grow to be the genuine blood of the associations.

KEYWORDS: *Employees, Recruitment, Selection, Recruitment Policy, Enterprise Weather, Ethical Values.*

I. INTRODUCTION

Human Resources Management is concerned with human beings, who are the energetic elements of management. The success of any organization or an enterprise will depend upon the ability, strength and motivation of person's working in it. The Human Resources Management refers to the systematic approach to the problems in any organization. It's involved with achievement, coaching and Development of personnel.Human resource is the most important asset of an organization. It ensures sufficient supply, proper quantity and as well as effective utilization of human resources..

II. OBJECTIVES OF THE STYDY:

- To study the present Recruitment Policies in "TECHSTAR IT SERVICES"
- To study the type of recruitment/methodology undertaken in the organization.
- To study the different methods of recruitment depending on the requirements of the organization.
- To find the relationship between the qualification and the jobs offered to the employees in the organization.
- To study the changes of recruitment policy in recent times in the organization.
- To know how the company fulfills its manpower requirements.

III. RESEARCH METHODOLOGY

The study was confined to territorial division of "TECHSTAR IT SERVICES" Hyderabad with special reference to its Recruitment policy.

Sample size:

The study was conducted with sample size of 60 employees selected at random from both supervisory and management staff of" TECHSTAR IT SERVICES."

Data collection:

Primary data:

A detailed and well-structured questionnaire was presented to the managerial staff at "TECHSTAR IT SERVICES". Copies of the questionnaire being distributed to the employees at random to obtain their views followed this.

Further discussions regarding the recruitment policies were held with the HRD manager to have an in-depth knowledge and future plans of the company for its effective implementation.

Secondary data:

Secondary data was gathered from academic texts and company profile from company's website.

Analysis:

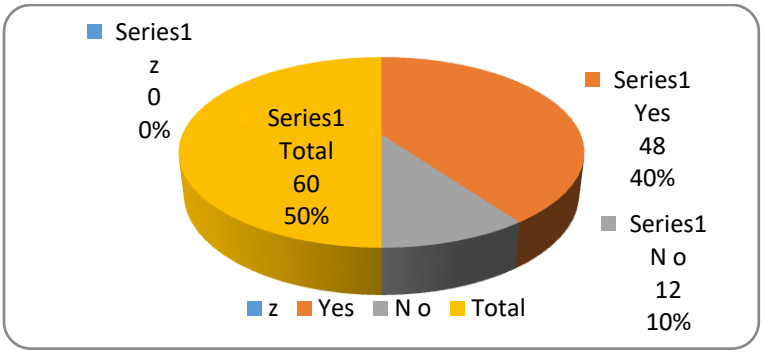
The data collected through questionnaires distributed to the employees was analyzed

IV. ANALYSIS OF STUDY

1. Employees were asked whether they were allocated the post opted by them, for which the following responses to were obtained.

options	No.Of.Respondents	Percentage
Yes	48	80
N o	12	20
Total	60	100

TABLE 1



Graph 1

INTERPRETATION: Out of the 60 respondent whose opinion was asked allocation of the post , 80% of respondents said that they were allotted the post opted by them where as 20% of the respondents said that they were no allotted the opted by them.

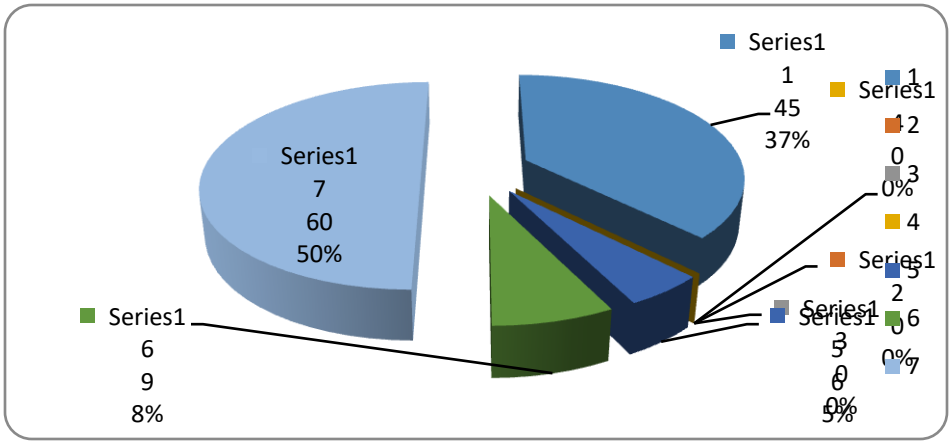
CONCLUSION:

Majority of the employees are satisfied with their allotted post in the organization, but still a few employees are dissatisfied with the posts allotted to the in the organization.

2. Employees were asked as to how they were recruited in the company for which the following responses were obtained.

Options	No.Of. Respondents	Percentage
Open competition	45	75
Recommendations	0	0
Employment exchange	0	0
Trade union recommendations	0	0
Consultancy	6	10
Campus interviews	9	15
Total	60	100

TABLE 2



Graph 2

INTERPRETATION: Out of the 60 respondent questioned about their recruitment in the organization 75% of the respondents were recruited through open competition, 10% through consultancy and 15% through campus interviews.

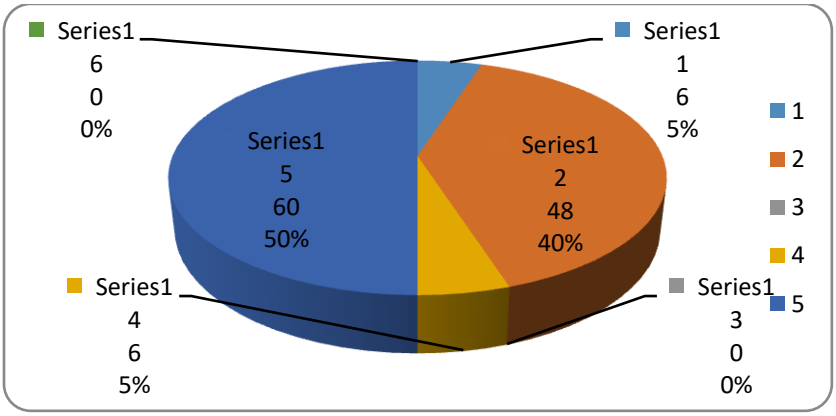
CONCLUSION:

Majority of the employees were recruited through open competition which is a good sign of transparent recruitment policy in the company.

3. Employees were asked about the time period for which they were employed, for which following the responses were obtained.

Options	No. Of. .Respondents	Percentage
Short time period	6	10
Long time period	48	80
Daily wages	0	0
Particular project only	6	10
Total	60	100

TABLE 3



Graph 3

INTREPRETAION: Out of 60 employees who were asked about the time period for which they were recruited, 80% of employees are recruited for long time period where as 10% of employees are recruited only for particular projects.

CONCLUSION:-

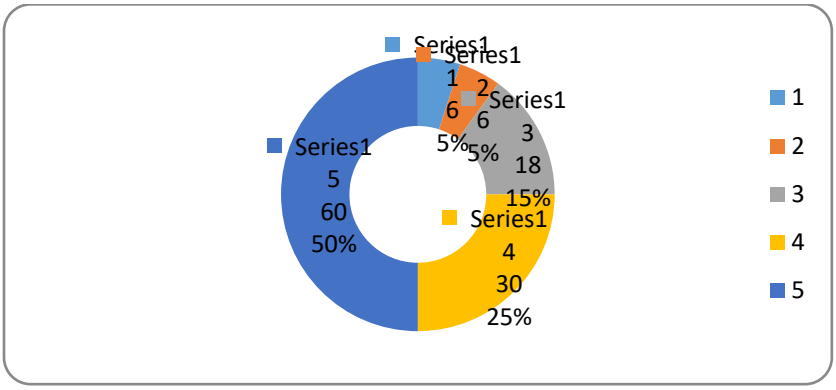
Majority of the employees have been recruited for long time periods and very few employees are recruited for particular as well for short time periods. This shows the stability of the organization and the satisfaction of the employees.

4. Employees were asked the reasons for the taking up this job, for which the response was as follows.

Options	No. Of. .Respondents	Percentage
Good pay Scale	6	10
More benefits	6	10
Career growth	18	30

All the above	30	50
Total	60	100

TABLE 4



Graph 4

INTERPRETATION:- out of the 60 employees asked about the reason for taking up their respective jobs for which 30% of the employees said that they took the job for all the reasons like 'career growth' , 'good pay scale' as well as 'more benefits'., the rest 10% answered as 'good pay scale' was the main reason for taking up the job in APDDCF Ltd.

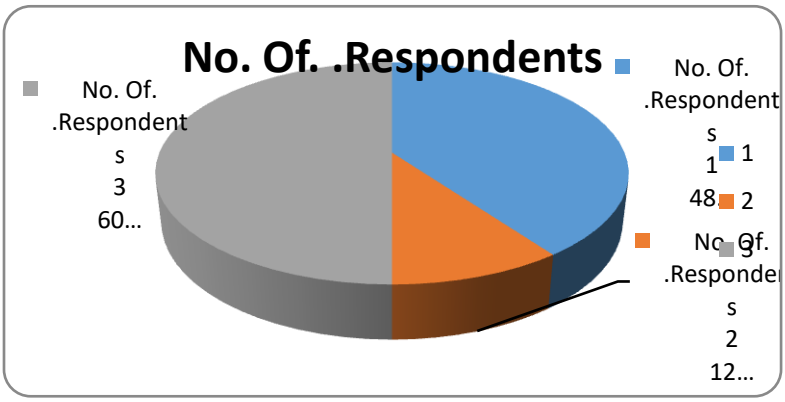
CONCLUSION:

Majority of the employees are of the opinion that all the factors like 'career growth' , ' more benefits' , 'good pay scale' was the main reason for taking up the job in "APDDF Ltd".

5. Employees were asked whether they found any relations there qualifications and the job offered to them, for which they responded in the following.

Options	No. Of. .Respondents	Percentage
Yes	48	80
No	12	20
Total	60	100

TABLE 5



Graph 5

INTERPRETATION:

Out of 60respondents who are asked whether they found any relation between their qualification and the jobs offered to them, 80% of the respondents said that they found a relation where as 20% of the respondents said that they did not find any relation.

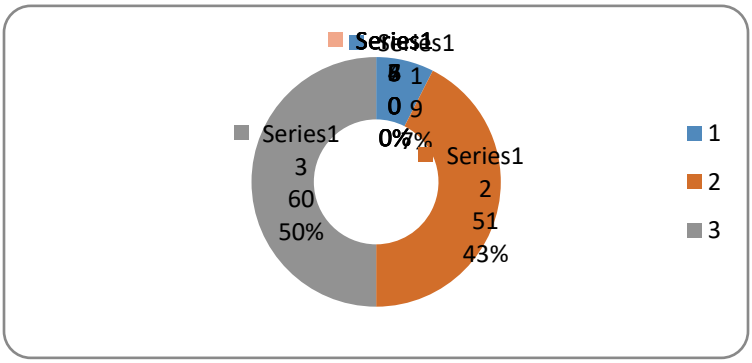
CONCLUSION:

Majority of the employees are satisfied with their jobs where as the rest of the employees are not satisfied with their jobs as they do not find any relation between their qualification an the job thus offered to them.

6. Employees were asked whether they observed any change in the recruitment process in recent times for the following responses were obtained.

Options	No. Of. .Respondents	Percentage
Yes	9	15
No	51	85
Total	60	100

TABLE 6



Graph 6

INTERPRETATION:

Out of the 60 employees questioned regarding any change in the recruitment in recent times,15% of the respondents did not find any change, where as 85% of the respondents found some change.

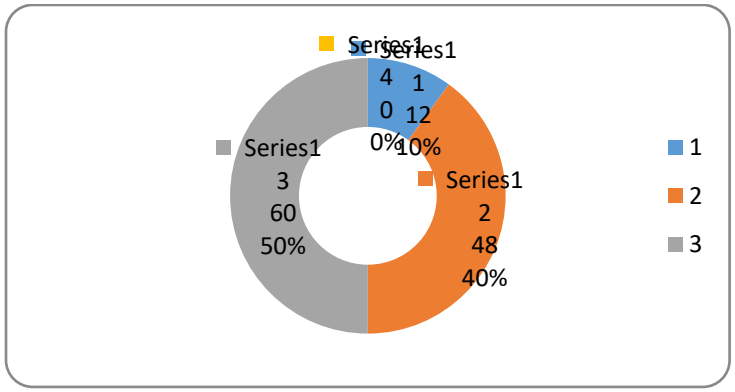
V.CONCLUSION:

Majority of the employees with vast experience, found no significant change in the recruitment policy , of the company in recent times.

Employees were asked about the type of recruitment methodology used in recruitment employees for whom the responses are in the following way.

Options	No. Of. .Respondents	Percentage
Centralized	12	20
Department Recruitment	48	80
Total	60	100

TABLE 7



VI. FINDINGS

- The most significant finding of the study on Recruitment strategy prevailing in the organization is very effective. The employees are quite satisfied with the current recruitment methods.
- The study shows that 76% of the employees who have put in long year of service have recruited via open competition. Which shows the transparency of the recruiting policies of the company?
- 92% of the employees have been working in the organization for a long period which signifies the job security and satisfaction offered by the company to its employees.
- Our study shows that 44% of the employees have joined this organization aiming for career growth, good pay scales, and more benefits which the company offers. Thus the statistics shows that the company has a positive outlook towards the career growth of its employees in addition to the other existing benefits.
- The company's approach to its recruitment policy shows that the right person is very essential for the right job, as nearly 88% of the employees felt that they were offered jobs according to their qualification and experience. Thus setting a relationship between qualification and job offered.
- The study shows that 72% of the employees were of the opinion that the recruitment policy of the company is decentralized with each department recruiting its own employees as per their requirement from the time to time.
- The company gives utmost importance to its manpower requirements by identifying it well in advance taking into consideration the contingencies like retirement, budgetary plans, and attrition rate. The planning of the manpower requirement is being don't in the light of the business plans of the company.The company has been trying to infuse new blood in the organization by appointing fresh graduates and technologists, to set a competitive so as to face the competitive world outside.
- The company has been trying to meet the expectation of its employees by providing job satisfaction to them by offering jobs as per their qualification and experience.

VII. SUGGESTIONS

1. H.R Department should be more practical and efficient so that the recruitment and selection become more effective.

2. Stress should be given on proper maintenance of database of application for future recruitment in the organization.

3. The company should follow new traits / trends in the recruitment process.

4. The stress should be given on knowledge and the experience should be the major criteria for selection of employees.

5. More stress should be given to recruit qualification & skills percentage for scrutinizing the application of prospective candidates.

VIII. CONCLUSIONS

The sources of recruitment in the organization is totally based in both the factors i.e internal and external. The recruitment of the prospective candidate for a particular post is based in experience, age, qualification and percentage in the academic year. The selection process is totally based on skills, communication and technical qualities. The formal interview is conducted by the HRD. After selection the employees are inducted for 1-5 days or more than 15 days.

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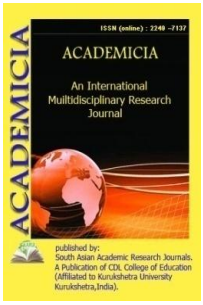

A STUDY ON RISK AND RETURN ANALYSIS OF INDIAN IT SECTOR AT INDIA BULLS

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ABSTRACT

Risk and return analysis plays a major role in most single decision making process. Every capitalist desires to avoid risk and maximize return. Successful investment requires a careful assessment of the investments potential returns and its risk of loss. A firms risk and expected returns directly affect its share price. In real world situations, the Risk of any single investment wouldn't be viewed severally of alternative assets. New investment should be thought-about in light of their impact on the risk and return of the assets. In traditional financial analysis, investment management tools allow the investors to evaluate the return and risk of individual investments and portfolios. Usually, higher the danger, higher the returns and lower the danger, lower the returns. However a general understanding of this development isn't enough to form applicable choices concerning investments. This study reported a statistically significant relationship between risk and return. The study is initiated with the main objective of determining the risk and return profile of five IT firms listed on BSE .Finally, the study proves there's a relation between risk, return and capitalist the most effective company among the selected company.

KEYWORDS: *Risk, Return, Bombay Stock Exchange (BSE),Investment Decision,Intrinisic Value,Share Price,Indian IT Industry.*

1.1 INTRODUCTION

RISK:

RISK The meaning of risk in dictionary is "a situation involving to danger". In terms of finance (or) management it is "investment associated with uncertainty". It is possibility that expected return on investment is totally different from normal return. This concept is most important in finance i.e., higher risk has higher return.

In the investment world, the definition of risk is the likelihood that associate investments actual return is going to be completely different than expected. Risk means that you have got the chance of losing some, or perhaps all, of your original investment.

RETURN:

Return is "what we receive other than investment". The return says about the profit (or) loss on what you have invested.

Returns refer to the potential loss or gain experience through investments in securities. If a shareholder decides to spend in a security that has a comparatively low risk, the possible return on that savings is usually small.

II. REVIEW OF LITERATURE:

1. Kohers and others (2006) made an effort in comparing the return of the stock market with respect to emerging markets and developed markets. The study explained by way of analyzing 49 companies of which 26 countries belonged to emerging countries and the remaining 23 countries belonged to developed countries. The study found that the risk associated with the emerging market was more than in developed countries. Since the expected return of the investment in the emerging markets was commensurate with risk. The study concluded that the risk-averse attitudes of the investors were found to be higher in the emerging market in comparing with the developed market.
2. DWI and Others (2009) made an attempt to find out the influence of accounting information on stock return and therefore the study used multiple regression by way of identifying financial ratio, firm size, and cash flow as an independent variable and stock return as the dependent variable.
3. Sangeetha and Dheeraj (2007) made an attempt to find out the relation among the return of the scrip, market information, and accounting information. They wanted to study the influence of market information on the return of the scrip was high or the influence of accounting information was high on the scrip's return. They collected the information on the basis of monthly data related to various sectors from BSE during the year 1999 to 2006. The study used a regression model to find the significant impact of accounting information and market information on scrip's return and found that the market information made significant influence whereas the accounting information had no impact on the return of the scrip.
4. Hasan Ali and Habibolah (2010) tested the risk-return relationship by way of taking 74 companies as the sample size in the Tehran Stock Exchange during the period of 2003-2005. The study examined the characteristics of the return in terms of Skewness and Kurtosis to find out the distribution of the return series. As far as the study is concerned, the effect of Kurtosis did not show any significant relation with the return during the study period whereas

the Skewness showed the important effects on returns. The study further explored that the relationship between beta and return was found to be non-linear.

III. OBJECTIVES:

1. To co-relate the firm's risk and return and state, the best company among the selected IT companies.
2. The Basic objective is to Minimize Risk and Maximize Return profile of five IT firms listed on BSE.
3. To know the relation between risks, return the most effective company among the selected company.
4. To misuse this opportunity and win benefit by methods for interest in this segment
5. To help dissect the organization by understanding straight forward terms to contribute accurately and viably.

IV. HYPOTHESIS OF THE STUDY

H0: There is no significant relationship between the risk and return of IT companies.

H1: There is a significant relationship between the risk and return of IT companies.

V.RESEARCH METHODOLOGY:

It is the scientific way to solve the research problem. It is the systematic, theoretical analysis of the ways applied to a field of study.

DATA COLLECTION METHODS

The data assortment ways embrace each the first and secondary assortment ways.

Primary data:

Primary data is information that is collected by an examiner from the first-hand source, by means of methods like surveys, interviews, or experiments.

Secondary data:

The secondary data can be obtained from information collected through internet searches, books, government departments, and libraries, NSE, etc.

Period of study:

Period of study: Period of study is taken from 2015 to 2019 in order to calculate Risk and Return analysis of five different companies of the IT sector.

STATISTICAL TOOLS:

Statistical tools used for the study are mean, standard deviation and T-test.

SAMPLE DESIGN:

The study of analysis mainly focusing on the difference of changes in share prices of top Indian IT companies listed on BSE indexes are taken for the study.

SAMPLE SIZE: To analyze the risk and return of five IT companies.

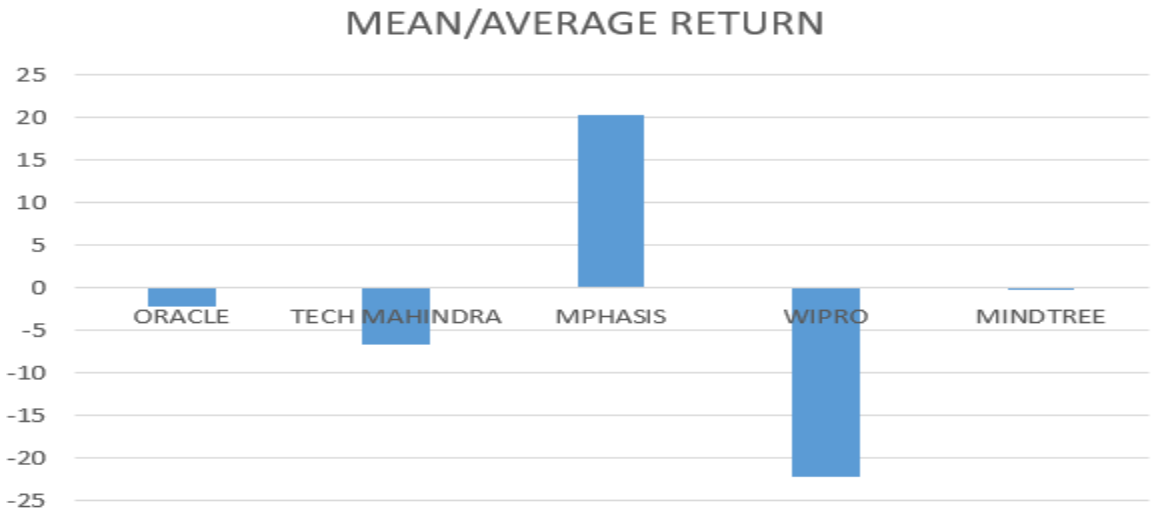
FIVE IT COMPANIES:

1. Oracle Ltd.
2. Tech Mahindra Ltd.
3. Mphasis Ltd.
4. Wipro Ltd.
5. MindTree Ltd.

VI. DATA ANALYSIS

1.MEAN OF IT COMPANIES:

COMPANY	MEAN
ORACLE	-2.23
TECH MAHINDRA	-6.74
MPHASIS	20.37
WIPRO	-22.22
MIND TREE	-0.08

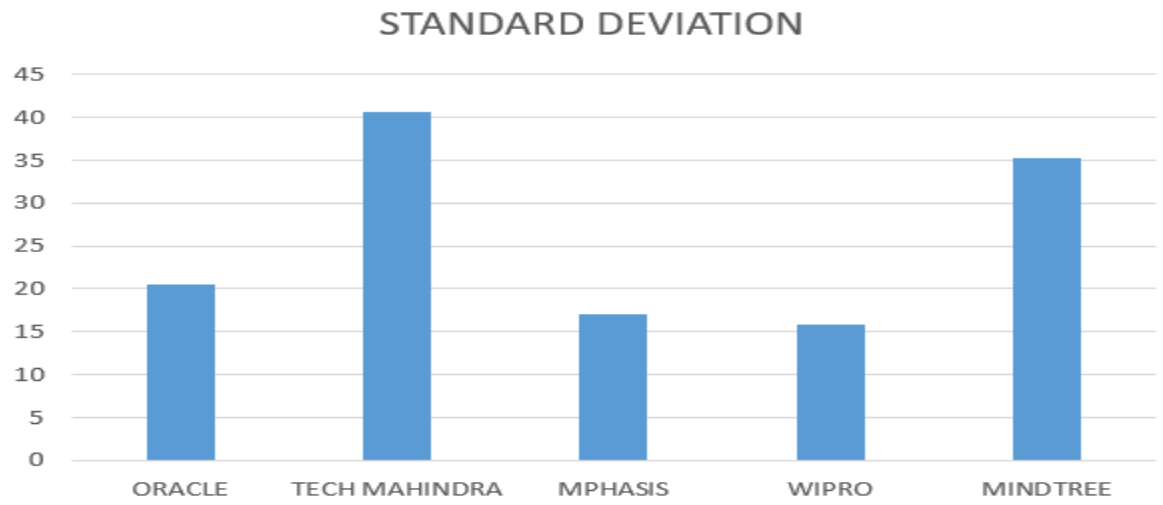


INTERPRETATION:

From the above analysis, to compare different companies of oracle, Tech Mahindra,Mphasis, wipro, andmindtree. It is observed that wiprois having less mean when compared to other companies.

2.STANDARD DEVIATION OF IT COMPANIES:

S.NO	NAME OF THE COMPANY	STANDARD DEVIATION
1	ORACLE	20.49
2	TECH MAHINDRA	40.55
3	MPHASIS	17.12
4	WIPRO	15.86
5	MIND TREE	35.31

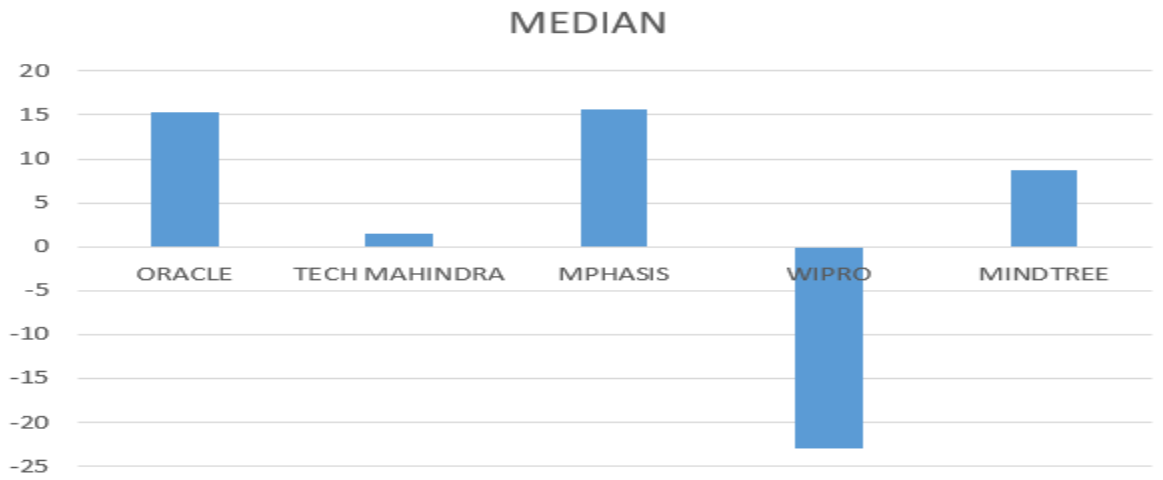


INTERPRETATION:

From the above study, we can analyze that the Tech mahindra(40.55) is having highest standard deviation and wipro (15.86) is having the lowest standard deviation.

3.MEDIAN OF IT COMPANIES:

S.NO	NAME OF THE COMPANY	MEDIAN
1	ORACLE	15.34
2	TECH MAHINDRA	1.5
3	MPHASIS	15.61
4	WIPRO	-22.96
5	MIND TREE	8.7



INTERPRETATION:

From the above graph, Mphasis(15.61)shows more result compared toOracle(15.34),Tech mahindra (1.5) , Wipro(-22.96),MindTree (8.7).

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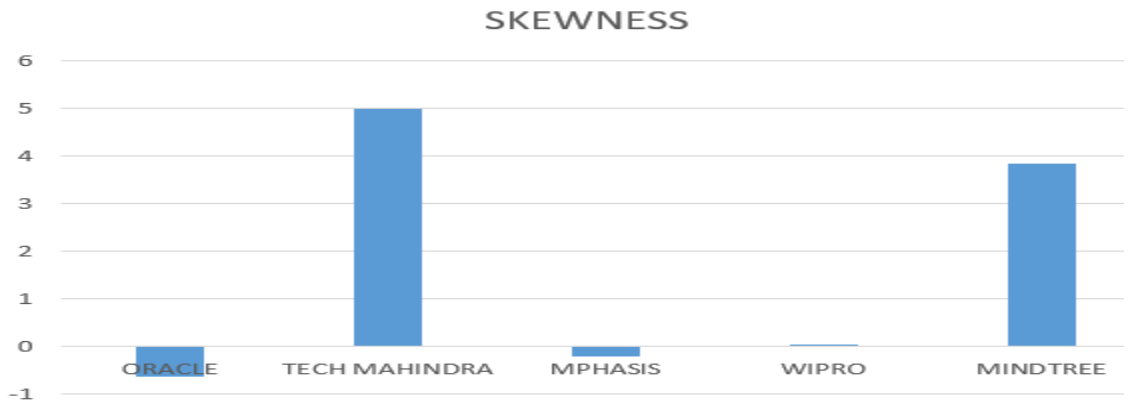
4.SKEWNESS OF IT COMPANIES:

S.NO	NAME OF THE COMPANY	SKEWNESS
1	ORACLE	-0.64
2	TECH MAHINDRA	4.99
3	MPHASIS	-0.2
4	WIPRO	0.04
5	MIND TREE	3.85

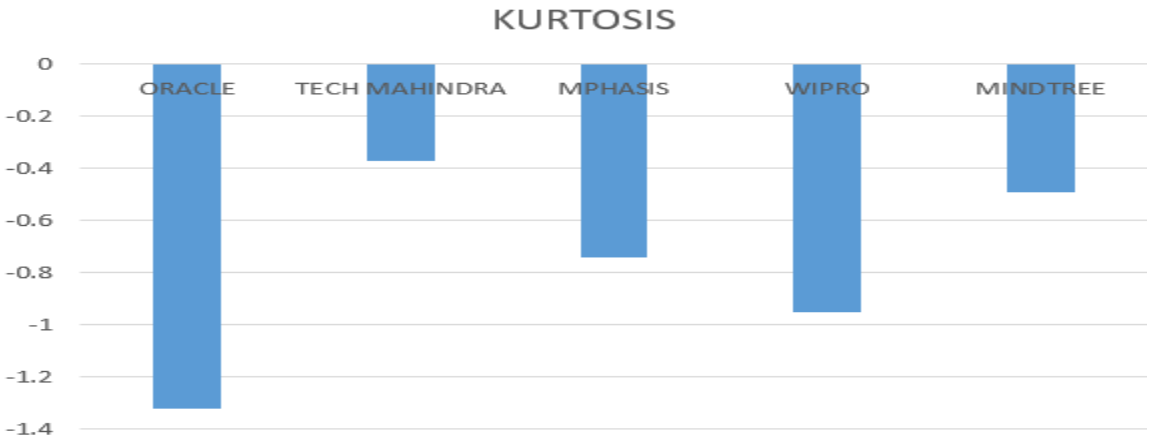


INTERPRETATION:

From the above study, the skewness of oracle (-0.64),Mphasis(-0.2) shows negative result.Tech Mahindra(4.99),wipro(0.04),MindTree(3.85) shows posiitve result.

5.KURTOSIS OF IT COMPANIES:

S.NO	NAME OF THE COMPANY	KURTOSIS
1	ORACLE	-1.32
2	TECH MAHINDRA	-0.37
3	MPHASIS	-0.74
4	WIPRO	-0.95
5	MIND TREE	-0.49



INTERPRETATION:

From the above analysis,oracle(-1.32) Tech mahindra (-0.37),mphasis (-0.74),wipro (-0.95) and mindtree (-0.49)shows negative result.

6.**T-TEST RESULT OF MPHASIS WITH ORACLE:**

TABLE COLUMN SUB HEAD	MPHASIS	ORACLE
Mean	57.515	75.25833
Variance	13382.48	28600.76
Observations	6	6
Pearson Correlation	0.99754	
Hypothesized Mean Difference	0	
Df	5	
t Stat	-0.79999	
P(T<=t) one-tail	0.230009	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.460017	
t Critical two-tail	2.570582	

For the above table, H0 is accepted on the basis of calculated value -0.79999 is less than the table value.

T-TEST RESULT OF MPHASIS WITHTECH MAHINDRA:

TABLE COLUMN SUB HEAD	MPHASIS	TECH MAHINDRA
Mean	57.515	280.675
Variance	13382.48	446435.4
Observations	6	6
Pearson Correlation	0.997055	
Hypothesized Mean Difference	0	
Df	5	
t Stat	-0.98868	
P(T<=t) one-tail	0.18411	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.36822	
t Critical two-tail	2.570582	

For the above table, H0 is accepted on the basis of calculated value -0.98868 is less than the table value.

T-TEST RESULT OF MPHASIS WITH WIPRO:

TABLE COLUMN SUB HEAD	MPHASIS	WIPRO
Mean	57.515	36.905
Variance	13382.48	11286.84
Observations	6	6
Pearson Correlation	0.983629	
Hypothesized Mean Difference	0	
Df	5	

t Stat	2.277002	
P(T<=t) one-tail	0.035903	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.071807	
t Critical two-tail	2.570582	

For the above table, H0 is rejected on the basis of calculated value 2.277002 is greater than the table value.

T-TEST RESULT OF MPHASIS WITHMINDTREE:

TABLE COLUMN SUB HEAD	MPHASIS	MINDTREE
Mean	57.515	215.645
Variance	13382.48	255256.5
Observations	6	6
Pearson Correlation	0.997436	
Hypothesized Mean Difference	0	
Df	5	
t Stat	-0.99335	
P(T<=t) one-tail	0.183075	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.366149	
t Critical two-tail	2.570582	

For the above table, H0 is rejected on the basis of calculated value -0.99335 is greater than the table value.

VII FINDINGS

1. During the study period, the mean returns for selected IT companies shares both positive and negative figures.
2. The risk of TECH MAHINDRA is higher when compared to selected IT companies.
3. The skewness of ORACLE is less to that of remaining IT companies.
4. MPHASISis having highest median and WIPRO is having less.
5. The value of MPHASIS is higher returns in WIPRO is having less returns.
6. The value of kurtosis is higher in TECH MAHINDRA and ORACLE is less.

STATISTICAL ANALYSIS

Descriptive statistics: To analyze the descriptive statistics the mean value is considered.

T-test: T-test is done to find out significant differences with the 5 companies and the factors. if the T-test value is greater than T-critical two tail the null hypothesis is rejected, if it is less then null hypothesis is accepted.

TESTING OF HYPOTHESIS

Based on the above study, T-test results of five IT companies whose all calculated values (t stat)

Are less than tabulated value(t critical two tail). So H0 is accepted.

By doing T-test for the selected IT companies it has been revealed that Calculated value is less than table .So, H0 is accepted.

VIII.SUGGESTIONS:

1. Investing in MPHASIS is the most profitable since the returns generated from it is comparatively high.
2. Investing in WIPRO is not safe since it is risky and the returns generated from it are lesser than any other security.
3. Any investor having a long term horizon must invest in a security having lower standard deviation to enjoy safe and fruitful gains in future.

IX.CONCLUSION

The IT industry is having highest growth opportunity in the near future, since information technology plays an important role in the economic development. Indian IT sectors have fared well on growth, asset quality and profitability with other regional IT sectors over the last years. The study of relationship between risk and return analysis helps the capitalist to choose up the securities supported for his alternative. The study of this kind provides information about the presentation of a variety of stocks in the market in terms of risk and return and suggests the best company for investment. Further, the inability of IT sector managements to improve capital allocation, increase the productivity of their service platforms and improve the performance ethic in their organizations could seriously affect future performance. The above study gives an optimistic view about the industry and its expansion which recommends the investors to keep a good look at on the major company to help in terms of returns on their investments.

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A STUDY ON AIRTEL SALES AND ADVERTISING

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ABSTRACT

In this study a sample of respondent of selected mobile telecommunications company had been interviewed to know sales and advertising impact on consumer behavior. A structured questionnaire had been used for collecting primary data. The results of this research study had shown that advertising is more important for enhancing customer satisfaction. The service companies need to invest lot on advertising so that customer remember and retain with the company. The results of this study are helpful in formulation marketing strategy in telecommunication sector.

KEYWORDS: *Advertising, Sales, Consumer Behavior, Customer Satisfaction, Telecom Sector, Mobile Services.*

INTRODUCTION

In India the growth of telecom sector is high compared to any other sector. Now using smart phone and consumption of data services had become necessary for many people in various occupations. The demand for data had made companies to think about data plans and give less importance for other services. The customers have got habituated that talk time or voice calls would be unlimited automatically and they need internet data. In this way the consumption pattern had changed a lot in the recent years. In this regard the present study of sales and advertisements on consumer behavior with regard to Airtel had been discussed in this research study.

Sales and advertising are both functions of marketing, which involves getting products from the idea stage to consumers. Many small companies run advertising first to support the selling function. The advertising helps inform consumers and business customers about the company's products and services. A sale is usually a more infrequent activity than advertising. Sales reps visit their customers, make their sales and the products are shipped to customers. They may not

visit a particular customer again for another month or two. Advertising usually occurs more frequently. Small companies may advertise daily, weekly or monthly, depending on the type of media. It takes time for people to respond to advertising. They often need to hear an advertising message multiple times before they understand the offer or start recognizing a particular brand or company

ABOUT AIRTEL

Lead by Sunil Mittal and set up in 1995 as Bharti Cellular Limited, the company offered services under the Airtel brand. It became the first telecom company in India to reach two million subscribers, bringing down STD and ISD rates under the IndiaOne brand. After many joint ventures and acquisitions through the decades, the company was a leading telecom network with services in 16 countries with close to 400 million subscribers as of 2018. In India, the company has diversified to offer mobile data services, digital television, software and cloud products, and Android-based tablets to the fastest growing mobile phone market. The telecom equipment sector revenue was estimated to be around 26 billion U.S. dollars by 2020. The number of internet subscribers was estimated to double by 2021. A compound annual growth rate of over 18 percent was forecast for the mobile value-added services within the country.

OBJECTIVES OF THE STUDY

1. To study the impact of advertisements on customer satisfaction at Airtel.
2. To know the impact of selected factors on customer satisfaction.
3. To study the trend of sales and advertisements at Airtel.
4. To know the relationship between occupation and recharge mode.

LITERATURE REVIEW

Jain (2011) had that celebrity endorsement positively influences consumer intention in telecom industry. The credibility of endorsement is associated with positive intention towards usage of telecom service. Iglesias (2011) had considered elements like brand awareness, brand image, consumer attributes and brand preference for assessing consumer behavior towards telecommunications service. Advertising, quality, price, risk perception and word of mouth (WOM) influence the overall brand preference of consumers for telecommunications service. Reasonable price creates positive impact on consumer intention towards services.

Czarnecki and Dietze (2017) had mentioned that tremendous changes have altered the rules and regulations in telecom industry in the past two decades. Innovative applications, convergent services, and dedicated customer orientation are today's success factors. Gershon (2013) the telecommunication industry had changed the lifestyle of people in the modern world. Adoption of digital technology had become possible with support of telecommunication networks. Pehrsson (2012) had developed a strategic model for implementing in telecommunication industry.

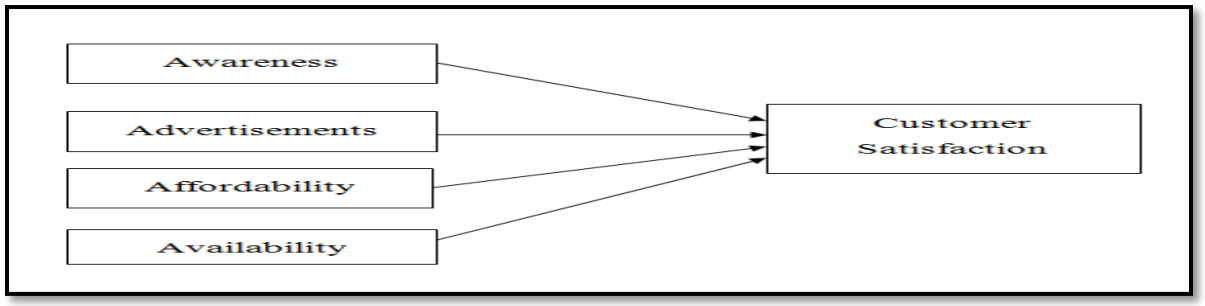
Min et al (2016) had explained the need for customer retention in wireless telecommunications networks. It is suggested that organizations in telecommunications industry need to invest for retaining customers. Chen and Myagmarsuren (2011) had explained that relationship quality is influenced by brand image and service quality in telecommunications industry. Wang et al (2014) had argued that corporate performance in telecommunications industry is influenced by

corporate social responsibility activities. Beard (2015) had explained that organizations with investment in advertising can improve their brand image.

Sujatha et al (2015) had explained about the role of telecommunication in implementation of over-the-top (OTT). Kumar (2012) had stated that modern telecommunication organizations are using business intelligence to understand the usage pattern of customers. Liu and Jayakar (2012) had compared the policy of telecommunication between China and India. Mathew and Dambal (2010) had mentioned that consumer show positive intention for viewing mobile advertisements. According to Ul Haq (2012) consumer attitude towards mobile advertisement is different from traditional advertisements. Dash and Kumar (2011) had analyzed the usage behavior of rural consumers towards mobile services.

RESEARCH METHODOLOGY

In this study a structured questionnaire had been used for collecting primary data. The sample size of this study is 100 and simple random sampling had been used. The prerequisite is that every respondent must be user of Airtel mobile services. There are five constructs in the questionnaire and each construct has three items. The items have been framed based on the previously published scales. Each items is measured on five point Likert-type scale from 5 to 1 where 5 means strongly agree and 1 means strongly disagree. Among the five constructs one is dependent variable and four are independent variables which can be seen in Figure 1. The dependent variable in this research model is customer satisfaction and independent variables are awareness, advertising, affordability and availability. Hypothesis testing had been made using SPSS software. The statistical tools applied on primary data in this study are frequency analysis, descriptive statistics, regression analysis and cross tabulation. Books, journals, online sources have been used for gathering secondary data need for this study.



Data Analysis

The sample size of this study is 100 and frequency analysis for five years has been shown in the following Table 1. The options for each variable had been shown in second column and frequency for each option had been shown in third column of table 1.

TABLE 1: FREQUENCY TABLE

Variable	Option	Frequency (%)
Gender	Male	70
	Female	30
Age group	18 to 24 Years	28

Variable	Option	Frequency (%)
	25 to 34 Years	36
	35 to 44 Years	28
	Above 44 Years	8
Occupation	Student	12
	Employee	50
	Business	15
	Others	23
Source	Television advertisements	26
	Friends	30
	Outdoor advertisements	18
	Internet advertisements	18
	Others	8
Recharge mode	Retailer	15
	Mobile app	39
	Online	25
	It depends	21

Majority of the respondents seventy percent are male and remaining thirty percent are female from the perspective of gender. Twenty eight percent of respondents belong to 18 to 24 years age group, thirty six percent belong to 25 to 34 years age group, twenty eight percent belong to 35 to 44 years age group and remaining eight percent belong to above 44 years age group. It is observed that majority of the respondents are employees with fifty percent out of 100 respondents, students are twelve percent, fifteen percent are having own business and twenty three percent do other kind of occupation as per above Table 1. From the dimension of source of knowledge or advertisement Airtel product it is observed that twenty six percent have gained knowledge about Airtel from television advertisements, thirty percent from friends, eighteen percent from outdoor advertisements, eighteen percent from internet advertisements and eight percent from other sources. The respondents have stated that fifteen percent takes help of retailer for mobile recharge, thirty nine percent through mobile app, twenty give percent from online mode and twenty percent stated that it depends on the situation.

TABLE 2: DESCRIPTIVE STATISTICS

	N	Mean	Std. Deviation
Awareness	100	4.350	0.479
Advertisements	100	4.140	0.681
Affordability	100	4.300	0.784
Availability	100	4.440	0.440
Customer Satisfaction	100	4.060	0.263
Valid N (list wise)	100		

According to Table 2 the mean value for availability is high with 4.44. and its standard deviation is 0.440. It can be stated that customers are more satisfied with availability of mobile services through various modes like showrooms, retailers and company direct selling agents. The mean value for customer satisfaction is 4.060 and its standard deviation is 0.263 shows that customers have agreed that they are satisfied highly with Airtel mobile services. The low standard deviation is positive indicator reflecting the quality services of Airtel mobile services.

Hypothesis H1: There is positive impact of awareness on customer satisfaction towards Airtel mobile services.

Interpretation: H1 is accepted because p-value (significant value) in the last column is for awareness variable is less than 0.05 as per Table 3. Therefore the increase in awareness about Airtel mobile services positively impact customer satisfaction.

TABLE 3: COEFFICIENTS[A]

Model		Un-standardized Coefficients		Standardized Coefficients	t	Sig. (p-value)
		B	Std. Error	Beta		
1	(Constant)	11.389	0.475		23.982	0.000
	Awareness	2.330	0.077	0.207	4.285	0.000
	Advertisements	2.139	0.064	0.124	6.182	0.000
	Affordability	0.597	0.050	0.614	3.850	0.500
	Availability	3.619	0.064	0.520	9.662	0.000

a. Dependent Variable: Customer Satisfaction.

Hypothesis H2: There is positive impact of advertisements on customer satisfaction towards Airtel mobile services.

According to Table 3 the p-value for advertisements is less than 0.05. Hence H2 is accepted which can be stated that increase in advertisements of Airtel mobile services creates positive impact on customer satisfaction.

Hypothesis H3: There is positive impact of affordability on customer satisfaction towards Airtel mobile services.

H3 is rejected based on p-value which is more than 0.05 as per Table 3. Hence it is stated that there is no significant association between affordability and customer satisfaction with regard to mobile services of the company.

Hypothesis H4: There is positive impact of availability on customer satisfaction towards Airtel mobile services.

H4 is accepted because p-value for availability is less than 0.05 as per Table 3. Therefore H4 is accepted which means that availability of mobile services in variety of modes and with distributors had created positive impact on customer satisfaction.

TABLE 4: OCCUPATION * RECHARGE MODE CROSSTABULATION

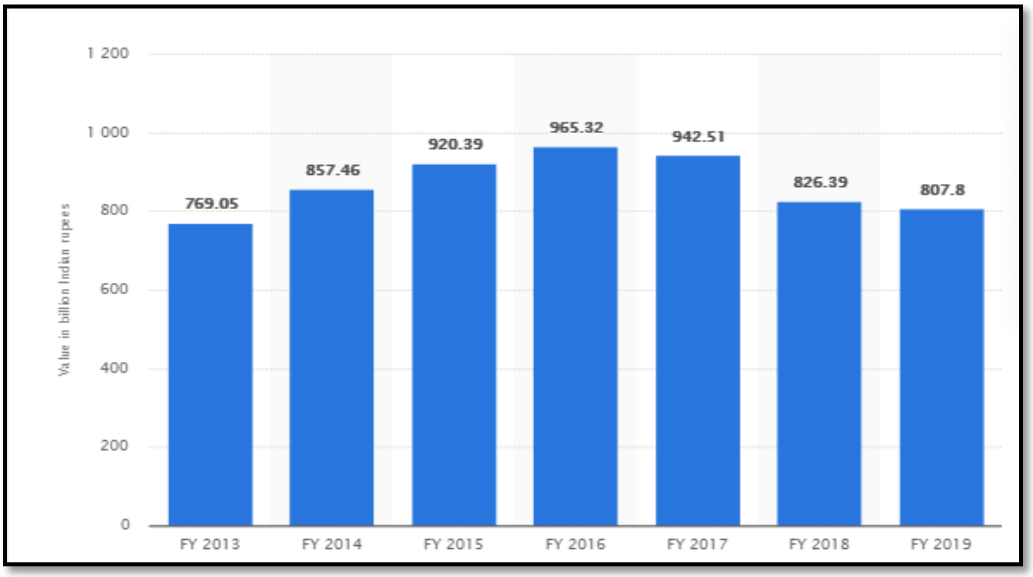
Count

		Recharge mode				Total
		Retailer	Mobile App	Online	It depends	
Occupation	Student	5	0	0	7	12
	Employee	5	24	21	0	50
	Business	0	4	4	7	15
	Others	5	11	0	7	23
Total		15	39	25	21	100

(Source: SPSS Output)

It is observed from above Table 4 that employees are using mobile app and online mode in high frequency compared to customers from other occupations. The mobile app had become more favorable option for majority of the participants in the study. The intention towards online recharge mode had been increasing in the recent years. In the above Table 4 the usage of mobile recharge mode according to occupation had been cross tabulated. It should be noted that many people have also mentioned that it depends on the situation to select the recharge mode.

Figure 2: Bharti Airtel revenue across India from FY 2013 to FY 2019



As per figure 2 it is observed that there is consistency in sales and revenue at the company. Even thought there is stringent competition from giant new entrants into mobile services industry the company had shown good indicators for financial performance.

FINDINGS: Customer satisfaction is high at Airtel and company had good strategy for customer retention. The signal quality of the mobile services had made customer to retain with the company. The availability of mobile services and assistance from call centers had made the company to maintain good relationship with the customers. The advertising is constantly

reminding about new products and service of the company. The company had invested lot in advertising and it had got better returns on its investment.

SUGGESTIONS: It is important for the company to remind that Airtel provides value added services with end to end secured payments. The company had to enter long term partnership with utility companies for bill payment. The concentration on data packs and live news is more important. It is time for the company to show that internet service is primary and it provides customized packs for customers. The customer must be given incentives for downloading and using mobile apps. Programs must be implemented for engaging customers and company should also develop gaming apps for high interaction with customers.

DISCUSSION AND CONCLUSION

The customer satisfaction of the selected telecommunication services company is supported by its advertising strategy. The logo of the company had changed in the recent years and it is easily recognized and remembered by customers. The availability of services from various distributions and middlemen had positive influenced customer satisfaction. Even though company is offering many services at affordable prices the customer satisfaction is not influenced by the pricing strategy of the company. The sales of the company for the last seven years showed the capability of the company in the competitive mobile services industry. Now future is data plans therefore company needs to concentrate more on creating customized plans for various customers. The usage of smart phone had drastically increased in the recent years therefore innovative and affordable data plans need to be launched by the company. The company should retain customers by giving customer specific plans.

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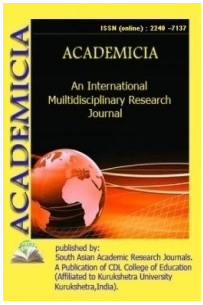

A STUDY ON EQUITY ANALYSIS OF BANKING SECTOR LISTED IN BSE

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ABSTRACT

Every investment has its own strengths and weaknesses. Every investor thinks that his investment should get high returns, but it's associated with a risk factor. Compared to all other investment's equity investment will get high returns and as well as it has high risk. So, in order to reduce the risk, the investor before investing he must do the stock market research. Analysis of individual securities and operation of their markets and determining the risk reward structure of equity. The future price movement of a financial instrument is determined using fundamental analysis based on environmental, political, economic and other factors. Technical analysis is a method used to predict the price movement and future market trends by studying charts of past market action which consider volume of trading, price of instruments, and open interest in the instruments where applicable.

KEYWORDS: *Stock, Return, Beta, Market, Banking Sector, Equity Analysis.*

INTRODUCTION

LITERATURE REVIEW:

B.Nisha (2018) in her study Equity analysis of banking sector listed in NSE. Find out that before investing in the shares investor has to use technical analysis to get better returns and for safe investment. The main objective of the study is to forecast the stock prices using technical analysis.

K.S. Nemavathi and Dr.V.R. Nedunchezhian (2012) in their study technical analysis they found out that there is high fluctuations in the selected securities during the period with the use of effective tools, to accomplish the objectives of the research.

Dr.SreemoyeeGuha Roy (2013) in her study equity research, to make an investment decision the investor should perform fundamental and technical analysis of the stock, which includes the following parameters economic, industry, and company analysis. The study concludes about investor's decision making behaviour.

NEED OF THE STUDY:

1. Equity analysis plays a major role, as it provides the information to the market. An efficient market depends upon the information; a lack of information creates inefficiencies that result in stocks being misrepresented.
2. This study proved the information to the individual investor.
3. The need of the study is to know the performance of the stock through equity analysis, which helps the investor whether to invest or not in the stock.

OBJECTIVES OF THE STUDY:

1. The major objective is to analyse the equity of selected banking stocks listed in BSE.
2. To understand the banking sector stock prices movement of selected bank stocks.
3. To compare the performance of the selected banking sector stocks.
4. To evaluate the relationship between selected stock and market index.

SCOPE OF THE STUDY:

1. The present study is limited to the Equity Analysis of banking sector with the help of tools and determining the risk, return and relationship involved in the share prices of the banks with the market. The study has covered five years' time period. This study helps in identifying the volatility of stock prices of the selected bank.

HYPOTHESIS:

- H0: There is no relationship between the market index and the selected sample of banking sector stock return.
- H1: There is a relationship between the market index and the selected sample of banking sector stock return.

RESEARCH METHODOLOGY:

Primary data:

The data which is directly collected from the company is called as primary data.

Secondary data:

The current study is completely based on the secondary data. The data is collected from the different journals, media,and BSE official website and through banks official websites.

PERIOD OF THE STUDY:

The period of study is limited to five year i.e. January 2015 to December 2019.

METHOD OF SAMPLING:

In the banking sector five national banks are selected randomly which are listed in the BSE. They are Bank of Baroda, Syndicate bank,and Union bank of India, Canara bank, and Indian bank. Random sampling method is used for selecting.

TOOLS AND TECHNIQUES:

Mean:

Mean is the average of group of numbers. This is used to find out the middle value of the group of numbers. Mathematically mean is the sum of all the observations which is divided by the number of observations.

Mean = sum of observations/no of observations

Standard deviation:

Standard deviation isthe measure of deviation of a set of data from its mean. Standard deviation is used in financial derivative terms to measure the risk involved.

Standard deviation=Sqrt $(\Sigma(x\text{-mean})^2/N)$

Beta:

Beta measures the systematic risks of a security by an historical data of individual stock and the market return.

Beta= $(N*\Sigma XY-\Sigma X*\Sigma Y)/ (N*\Sigma X^2-(\Sigma X)^2)$

LIMITATIONS:

1. The study is conducted on selected sector and therefore it is limiting to the area of research.
2. There is less possibility of generalization of the study.
3. This study considers the information only for limited duration of time which is five years.
4. It is not possible to have detailed study of project because the time span of the project is only 45 days.

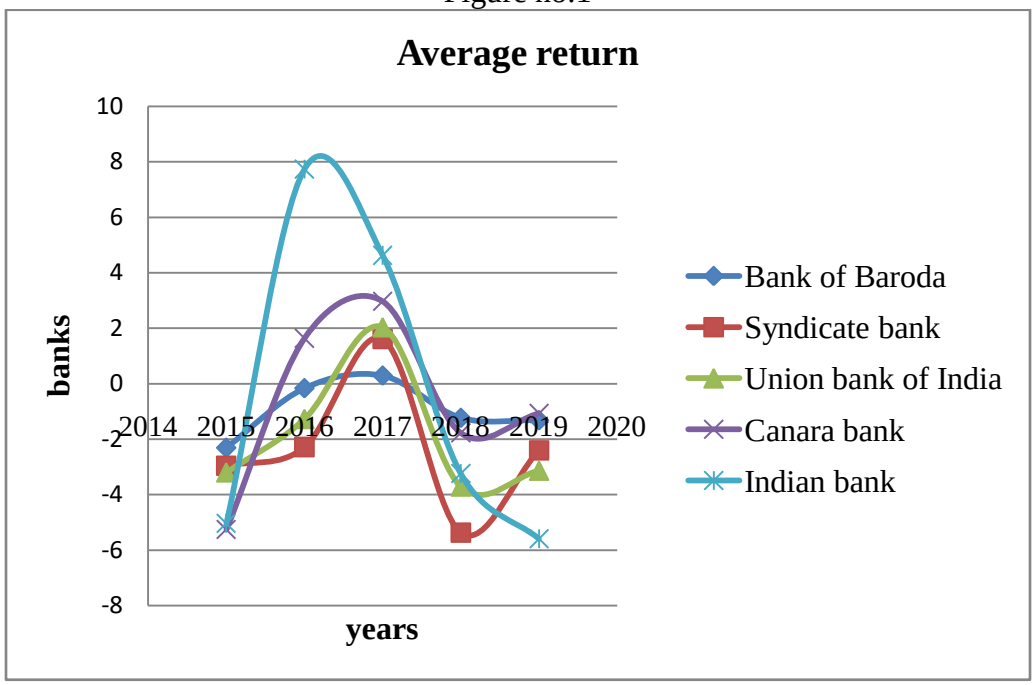
AVERAGE RETURN:

TABLE NO: 1 AVERAGE RETURN OF SAMPLE:

Years	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
2015	-2.3059	-2.9573	-3.2007	-5.2566	-5.0345
2016	-0.1661	-2.2839	-1.2756	1.64011	7.7359
2017	0.28749	1.60931	2.02923	2.97093	4.62605
2018	-1.233	-5.3664	-3.7115	-1.776	-3.2377
2019	-1.3192	-2.4045	-3.1397	-1.0719	-5.5897

Source: historical data of company stock price from Bombay stock exchange.

Figure no:1



Interpretation:

The above graph no: 1 shows the highest average return is 7.7359 of Indian bank in 2016 and the least average return is -5.5897of Indian bank in 2019. Bank of Baroda highest average return is in the year 2017 and lowest in 2015. Syndicate bankhighest average return is in the year 2017 and lowest in 2018.Union bank of Indiahighest average return is in the year 2017 and lowest in 2018.Canarabank highest average return is in the year 2017 and lowest in 2015. Indian bankhighest average return is in the year 2016 and lowest in 2019. The average return of the all the banks has positive return in the year 2017.

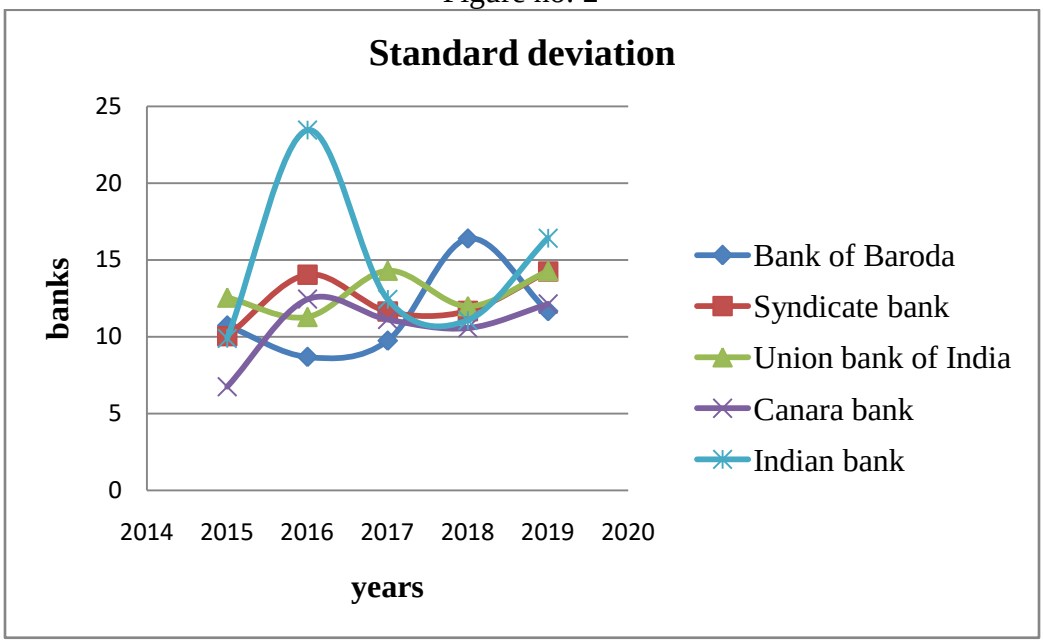
STANDARD DEVIATION:

TABLE NO: 2 STANDARD DEVIATION OF SAMPLE

Years	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
2015	10.7215	10.0434	12.5479	6.75483	9.90438
2016	8.67628	14.0434	11.2891	12.4428	23.4505
2017	9.7356	11.6423	14.299	11.1287	12.4386
2018	16.3916	11.6765	11.9893	10.571	11.0686
2019	11.662	14.2499	14.2765	12.128	16.4227

Source: historical data of company stock price from Bombay stock exchange

Figure no: 2



Interpretation:

The above graph no:2 shows the highest standard deviation is 23.4505 of Indian bank in 2016 and the least standard deviation is 6.75483 of Canara bank in 2015.The highest standard deviation of Bank of Barodais in the year 2019 and lowest in 2016. Syndicate bankhighest standard deviation is in the year 2019 and lowest in 2015.Union bank of Indiahighest standard deviation is in the year 2017 and lowest in 2016.Canarabank highest standard deviation is in the year 2016 and lowest in 2015. Indian bankhighest standard deviation is in the year 2016 and lowest in 2015.

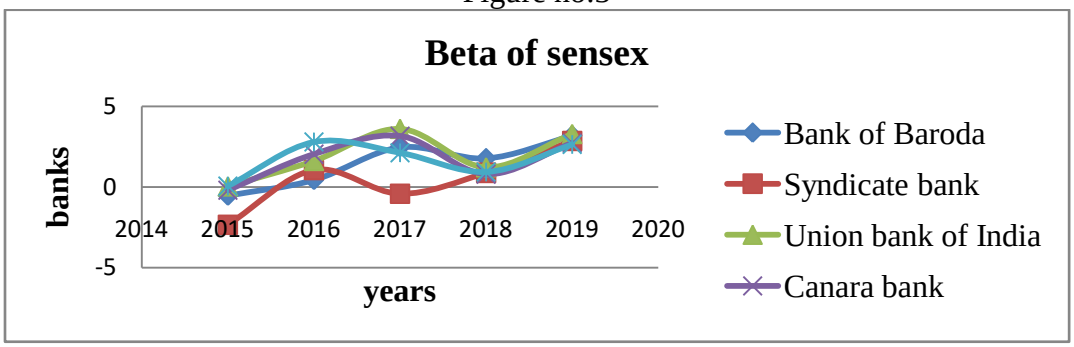
BETA OF SENSEX:

TABLE NO: 3 BETA OF SAMPLE

Years	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
2015	-0.5466	-2.3504	0.03213	-0.1986	0.05605
2016	0.42842	1.04459	1.61216	2.03538	2.79011
2017	2.46268	-0.4267	3.60265	3.15568	2.12387
2018	1.77208	0.87285	1.21703	0.80023	0.93278
2019	3.17761	2.84353	3.28368	2.72139	2.63293

Source: historical data of company stock price from Bombay stock exchange

Figure no:3



Interpretation:

The above graph no: 2 shows the highest beta is 3.60265of union bank of India in 2017 and the lowest beta is -2.3504 of syndicate bank in 2015.The risk factor of Bank of Baroda is high in the year 2019 and lowest in 2015. Syndicate bankhighest risk factor is in the year 2019 and lowest in 2015.Union bank of Indiahighest risk factor is in the year 2017 and lowest in 2015.Canarabank highest risk factor is in the year 2017 and lowest in 2015. Indian bankhighest risk factor is in the year 2016 and lowest in 2015.

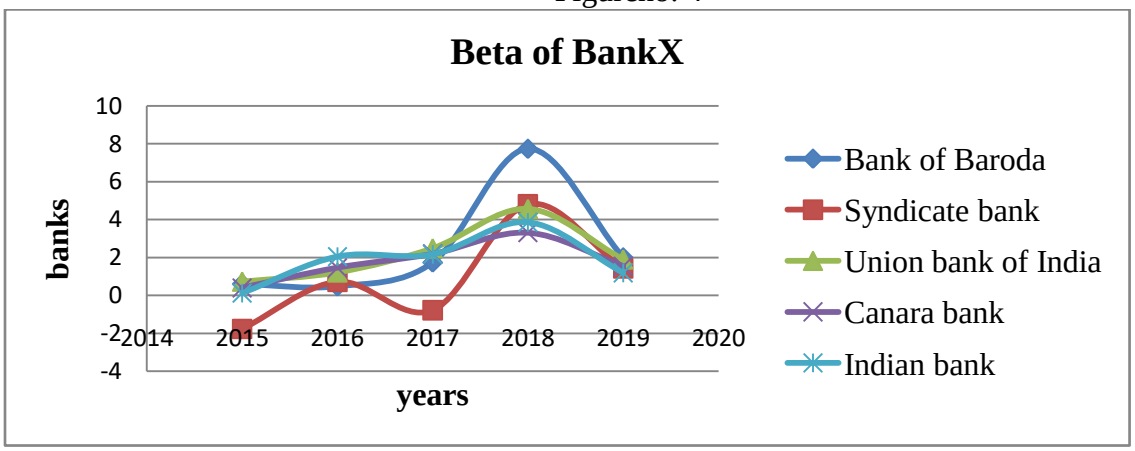
BETA OF BANKX:

TABLE NO: 4 BETA OF SAMPLE

Years	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
2015	0.599	-1.7665	0.72452	0.40257	0.12313
2016	0.47449	0.71968	1.20916	1.46352	2.04695
2017	1.73445	-0.781	2.47954	2.1913	2.16355
2018	7.73538	4.80275	4.55819	3.30976	3.85023
2019	1.99816	1.41305	1.89547	1.548	1.19228

Source: historical data of company stock price from Bombay stock exchange

Figureno: 4



Interpretation:

The above graph no: 4 shows the highest beta is 7.73538of bank of Baroda in 2018 and the lowest t beta is -0.781of syndicate bank in 2017. The risk factor of Bank of Baroda is high in the year 2018 and lowest in 2016. Syndicate bankhighest risk factor is in the year 2018 and lowest in 2015.Union bank of Indiahighest risk factor is in the year 2018 and lowest in 2015.Canarabank highest risk factor is in the year 2018 and lowest in 2015. Indian bankhighest risk factor is in the year 2018 and lowest in 2015.

CORRELATION:

Companies	Market return	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
Market return	1					
Bank of Baroda	0.692430205	1				
Syndicate bank	0.710312018	0.647054986	1			
Union bank of India	0.707574478	0.83479915	0.924787263	1		
Canarabank	0.738392098	0.990244176	0.645519037	0.800399837	1	
Indian bank	0.269428962	0.866637303	0.525961446	0.738049489	0.81658321	1

Interpretation:

The average calculated value of banking sector is 0.805 from above study we conducted and the critical value of correlation with degree of freedom (v=5) with level of significance at 5% is 2.015.from the above data we can say that the critical value is more than the calculated value and hence we accept H_0 at the 5 % level of significance as there is no impact on banking sectors of selected banks by market returns.

FINDINGS:

1. From the above studywe observe that theaverage return of Indian bank has increased massively in 2016 and again reduced from the next year.
2. From the above study we can say that the risk factor is more fore union bank of India with the market (Sensex) and the risk factor is more for the bank of Baroda with the market indices (bankX).

SUGGESTIONS:

1. To get a good return the investor has to use equity analysis and analyse the performance of all the stocks.
2. Before investing in the stocks the investor should also observe the average return and risk involved in individual stock from past two to three years for better investment.

CONCLUSION:

From the above study we can conclude that investor has to use fundamental analysis as well as technical analysis for the safe investment. The study which show the risk and relationship

between the individual companies return and market return. This study also helps in finding the risk and relationship with individual companies return and market indices.

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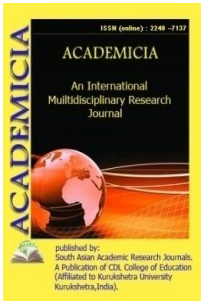

A STUDY ON HUMAN RESOURCE INFORMATION SYSTEM ON HERITAGE FOODS PVT LTD

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ABSTRACT

Human resource information system which is additionally referred to as a person's resource data system or human resource management system. It is essentially an intersection of human resources and knowledge technology through a HR software solution. this enables HR activities and processes to occur electronically. The Human Resource data system Human resource information system may be a software or online solution for the info entry, data tracking, and data information needs of the Human Resources, payroll, management, and accounting functions within a business. Their goal is to merge the numerous parts of human resource, including payroll and labour productivity.

KEYWORDS: *Human resource information system Human Resource Management system Human Resource data system*

INTRODUCTION

In today's globalized world it would like to go as per the technology changes. Human Resource data System is a software package that helps in designing, dominant the hour price. conjointly helps in win improved potency & quality in hour call creating. And for the improvement in worker & social control productivity the study of Human Resource data System is necessary. Human Resources square measure AN structure perform that deals with problems like accomplishment and choice, training, appraisal, compensation and performance management of the worker. kinsmen also are thought- about to be resources as a result of it's the flexibility of humans that helps to alter the gifts of nature into valuable resources.

Objectives

• To study the human resource information system.

• To find out the problem areas of human resource information system.

• To study the need and importance of the human resource information system.

• To find out the requirements for implementation of the human resource information system.

HYPOTHESIS:

1. HRIS is an effective tool to take decision quickly and accurately. 2. HRIS result into increased in organization efficiencies and cost saving. 3. HRIS is an effective tool for improving individual and overall development of

organization.

REVIEW OF LITERATURE:

Smith and kelly1997 believe that" future economic and strategic advantages will rest with the organization that can most effectively attract, develop and retain a diverse group of the best and the brightest human talent in the Market place. The effective management of the human resource in the firm to gain a competitive advantage in the market place requires timely and accurate information on current employees and potential employees in the labor market. With the evaluation of computer technology, meeting this information requirement has been greatly enhanced through the creation of HRIS. With technological advancements many companies have realized the need to implement more sophisticated computerized systems, like Human Resource information system.

RESEARCH METHODOLOGY

Data collection involves two methods

A. Primary Data.

B. Secondary Data.

A. PRIMARY DATA:-

These methods refer to collection of first hand data, this is directly collected from the officials of the organization. This data is collected by following methods.

1. Interview of the officials.

Dep. Manager (MIS).

Manager.

Attendance recorder.

Employees.

2. Observation of overall working of Human Resource Information System in organization.

3. Questionnaires filled by respondents.

B. SECONDARY DATA:-

This data refers to the collection of second hand data. This data is collected from the company in the written or printed format.

The sources of this data can be as follows....

a) The annual report of the organization.

b) Official records of the organization.

c) Other published articles of the organization.

RESEARCH TOOLS

Human resource departments have a lot of information to input, store and track. Performance solutions. Recruiting software. Payroll service. Benefits management platform. Employee engagement.

1. Multiple choice questions 2. Closed ended questions

SAMPLE SIZE:100

RATIO: 2:1

STATISTICAL METHODS USED:1. Bars &chart 2. Percentage analysis

STATISTICAL TOOLS USED:

VARAIBLES:

Independent variable: performance appraisal and communication.

Dependent variable: cost and time saving decision making.

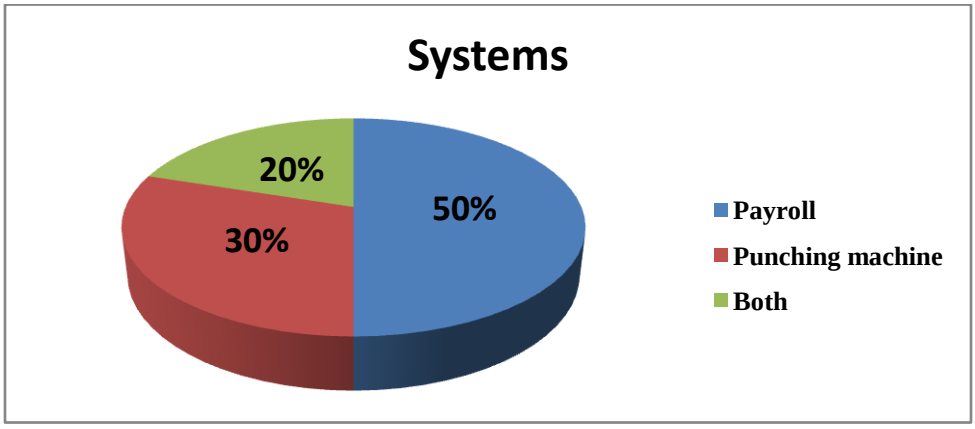
DATA ANALYSIS AND INTERPRETATION:

1: On which system you are working?

Sample size: 10

System	Respondent	Percentage (%)
Payroll	**5**	**50**
Punching machine	**4**	**30**
Both	**1**	**20**

Chart:

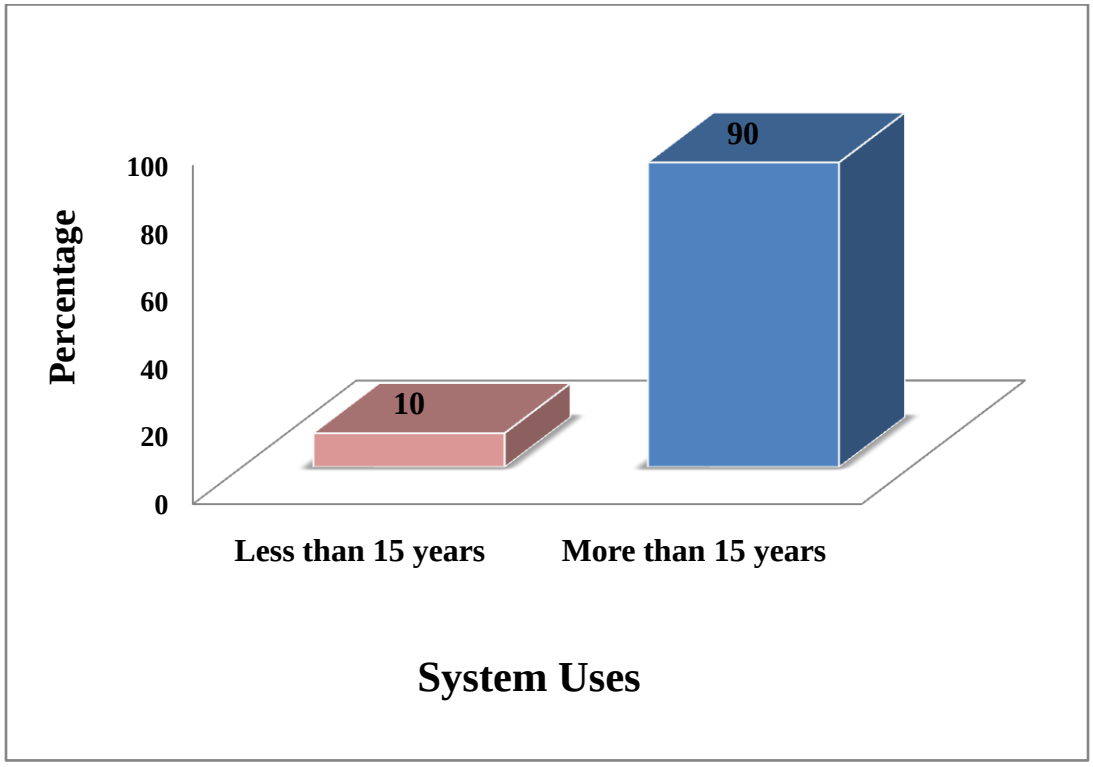


Interpretation: The above table no 1 & the diagram 50% people working on Payroll system, 40% people are working on punching machine & 10% people are working on both the system to admin.

2: From how many years you are using this system?

Years	Respondent	Percentage (%)
Less than 15 years	1	10
More than 15 years	9	90

Chart:



Interpretation: As per the above table no 2 & the diagram 90% people are working more than 15 years & only 10% people are working less than 15 years.

3: Before HRIS how the records were kept?

Record keeping	Respondent	Percentage(%)
Manually	5	50
Computerized	3	30
Both	2	20

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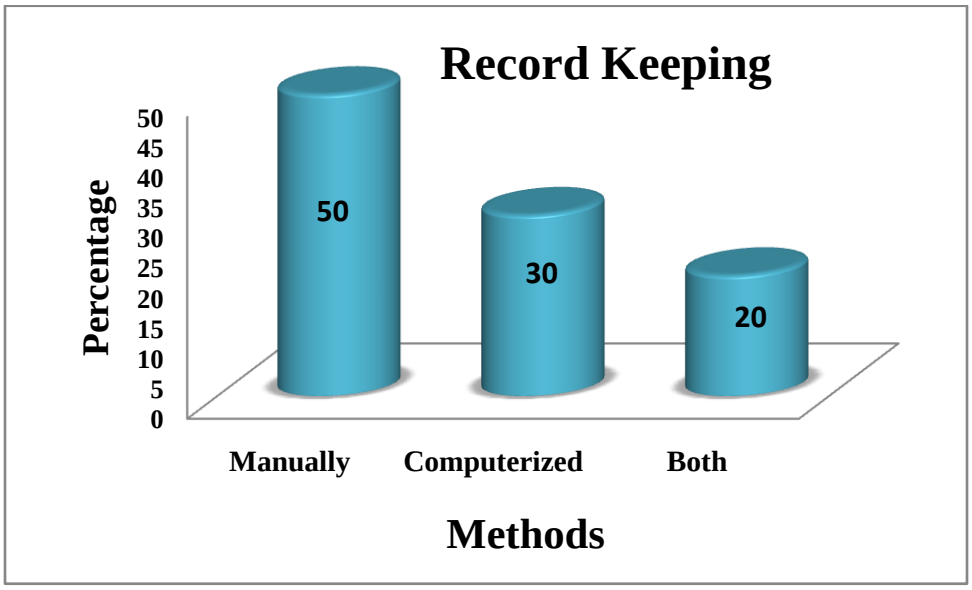
Chart:

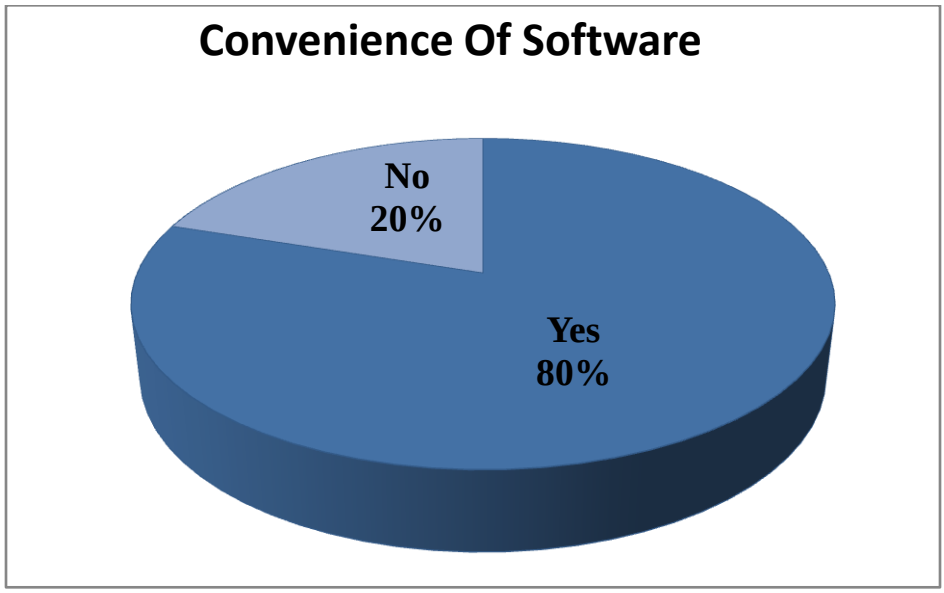


Interpretation: As per the above table no 3 & the diagram 50% people says the keep data manually, 30% computerized and 20% both types.

4: Do you think the current payroll software is convenience for keeping record?

Result	Respondent	Percentage(%)
Yes	8	80
No	2	20

Charts:

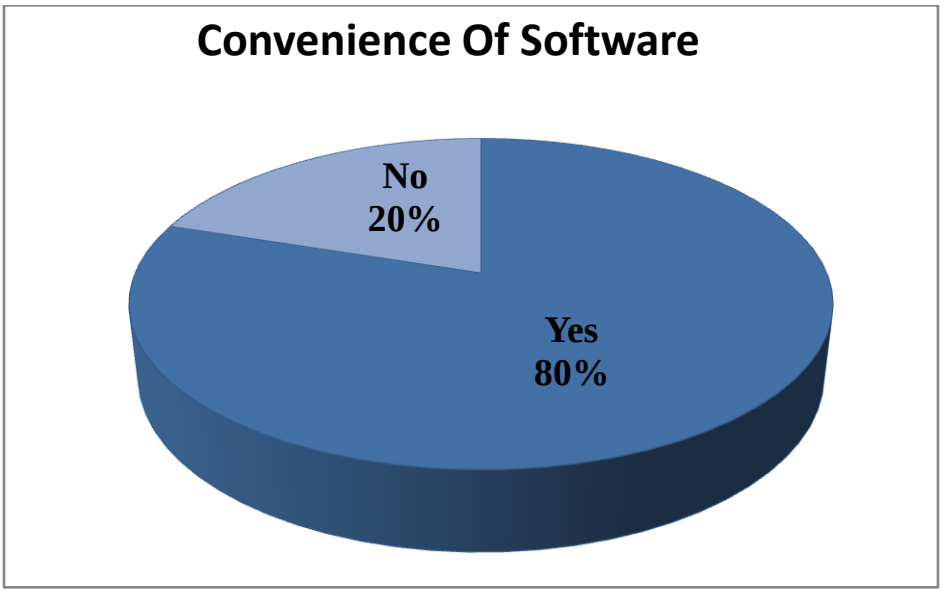


Interpretation: As per the above table no 4 & the diagram the 80% people says Payroll system is convenience & 20% are saying not.

5: Is Punching System provides better Attendance result?

Result	Respondent	Percentage(%)
Yes	8	80
No	2	20

Charts:



Interpretation: As per the above table no 4 & the diagram the 60% people says punching system provides better attendance record& 40% are saying not.

FINDINGS:

1. Most of the employees are satisfied by the performance of the existing system.
2. The system helps keeping the records of employee's attendance, payroll manager & all functioning of HR.
3. Existing system is good but there is problem implement security policy for security reasons.
4. The HRIS is important & needful and employees require changes in existing system.
5. There are 10 peoples are involved in support of existing system.

SUGGETIONS

1. The organization should implement ERP system for better decision making regarding for security.
2. They should install Login system i.e. user id & password for security reasons.
3. The software should be updated or redesigned as per the changing requirements of business or HR department.
4. Records should be recorded properly while manual booking, so that it can be entered properly in HRIS.

CONCLUSION: HRIS is very important software for the development of the company. The system helps keeping the records of employee's attendance, payroll manager & all functioning of HR. this existing system is needful but some employees needs to change as per requirement. By proper training to employees it can help to reduce all the paper work. The importance of the human resource function & HRIS is increasing day by day and it seems to benefit in future.

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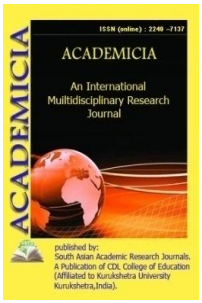

A STUDY ON INVENTORY MANAGEMENT

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I. ABSTRACT

The project work entitled Inventory Management includes detail study about inventory, its importance and effectively it should be managed for smooth operations of business. Inventories are assets of the firm and require investment and hence involve the commitment of firm's resources. Every firm is required to manage the inventories in such a way as to get the best returns. The objective of inventory management is to determine the optimum level of the inventory that is the level at which the interest of all the departments are taken care of. The inventory management seeks to maximize the wealth of the share holders by minimizing the cost of procuring and maintaining. The objective behind the inventory management is maintaining sufficient stock of raw materials ensuring continuous supply to production process for uninterrupted production schedule and minimizing the total annual cost of maintaining inventories. Inventories are assets of the firm and hence involve the commitment of firm's resources; managers must ensure that the firm maintains inventories at the correct level.

KEYWORDS: *Inventory Management, Stock, Raw material, Production.*

II.INTRODUCTION:

Inventory can be referred to as sum of the value of raw materials fuels and lubricants, spare parts, maintenance consumables, semi processed materials and finished goods, stock at any given point of time. In large companies inventory place a most significant part of the current assets. The business has about 15 to 30% of inventories in total assets. Inventory is composed of assets that will be sold in feature in the normal course of business operations. The assets which firms stores as inventory is anticipation of need are raw materials, work in progress and finished goods. Controlling investments in inventories constitute crucial part in current assets. An efficient inventory controlling system will decide, what to purchase, when to purchase, how to purchase, size of purchase and from where to purchase (Suppliers).

III. TARGETS OF THE STUDY:

- To understand the concept of inventory management
- To understand the purchasing procedure of the inventories
- To understand the procedure of classification of inventories.
- To understand the procedure of codification of inventories

IV. RESEARCH METHODOLOGY:

For, the purpose of the study, the data collected from primary and Secondary has sanitized edited and presented in the form of tables and statements. The analysis of the data has been made with the help of certain mathematical techniques like percentages etc. Where ever feasible and appropriate graphs and diagrams are used.

Types of data:

Primary Data:

The source of data which is not readily available but collected through questionnaire and personal interviews.

Secondary Data:

The source of data which is readily available and collected through reports, journals books and periodicals and websites.

PERIOD OF STUDY: 5 YEARS

COMPANY : COCO COLA

Tools Applied:

For analysis purpose following techniques are applied

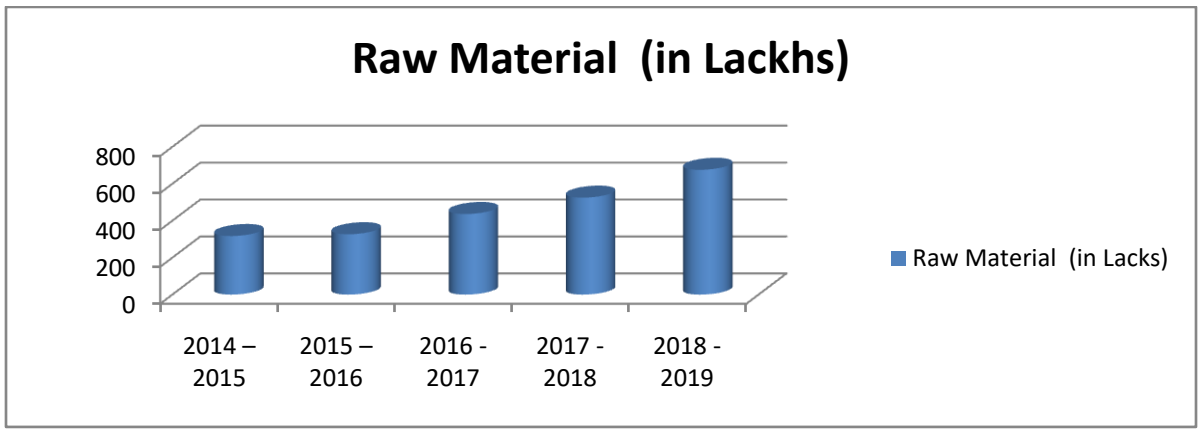
1. Inventory levels2. Ratio Analysis

V. INFORMATION ANALYSIS AND INTERPRETATION:

The investment on raw materials over a period of 5 years from 2014 to 2018 is presented in the following table.

1. INVESTMENT ON RAW MATERIALS

Year	Investment on Raw Material (in crores)
2014 – 2015	2566.82
2015 – 2016	3368.75
2016 - 2017	3925.71
2017 - 2018	5168.75
2018 - 2019	3964.26

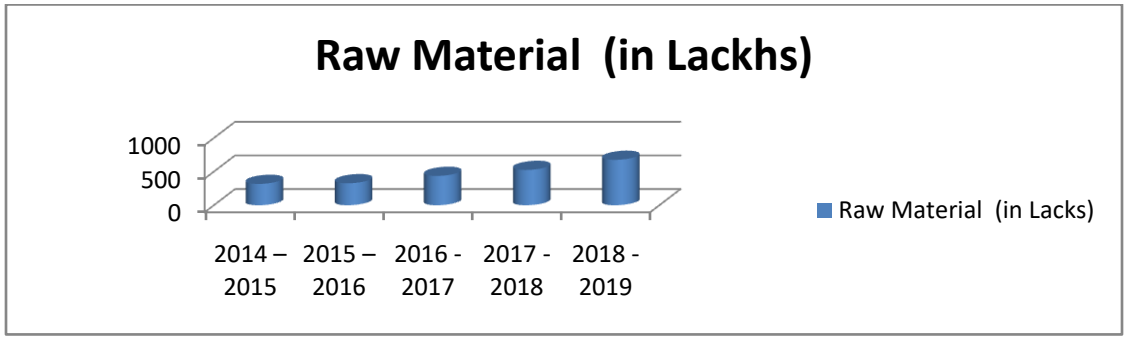


Interpretation: From the above table it can be understood that the inventory of was recorded at 3964.26 during the year 2018 – 19 and it is increased to 5168.75 during the year 2017 – 18.It shows that there is on decrease in the inventory to the more extent of 3964.26.The average inventory of COCA COLA was recorded at Rs.3925.71.

2. Trend Analysis: Trend analysis technique is applied to know the growth rate in investment of raw material of COCA COLA over the review period which is shown in the following table.

Trend Analysis

Year	Raw Material (in Lacks)	Trend %
2014 – 2015	317.14	140
2015 – 2016	326.83	143.0684
2016 - 2017	436.40	173.5251
2017 - 2018	524.93	160.2864
2018 - 2019	675.57	168.6972



Interpretation: The investment on inventory has increased in the year 2018 – 19. And the lost year investment has declared continuously. The percentage in 2013 – 14 was 168.69 % as compared to years 2014 – 15 to 2018 – 19.The trends in inventories show that inventory have been more in the year 2015 – 16 and then it has shown a downward trend and again it increased to some extent. The investment in inventories has shown fluctuating trend is initial years and then it rose to 173.52 % and again showing fluctuating trend.

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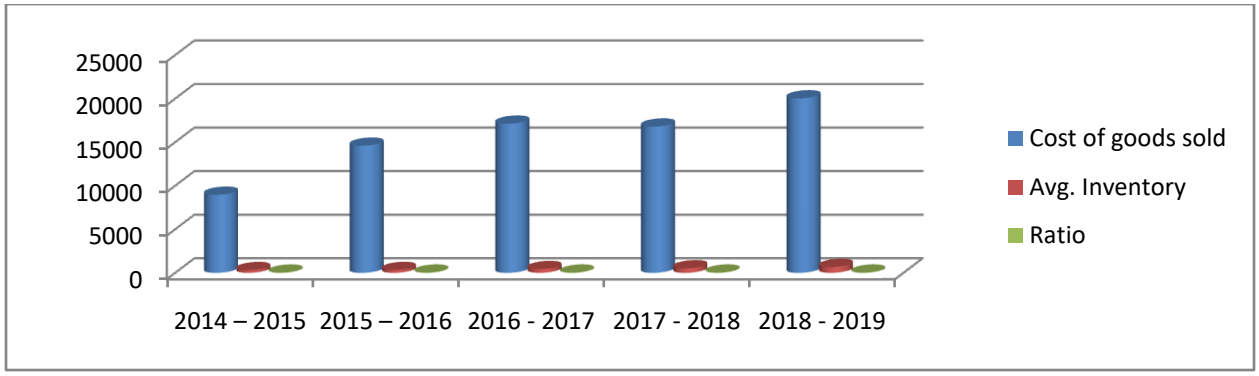
3. Inventory Turnover Ratio: cost of goods sold/avg inventory

This ratio indicates the number of times the stock has been turned over during the period & evaluates the efficiency with which a firm is able to manage its inventory.

Inventory turnover ratio:

Year	Cost of goods sold	Avg. Inventory	Ratio
2014 – 2015	8963.14	317.14	28.2658467
2015 – 2016	14594.45	326.83	32.4157819
2016 - 2017	17124.39	436.40	29.9825619
2017 - 2018	16796.90	524.93	31.9983617
2018 - 2019	20032.81	675.57	29.6531966

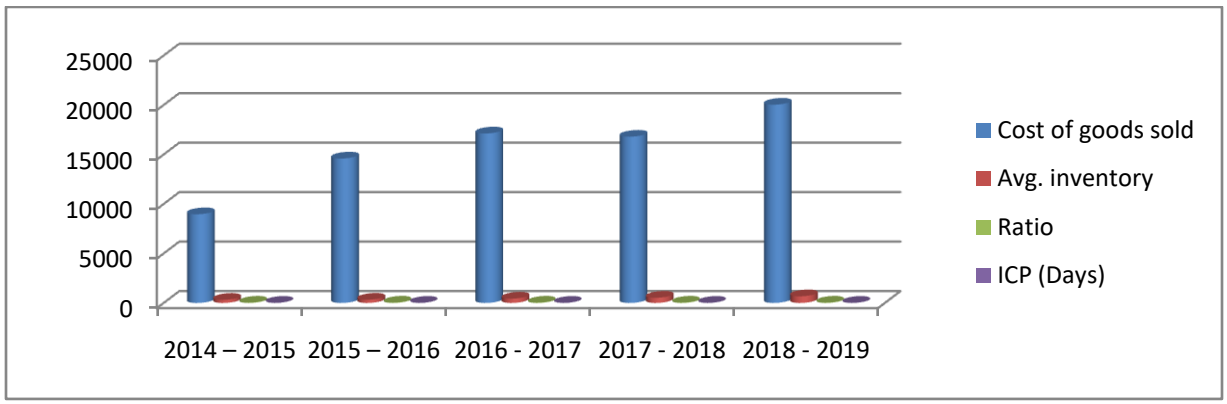


Interpretation: From the above table it can be observed that inventory turnover ratio is 28.26 in the year 2014-15 and it gradually increased to 29.65 during 2018 – 2019.In the year 2018 – 19 it is clear that the ratio is very less i.e., his stock Is not turned into sales quickly. As compared to all the years the ratio is very less .The average inventory turnover ratio was recorded at 8.5 times during the review period.

4. Inventory conversion period: It may also be of interest to see average time taken for clearing the stocks. This can be possible by calculating inventory conversion period. This period is calculated by dividing the number of the days by inventory turns over.

Inventory conversion period: (in crores)

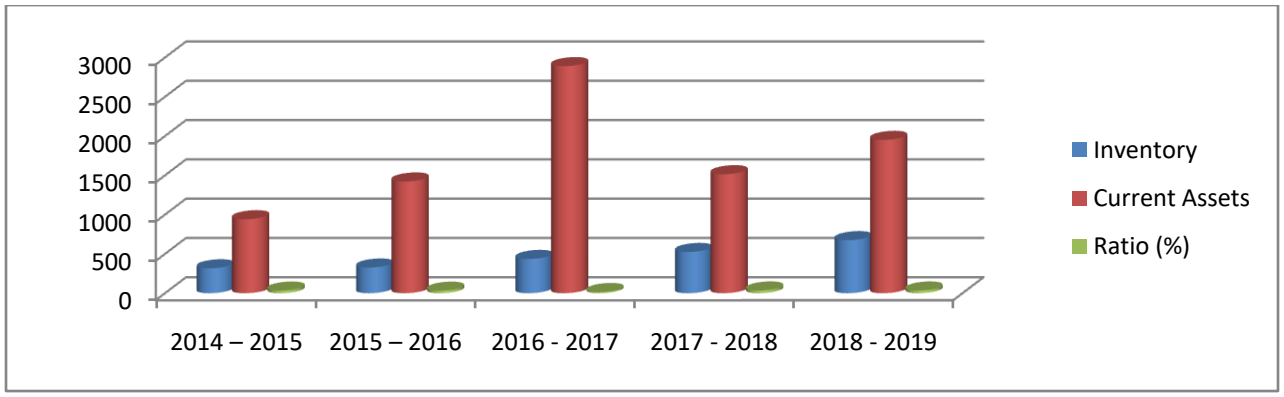
Year	Cost of goods sold	Avg. inventory	Ratio	ICP (Days)
2014 – 2015	8963.14	317.14	28.2658467	16.7362185
2015 – 2016	14594.45	326.83	32.4157819	15.1457016
2016 - 2017	17124.39	436.40	29.9825619	16.0069793
2017 - 2018	16796.90	524.93	31.9983617	15.250576
2018 - 2019	20032.81	675.57	29.6531966	16.1403437



Interpretation: The inventory conversion period was 232 days during the year, which indicates that the stock has been very quickly converted into sales which mean the company is managing the inventory efficiently.

5. Percentage of Inventory over current assets:

Year	Inventory	Current Assets	Ratio (%)
2014 – 2015	317.14	942.00	33.6624204
2015 – 2016	326.83	1422.14	31.9750719
2016 - 2017	436.40	2890.46	15.1379429
2017 - 2018	524.93	1514.52	34.7516127
2018 - 2019	675.57	1951.69	34.6146161



Interpretation: From the above table it can be understand that the % of inventory over current assets ratio was showing a inclining trend for two years 2015 – 2019. from the year2018 – 19 it is showing an increasing. The lowest inventory over current assets ratio was recorded at 15% during the year 2016– 17 and the highest inventory over current assets ratio we recorded at 34.75 % during 2017-2018.The average inventory over current assets ratio was recorded at 33 %.

V1.FINDINGS:

The production during 2014-15 was 14345.01 and 16048.30 respectively which is higher as compared to 2018-2019 which is 23586.80 and 25252.98.

Investment on raw material in 2017-2018 is 5168.75 Cr which very high as compared to 2018-19 which is only 3964.26 Cr.

The inventory turnover ratio shows that the stock has been converted into sales is only 1.02 times.

In the year 2015-16 the stock was cleared within 15.02 days whereas it took 16.73 days in the year 2014-2015 which took more days for clearing stock.

Year 2015-16 is not showing sample profits. This is because of Iron prices have been continuously under pressure due to persistent mismatch between supply and demand.

V11.SUGESSIONS:

- Though the production is higher in the year 2014-2015 and the sales were very high i.e., as per inventory conversion period it took 15.02 days.
- The investment on raw material should be made as per the requirement. Unnecessary investment may block up the funds.
- Neither too high nor too low inventory turnover ratios may reduce profit and liquidity position of the industry. So, proper balance should be made to increase profits and to ensure liquidity.
- The raw material should be acquired from the right source at right quality and at right cost.

V111. HYPOTHESIS:

1. Use of tools and achievement of cost reduction are independent of each other.

2. Use of techniques & achievement of cost reduction are independent of each other.

3. Behavioural pattern of employees & efforts of motivation practiced by the management are

Independent of each other.

1X. CONCLUSION:

In the present days scenario inventory management is playing a crucial part in the organization. The system of inventory management in Coca Cola very effective. The organization is basically and assembling unit and thus inventory place a most significant role in the decision making process. From the various calculations and figures relating to inventory management it is clear that the inventory classification of A items are maintain for days, as a result it reduce investment in raw material, reducing the lead time and also the large quantity discount because the stock are kept for days.

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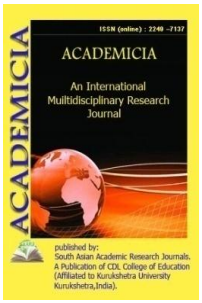

A STUDY ON TRAINING AND DEVELOPMENT ON EMPLOYEES

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ABSTRACT

Training and development play an important role in the effectiveness of organizations and to the experiences of people in work. Training has implications for productivity, health and safety at work and personal development. All organizations employing people need to train and develop their staff. Most organizations are cognizant of this requirement and invest effort and other resources in training and development. Such investment can take the form of employing specialist training and development staff and paying salaries to staff undergoing training and development. In this study the data were collected through questionnaire. The statistical tool used in this research is considering of percentages, bar diagrams, chi square test. The sample size taken is of 100 for the study with a ratio of 1:1. Variables which are used in this study are training as independent variable and employee performance as dependent variable.

KEYWORDS: *Performance, Employee, Training, Development*

INTRODUCTION

Training and development contain learning situations in which the employee acquires additional knowledge or skills to increase job performance. Training objectives specify performance improvements, reductions in errors, job knowledge to be gained, and/or other positive organizational results. However, individual growth is not an end in itself. Organization growth is need to be measured along with individual growth.

OBJECTIVES OF THE STUDY

1. To study the factors that are related to evaluation of Training programs conducted at NGA human resource Pvt. Ltd.
2. To examine how training is helping the employee in the work place.
3. To analyze the effect of training program in relation to employee performance

HYPOTHESIS

1. H1: There is no impact of Training program on employees performance.
2. H0: There is an impact of Training program on employees performance.

RESEARCH METHODOLOGY

The research methodology helps for observation and description of project. A sample of 100 employees is included in this study and the period of study is for 45 days. The data or information is gathered from primary and secondary sources.

PRIMARY DATA

Data is collected from employees through questionnaire.

SECONDARY DATA

Secondary data is collected from research publications, websites, journals, books.

SAMPLE SIZE

A Sample of 100 employees is taken.

STATISTICAL TOOLS

The statistical tool which is used for the research and study is correlation test and data is represented through tables and charts and graphs.

Variables

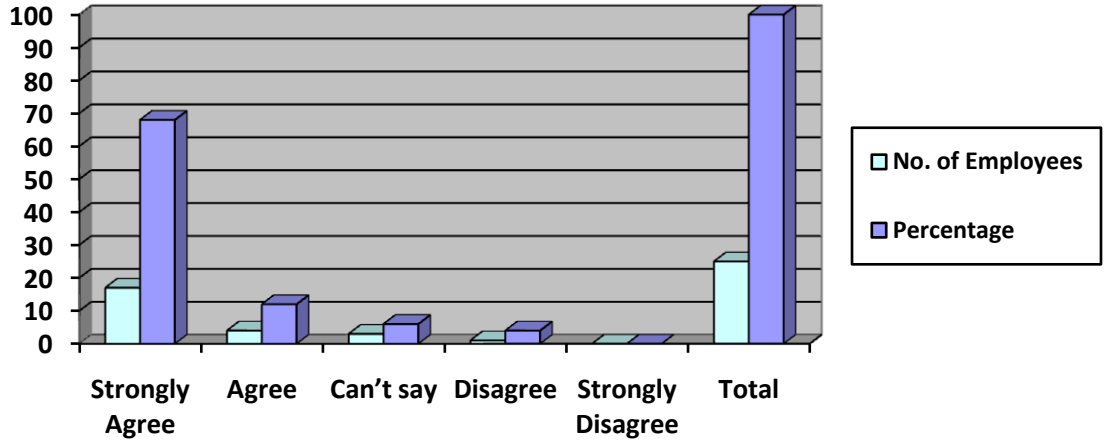
Independent Variable- Training and Development

Dependent Variable- Employee Performance

DATA ANALYSIS AND INTERPRETATION

1. Is the Training program useful to you in your present job?

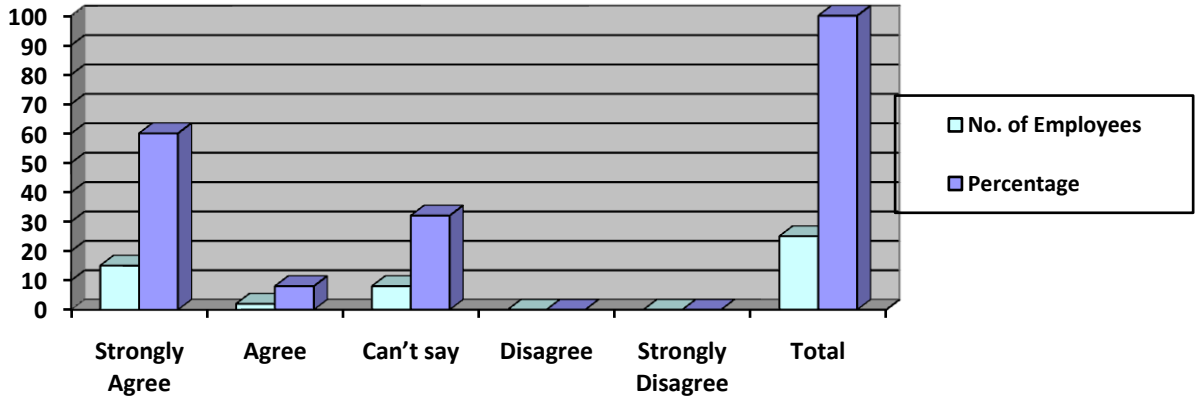
Particulars	Strongly Agree	Agree	Can't say	Disagree	Strongly Disagree	Total
No.of Employees	17	4	3	1	0	25
Percentage	68	12	6	4	0	100



From the above information most of the executives agree that the training program useful to them in their present job.

2. Is the Training program helps you to prepare you for the future jobs in your area of working?

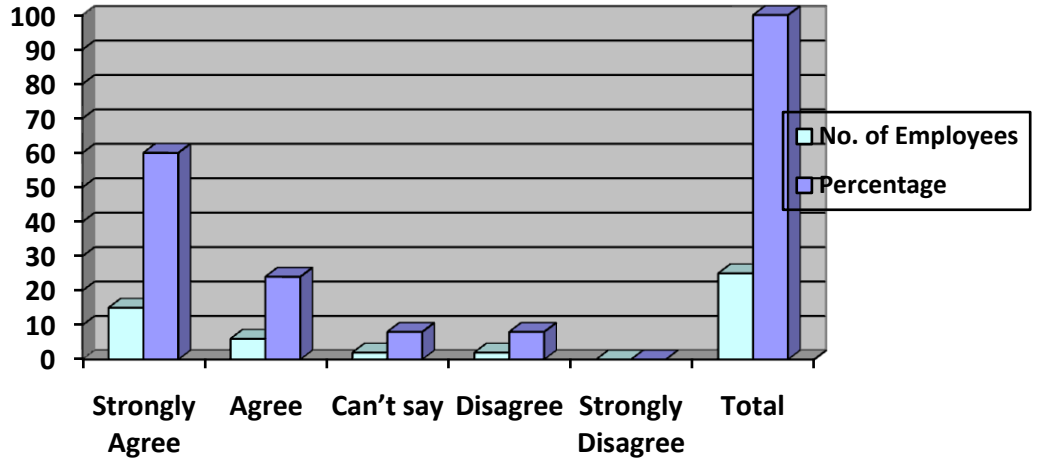
Particulars	Strongly Agree	Agree	Can't say	Disagree	Strongly Disagree	Total
No.of Employees	15	2	8	0	0	25
Percentage	60	8	32	0	0	100



From the above information most of the employees agree that the Training program helps to prepare them for the future jobs in their area of working

3. Is there is a significant impact on your performance with this Training program?

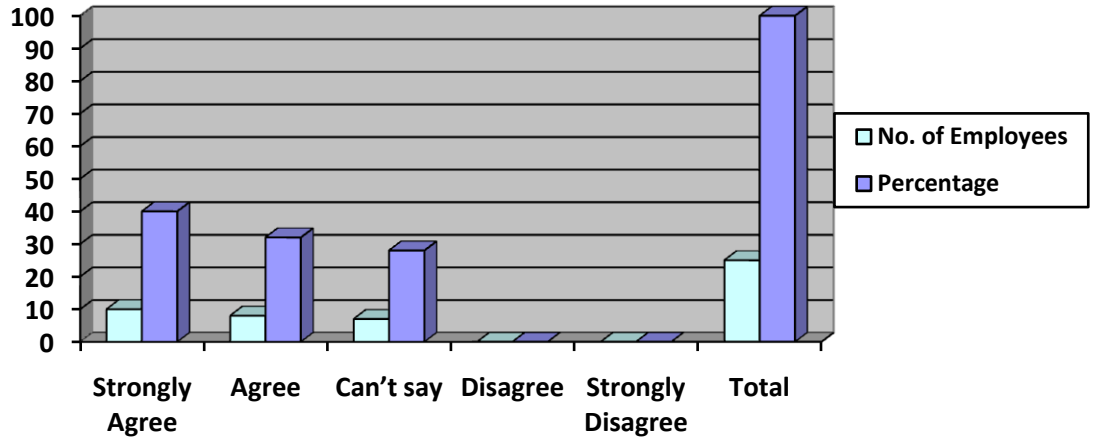
Particulars	Strongly Agree	Agree	Can't say	Disagree	Strongly Disagree	Total
No.of Employees	15	6	2	2	0	25
Percentage	60	24	8	8	0	100



From the above information most of the executives agree that there is a significant impact on their performance with this Training program.

4. Was the inputs received in your training can be implemented in team or individually?

Particulars	Strongly Agree	Agree	Can't say	Disagree	Strongly Disagree	Total
No.of Employees	10	8	7	0	0	25
Percentage	40	32	28	0	0	100



From the above information most of the executives agree that the inputs received in their Training program can be implemented in team or individually.

STATISTICAL ANALYSIS

CHI SQUARE TEST:

O	E	[O-E]	[O-E)2/e
17	20	-3	0.45
8	20	-12	7.2
12	20	-8	3.2
4	20	-16	12.8
3	20	-17	14.45
Total			38.1

Chi square test- 38.1

Table value- 40

Calculated value of chi square value is 38.1 is less than table value 40 where H0 is accepted and H1 is rejected. Hence there is relationship between training and Development.

FINDINGS

1. There is an advantageous accord amid the peers, subordinates, superiors in training.
2. In this alignment best no. of advisers are accede with the administration because their account and suggestions on some occasions only.
3. In this alignment Training programs will helps the advisers in accomplishing both alone goals and authoritative goals.
4. Maximum no. of advisers are annoyed with the Training affairs conducted by training to employees.

SUGGESTIONS

1. They should conduct added and added training programs accompanying to the anatomic competencies of employees.
2. NGA HR should ensure that whenever they yield acknowledgment from advisers their suggestions are taken into application and implemented as anon as accessible this will accomplish advisers to accord honest and acknowledge feedback.
3. NGA HR in this attention should conduct an appointment for acknowledgment so that absolute time advice is accessible with account to training needs of the employees.
4. Aim of any aggregation is to be ensure that all advisers administer techniques learnt in training affairs on the job appropriately at anniversary akin accomplishment abject training should be given.

CONCLUSION

Most respondents bidding that acknowledgment is calm from all the participants in the program. The agent in the alignment are able-bodied alternate in the training program. The training is getting accustomed to the advisers at approved interval. A lot of of the advisers are actual

abundant annoyed about the alternative of the candidates for training. Most of the advisers are bidding that the training programmed is imparting the latest technology in the market. Most of the advisers accede with the training programmed accommodated pre-specified objectives.

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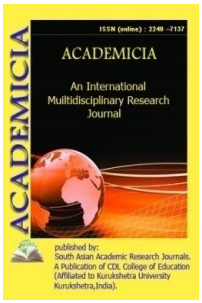

A STUDY ON CASH FLOW STATEMENT

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I .ABSTRACT

A cash flow statement is required as a feature of a total arrangement of financial summaries arranged in similarity with IFRS just as US GAAP for all business undertakings. Cash flow ought to be arranged under the accompanying three standard headings: "Operating (or) Working activities", "Investing (or) contributing activities", "Financing activities". The order of cash flows among working, contributing and financing exercises is fundamental to the examining and analyzing of cash flow information. Net cash stream (the adjustment in cash and equivalents reciprocals during the period) has minimal informative on its own; it is the order and individual parts that are instructive and informational. Even though the classification of cash flows, three fundamental classes is significant, it ought to be referenced that order rules are self-assertive.

KEYWORDS: *Cash Flow, Working Capital, Finance, GAAP.*

II. INTRODUCTION:

A] CASH FLOW STATEMENT ANALYSIS: Cash flow statement or cash stream statements gives data about the money receipts and payments of a enterprise for a given period. It gives noteworthy data that praises the profit and loss record and balance report. Cash flow statement groups cash flow during the period from working, contributing and financing exercises.

a] Cash Flow from Operating Activities: Cash created by manufacturing and selling of business is reflected under this. It similarly indicates inflow of money from working exercises or operating activities and out stream of money for business working costs or operating costs.

b] Cash Flow from Financing Activities: This segment of Cash stream articulation indicates money created from exercises to fund the business activity.

c] Cash Flow from Investing Activities: This segment means money put resources into long term assets or resources for example acquisition of machinery and other long term assets or resources just as other current resources.

III. OBJECTIVES OF THE STUDY

1. To determine the available sources of cash or money and usage of money.

2. To determine the net changes in cash or money showing the contrast among sources and usage of cash or money by three exercises during the time of study.

3. To quantify the heaviness of such sources and usage of money against cash benefit position of the firm to distinguish the strengths and weakness in cash stream position of the firm.

IV. RESEARCH METHODOLOGY:

SAMPLE SELECTION: Two banks are selected kotak securities and hdfc securities, both are private sector banks as of the both banks are similar these banks are subsidiaries to each other in diverse business activities in securities broking, investing activities.

PERIOD OF STUDY: The period of study for 5 years 2014-2019 financial statements.

DATA COLLECTION: Secondary Data

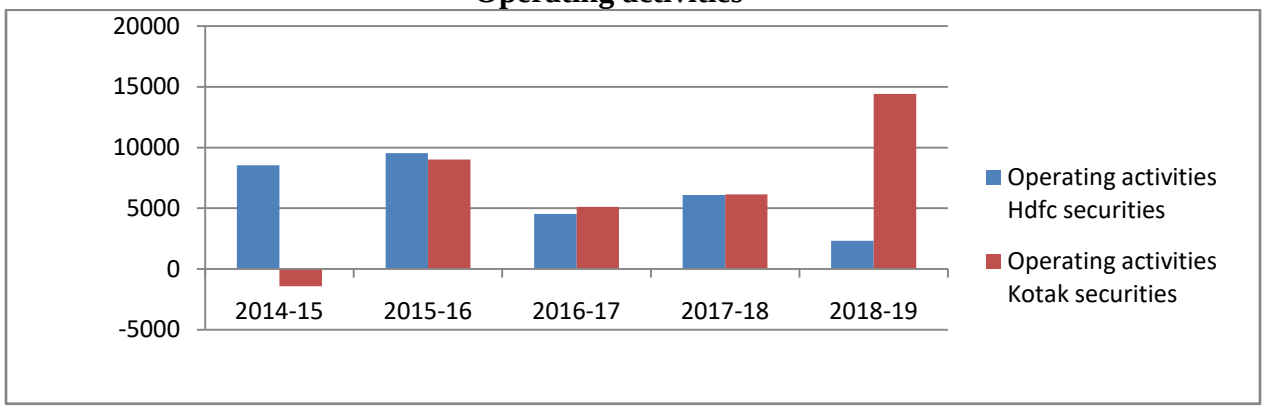
V.DATA ANALYSIS AND INTERPRETATION

	Operating activities		**Investing activities**		**Financing activities**	
Years	Hdfc securities	Kotak securities	Hdfc securities	**Years**	Hdfc securities	Kotak securities
2014-15	8542.64	-1405.45	-262.78	-1478.15	-1744.56	3938.22
2015-16	9535.21	9001.62	-500.62	-549.05	1079.43	-6161.83
2016-17	4547.08	5121.92	-874.90	-4112.52	140.18	-726.92
2017-18	6078.45	6133.61	-317.24	-6363.01	2331.35	-1463.90
2018-19	2316.15	14407.61	-348.45	-2971.84	124.10	256.51
Total	31019.53	33259.43	-2304.01	-15474.60	1930.52	-4157.92
Average	6203.91	6652	-460.79	-3094.92	386.10	-831.58
Rank	2.00	1.00	1.00	2.00	1.00	2.00
S.D	2934.38	5770.67	247.73	2281.80	1494.45	3631.71
Rank	1.00	2.00	1.00	2.00	1.00	2.00
COV	47.29	86.74	-53.75	-73.73	387.05	-436.71
Rank	1.00	2.00	2.00	1.00	2.00	1.00

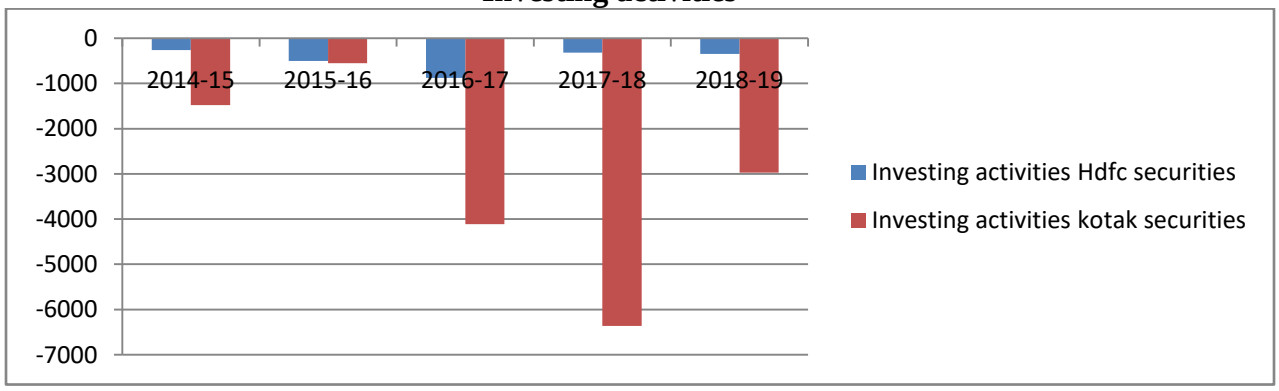
COMPARISION OF CASH FLOW STATEMENTS:

	Operating activities		**Investing activities**		**Financing activities**	
Years	Hdfc securities	Kotak securities	Hdfc securities	Kotak securities	Hdfc securities	Kotak securities
2014-15	8542.64	-1405.45	-262.78	-1478.15	-1744.56	3938.22
2015-16	9535.21	9001.62	-500.62	-549.05	1079.43	-6161.83
2016-17	4547.08	5121.92	-874.90	-4112.52	140.18	-726.92
2017-18	6078.45	6133.61	-317.24	-6363.01	2331.35	-1463.90
2018-19	2316.15	14407.61	-348.45	-2971.84	124.10	256.51

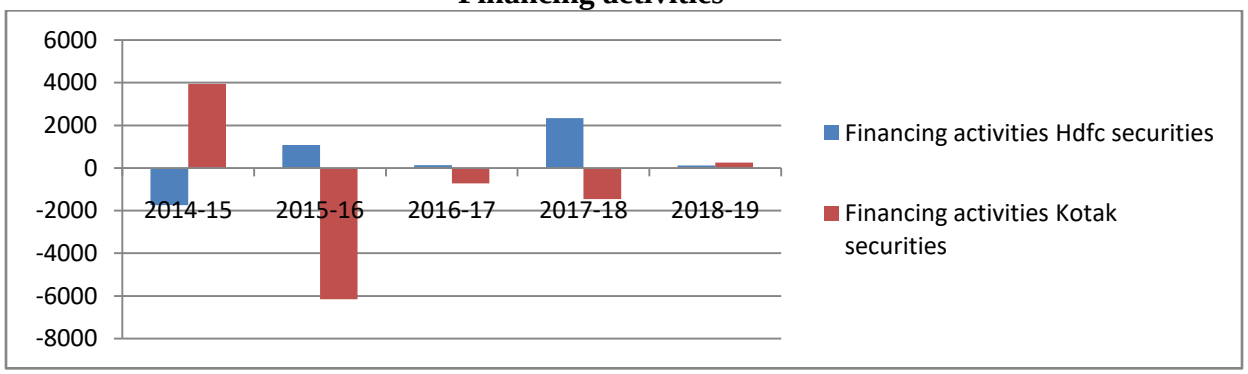
Operating activities



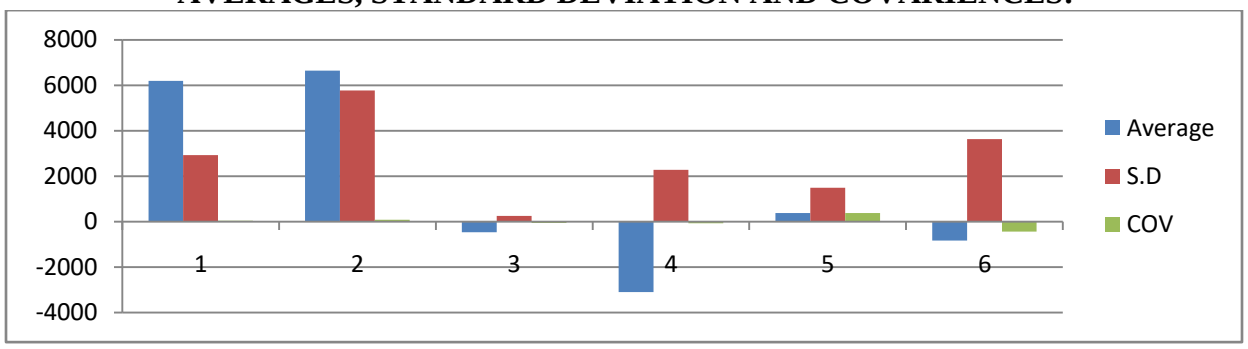
Investing activities



Financing activities



AVERAGES, STANDARD DEVIATION AND COVARIENCES:

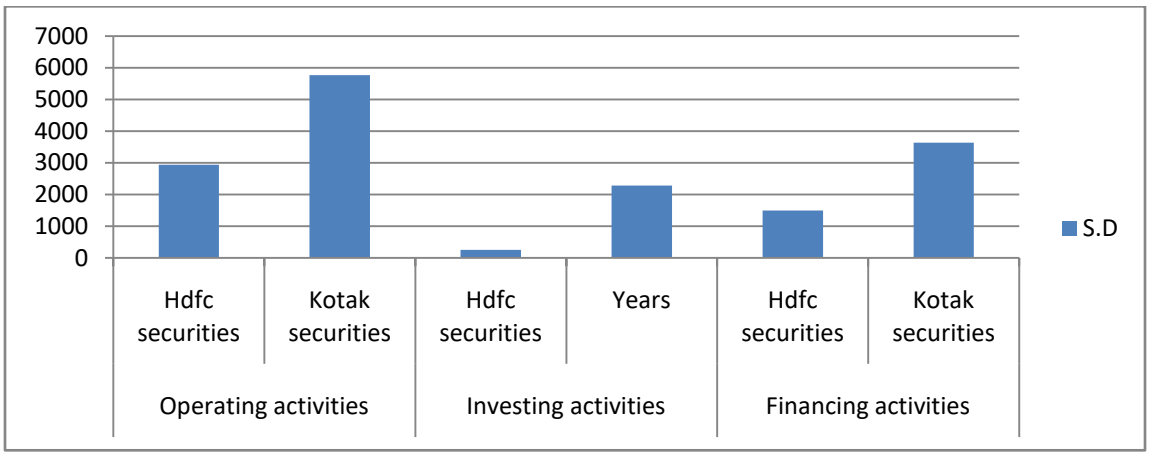


STANDARD DEVIATION (S.D):

Standard deviation from operating activities for hdfc securities is Rs.2934.38 crores and for kotak securities is Rs.5770.67 crores, In S.D lower will be1st and higher will be 2nd rank there by hdfc bank will be 1st and kotak will be given 2nd rank.

Standard deviation from investing activities for hdfc securities is Rs.247.73 crores and for kotak securities is Rs.2281.80 crores, so hdfc bank will be 1st and kotak will be given 2nd rank.

Standard deviation from investing activities for hdfc securities is Rs.1494.45 crores and for kotak securities is Rs3631.71 crores, so hdfc bank will be 1st and kotak will be given 2nd rank.

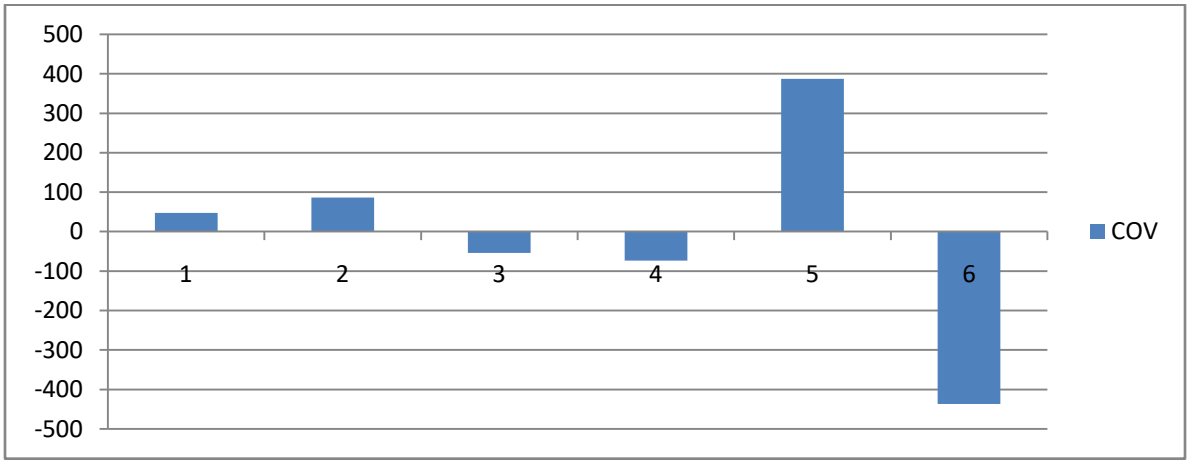


CO-EFFICIENT OF VARIATION:

Co-efficient of variation from operating activities for hdfc securities is Rs.47.29 crores and for kotak securities is Rs.86.74 crores, In COV lower will be1st and higher will be 2nd rank there by hdfc bank will be 1st and kotak will be given 2nd rank.

Co-efficient of variation from operating activities for hdfc securities is Rs. -53.75 crores and for kotak securities is Rs. -73.73 crores, so hdfc bank will be 1st and kotak will be given 2nd rank.

Co-efficient of variation from operating activities for hdfc securities is Rs. 387.05 crores and for kotak securities is Rs. -436.71 crores, so hdfc bank will be 1st and kotak will be given 2nd rank.



MULTIPLE REGRESSION ANALYSIS: HDFC SECURITIES

YEARS	NET PROFIT	OPERATING	INVESTING	FINANCING
2014-15	2862.09	8532.55	-252.69	-1733.47
2015-16	2428.18	9525.00	-500.53	1069.34
2016-17	2697.53	4537.00	-864.80	130.09
2017-18	-2810.72	6068.35	-307.14	2321.26
2018-19	1100.82	1210.05	-338.36	114.01

R	R- SQUARE	ADJ- R -SQUARE	STD ERROR OF EST
.915	.844	.358	1882.69

Coefficients

	Unstandardized coefficients Std error		standardized beta coefficients	T	sig
Constant	-1724.939	3088.517		-.550	.665
Operating	.200	.320	.247	.622	.631
Investing	-4.727	3.888	-.483	-1.205	.428
financing	-1.223	.626	-.764	-1.827	.293

KOTAK SECURITIES

YEARS	NET PROFIT	OPERATING	INVESTING	FINANCING
2014-15	1350.62	-1390.36	-1468.06	3928.13
2015-16	1490.42	8990.53	-539.00	-651.74
2016-17	1855.88	5110.83	-4100.43	-716.83
2017-18	2079.68	6122.62	-6353.00	-1453.81
2018-19	3400.40	14390.52	-2961.74	246.42

R	R- SQUARE	AD-J R -SQUARE	STD ERROR OF EST
1.000	1.000	.988	21.71804

COEFFICIENTS

	Unstandardized coefficients Std error		standardized beta coefficients	T	sig
Constant	925.800	21.290		43.448	.010
Operating	.147	.00	1.100	71.390	.001
Investing	-.053	.003	-.165	-12.947	.039
financing	.132	.002	.621	40.371	.010

The value of R for hdfc bank is .915 it explains that there is high correlation between cash flow from the explanatory variable such as operating activities, investing activities and financing activities and dependent variable as net profit of kotak securities.

The R square value indicates that the dependent variable can be explained by independent variable. The value equals .844 indicates 84.4% of variants in net profits. If another explanatory variable is added to it the R square value increases.

PREDICTEDNETPROFIT:-1724.929+(0.10Operating)+(-4.727*Investing)+(-1.222*Financing)+ei

The R square value indicates that the dependent variable can be explained by independent variable. The value equals 1.000 indicates 100% of variants in net profits. If another explanatory variable is added to it the R square value increases.

PREDICTED NET PROFIT: 915.800+(1.47*Operating)+(-0.053Investing)+(0.132*Financing)+ei

V1.FINDINGS:

1. In kotak securities the average cash flows from operating activities is high and it is low in investing and financing activities and

2. In Kotak standard deviation it is higher in all activities and in coefficients also higher.

3. In HDFC Securities the cash flow from operating activities is fluctuating and there is decreasing by 71.79%and averages is high

4. In HDFC Securities the cash flow from investing activities is constant and there is decreasing by 23.58% and In the case of financing activities it is in growing trend and increases by 997.01% in And the Standard deviation and co-efficient is lower .

V11.SUGESSIONS:

1. The operating activities should be monitored regularly.

2. The investing activities, invested efficiently

3. Proper monitoring on financing activities.

V111.HYPOTHESIS:

1. In the operating activities the average, standard deviation and covariance is different for both banks so the null hypothesis is to be rejected.

2. In the investing activities the average, standard deviation and covariance is different for both banks so the null hypothesis is to be rejected.

3. In the investing activities the average, standard deviation and covariance is different for both banks so the null hypothesis is to be rejected.

4. On the net profit of HDFC Securities there is no significant effect on operating, investing and financing activities and the null hypothesis is accepted, and there is a significant effect in KOTAK Securities in operating, investing and financing activities and null hypothesis is rejected.

1X.CONCLUSION

HDFC Securities is performs well than KOTAK Securities because the cash flows not affecting the net profit of the HDFC Securities but it is affecting the net profit of KOTAK Securities.

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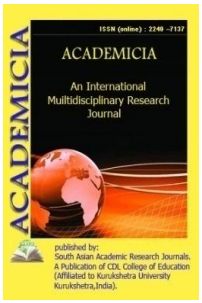

A STUDY ON EMPLOYEE COMPENSATION

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ABSTRACT

Employee compensation means providing a monetary value to employees but employer.an ideal management always helps in significantly to boost the performance of employees and creating engaged workforce environment. compensation management clearly visibility on each and every employee and by providing the remuneration employee improve performance employee compensation is a part of human resource management in every organization employees should be managed properly and motivated by providing best remuneration and compensation as per the industry standards . The compensation will also serve the need for attracting and retaining the best employees

KEYWORDS: *Employee, Compensation, Performance*

INTRODUCTION

The term compensation refers to the concept of reward that the employees receive In return for the work performed and services rendered by them to the organization Compensation includes monetary payments like bonuses, profit sharing, overtime pay, Recognition rewards and sales commission etc. Compensation is a vital part of human resources management decision making as it helps in encouraging the employees and improves the organizational effectiveness. Compensation packages with good pay and benefits help to attract and retain the best Employees.

NEED FOR THE STUDY

1. Compensation and reward management plays an important role in every organization.
2. To improve the quality of work standards for the achievement of goals of organization's
3. Directly or indirectly motivate the employees through compensation.

4. The main motive of compensation management is to fulfill the needs of both employees and the employer.
5. Compensation can improve organization productivity and effectiveness.
6. Employees carry positive attitude when they satisfied with their job.
7. Encourage the employees to improve the performance

OBJECTIVES

1. To find the impact of compensation of two types monetary compensation and non monetary compensation

2. To find the compensation received by the employee for the service they performed in organization.

3. To find Providing insurance, travel and home allowances in the non-form cash basic objectives of compensation focusing employee effort attract quality employees, retaining top performers, and motivating employees.

RESEARCH METHODLOGY

The present study has been conducted to find out the solution for the problem "A study on employee compensation. Data is classified into primary and secondary data.

Primary data:

Primary data refers to the information collected by a researcher from original sources, using methods like surveys, interviews, or experiments. The information is gathered from the main sources keeping research study in mind.

Secondary data:

Secondary data refers to data that is collected by someone other than the researcher. Common sources of secondary data for the study include, organizational records and data that was collected for other research purposes.

DATA ANALYSIS

1. Pay and compensation package is adequate and fair in comparison to performance.

OPTIONS	NO OF **RESPONSES**
Strongly agree	18
Agree	52
Neutral	18
Strongly disagree	12

INTERPRETATION:

The survey revealed that most of the employees agree for the reason of their pay and compensation package is adequate and fair in comparison to performance and some are disagreed.

Analysis of the study= Formula:

Number of respondents

 100

Total no. of respondent

2. Recognition & rewards are given based on employee performance.

OPTIONS	NO OF RESPONSES
Strongly agree	18
Agree	48
Neutral	16
Disagree	18

The survey revealed that most of the employees agree and strongly agree for recognition and rewards are given based on employee performance but some are disagreed.

Analysis of the study: Formula:

Number of respondents

 100 Total no. of respondent

3. Do you think that a good employee gets motivated with frequent Compensative pay? Is conducted?

(a) YES (b) NO

s.no	Options	No. of Responses	Percentage
1	YES	44	88
2	NO	6	12
	TOTAL	50	100

% of respondents

88% YES

12% NO

A majority of 88% of the employees said that a good workman gets motivated with frequent Compensative pay and 12% of the employees are not satisfied with above.

Analysis of the study: Formula:

Number of respondents

 100

Total no. of respondent

4. Do you think the reward system is fair and adequate?

(a) YES (b) NO

s.no	Options	No. of Responses	Percentage
1	YES	36	72
2	NO	14	28
	TOTAL	50	100

About 72% said that the reward system is fair and adequate and 28% responded that it is not fair.

Analysis of the study: Formula:

Number of respondents

□ **100**

Total no. of respondent

5. Do you think that incentives are needed for Compensation management programmers?

(a) YES (b) NO

S.NO	**OPTIONS**	**NO OF RESPONDENTS**	**% OF RESPONDENTS**
1	YES	100	100
2	NO	0	0
	TOTAL	100	100

From the above analysis we can say that 100% of the employees feel those incentives are needed for attending Compensation management. 0% of the employees feel those incentives are not needed for training programmers.

Analysis of the study: Formula:

Number of respondents

□ **100**

Total no. of respondent

6. Job provides scope to achieve goals?

Response	**Respondents**	**% of Respondents**
Strongly Agree	20	26.67
Agree	24	32
Neutral	10	13.33
Disagree	12	16
Strongly	9	12

From the above table, it is clear that, 32 % of employees agree that there is scope for achieving goals and 26% of them are strongly is agreed.

Analysis of the study: Formula:

Number of respondents

□ **100**

Total no. of respondent

7. Working under in human working conditions:

Response	Respondents	% of Respondents
Strongly Agree	25	33.33
Agree	30	40
Neutral	11	14.67
Disagree	4	5.33
Strongly	5	6.67

From above table 40% of employees agree with the working conditions are human and 33% of employees strongly agree.

Analysis of the study: Formula:

Number of respondents

 100

Total no. of respondent

FINDINGS

1. Compensation is the Human resource management functions that deal with every type of reward that individuals receive in return for performing organizational task.
2. The compensation management is an organized which is important for balancing the work
3. And employee relationship.
4. In this alignment employee compensation will help organization and employee goals.
5. The balancing the cost of compensation and retaining the employees have become the most important priority for the organization.

SUGGESTIONS

1. They should give direct and indirect compensation to improve competencies of employees.
2. •when employees understand that they can earn more is to perform at higher standard they are generally motivated.
3. Compensation packages with good pay and advantages can help attract and retain the best employees.
4. provide proper refund to the employees for their contributions to the organization and it creates
5. A base for happiness and satisfaction of the workforce.

CONCLUSION

It can be concluded that opportunity for growth and promotion outside, compensation, working conditions, work timings/shifts, relationship with managers, location of the organization, opportunity to use skills and work load are the major reasons for employee turnover.The employer's main goal is structuring compensation and benefits programs. To attract and retaining the right employees needed to help the employer be competitive. Compensation can

increase the productivity of an organization because it provides various rewards, bonus schemes etc.

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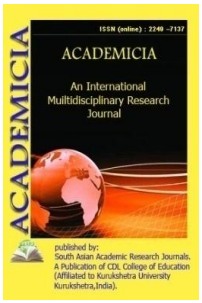

A REPORT ON CUSTOMER FEEDBACK ON MARUTHI SUZUKI

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ABSTRACT

Rising incomes, better financing for vehicles and improved roads are the combined drivers for strong This study conducts a comprehensive evaluation of India's small car automobile industry and analyzes its role as potential lead market for the low-cost small car concept. This report attempts to answer some of the questions regarding brand personality of small cars in India by conducting the market research. This report is categorized into parts, deals with introduction to brand personality, companies selected, product and the industry. This personality sketching will help in knowing what a customer (or a potential customer) thinks about a given brand of car and what are the possible factors guiding a possible purchase. Similarly, the idea of measuring the customer awareness will serve the same purpose of identifying the customer perception. Thus, by measuring the" willingness of existing users of a car to recommend it to others" will help the car manufacturers to chalk out the whole Customer Buying Behavior. The research was conducted to discover the satisfaction of the mass towards "CAR". The research was done completely for academic purpose for the course "Research Methodology". The Research's main objective was to discover the satisfaction level, acceptance level towards "MARUTHI CAR" and the major factors affecting the purchase of car like "MARUTHI Brand". The research was based on both primary data collected through survey using questionnaire and also through secondary data like journals, magazines and articles. Almost 100 Customers of Maruthi were interviewed utilizing a structured questionnaire. The data was collected from Hyderabad only. The data analysis was done through tables, charts, graphs

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KEYWORDS: *Customer Feedback, Automobile Industry, Marketing, Customer, Satisfaction.*

1.INTRODUCTION

What makes the perfect car that influence will willfully purchase?

The project highlights the factors that influence the buying decision of a consumer.

The factor under consideration would be:

- Price
- Income of the consumer
- Features in the car
- Safety standard
- Warranty scheme
- Finance facility

Is an Indian consumer ready for more? Which is the driving motive behind the effective demand of the car? How the coming of new models like swift does is going to affect the buying decision of consumer and especially the Tata 1 lakh car.

In other words, from the spread of choices provided by various manufacturers under various segments, of which one the customer will finally turn the ignition on and drive.

Customer satisfaction index: some of the most advance thinking in the business world recognizes that customer relationships are best treated as assets, and that methodical analysis of these relationships can offer a road map for enhancing them.

2. OBJECTIVES OF THE STUDY:

- The Primary Objectives are: -
- To know, what are the factors influencing the customer while deciding to buy the Maruti Suzuki.
- To provide information helpful to Mithra Agencies [Dealers of Maruti Suzuki] in planning and implementing of marketing approach towards the buying motives of Maruti Suzuki bike owners and also to know their satisfaction. (Based gathered information through questionnaire).
- To know the level of satisfaction among the owners and users of Maruti Suzuki.

3. SCOPE OF THE STUDY:

The study covers the consumer opinion on Maruti Suzuki and is restricted to Hyderabad only. The study is done to analyze the consumer perception towards the Maruti Suzuki. The survey was conducted from 3rd MAY, and the response relate to that period only.

4. LIMITATIONS OF STUDY:

- The study could not be conducted on a sizable sample size and area due to time constraint.

- The number of sample size is Customers of Maruthi and the study is confined Only to the Hyderabad confined limits.
- The study is time bound & would be applicable to the current findings of the study.

5. RESEARCH METHODOLOGY AND RESEARCH DESIGN:

Research Design

Sample Design : Descriptive Research

Type of universe : Consumer

Sampling unit : Hyderabad

- Size of the sample : 100
- Type of sampling : Simple random sampling
- Type of question : Open-ended and Close-ended
- Type of questionnaire: Structure disguised
- Type of scaling : Nominal, Ordinal, Interval scale

SOURCE OF DATA:

(a) Primary Source: This was the primary source of data. The data was obtained from individual respondent.

(b) Secondary Source: The usage of secondary data is made in knowing the industry trends and market share of individual company.

1. 6. REVIEW OF LITERATURE

The management of buyers' perceptions of waiting time by service businesses may be critical to customer satisfaction. Although reducing actual waiting time is important, what managers view as a short time to wait may feel too long to customers. Relevant literature from architecture, environmental psychology, physiology, functions management, sociology, and marketing is integrated to build a conceptual model of how the service environment may influence affect and, in turn, waiting time perception. Based on this model, propositions about how exactly specific service environment components (e.g., lighting, color, temperature) may influence affect and time perception are presented. Finally, a research agenda and implications for service facility design are proposed.

Analysing consumer behaviour is perceived as cornerstone of a successful marketing strategy Consumer behaviour is 'the mental and emotional processes and the observable behaviour of consumers during searching purchasing and post consumption of a product and service (Batra & Kazmi, 2004) Similarly, Engel (et al, 1990) refers consumer behaviour as the action and decision process of individuals who purchase goods and services for personal consumption.

Now if these defining requirements are closely observed, it is evident that analysing consumer's decision-making process is the foundation of entire notion of consumer behaviour To Maruthi Suzuki.

There are four different views related to consumer decision making process and behaviour (Schiffman & Kanuk, 2004). It is argued that first of them is 'economic view' that consumers are mainly facing imperfect competition and they are always expected to make rational decision on the basis of assumptions that they are aware of all product alternatives, they can rank benefits and limitation of each alternative and are able to identify one best alternative. Second 'Passive View' is absolutely opposite to financial view and suggests that consumers are irrational and impulsive as they are submissive to self-centred interests of marketers and got influenced by marketing tools. Similarly, third, 'Consumer's behaviour under this view is based on information seeking and processing attributes usually directed by a goal. For instance, buying a tooth paste from shop can have a specific goal of choosing product that can taste good.

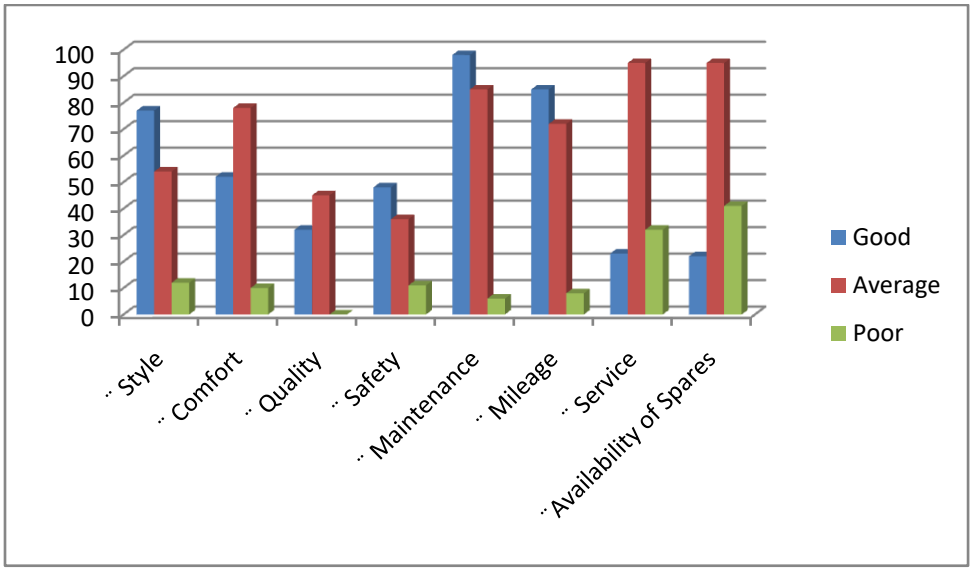
7.DATA ANALYSIS

Age of the consumers			
	Frequency	Percent	Valid Percent
Below 25 years	18	18	18
26 to 30 years	32	32	32
31 to 40 years	24	24	24
40 years & above	26	26	26
Total	**100**	**100**	**100**

Majority of Consumers falls between the age of 26 to 30 years, & later followed by 40 years & above. There is no investment activity between the age of below 25 years, it could be due to the people in this age are found to be students or employees.

What factors influenced you to own *Maruti Suzuki*?

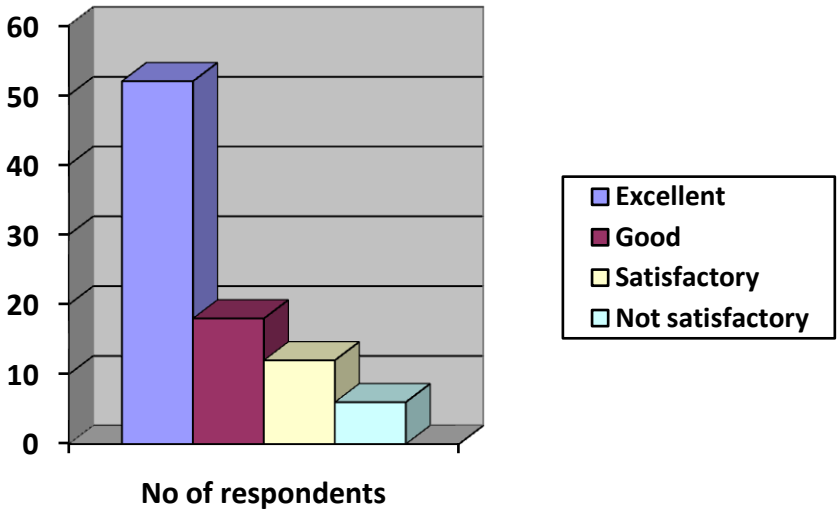
	Good	**Average**	**Poor**
☐ Style	77	54	12
☐ Comfort	52	78	10
☐ Quality	32	45	0
☐ Safety	48	36	11
☐ Maintenance	98	85	6
☐ Mileage	85	72	8
☐ Service	23	95	32
☐Availability of Spares	22	95	41



Maruthi suzki have good style and comfart for and quality good and also good mileage and maitna charges and availitbity of spare charges and from the above chart showing mare people atracted with style they are satisfied for service and 98% people choosing for good mantians and good mileage

Do you satisfy Maruthi Suzuki Service?

Particulars	**No of respondents**	**Percentage**
Excellent	52	52
Good	18	18
Satisfactory	12	12
Not satisfactory	6	6
Total	**100**	**100**



Interpretation:

From the above mentioned chart, it can be realized that liking of the Customers of Maruthi towards MARUTHI SUZKI is very high i.e. MARUTHI SUZKI service is liked by the majority of the respondents. But there is mixed responses over their plan to buy MARUTHI SUZKI. There were around 40 Customers of Maruthi who may buy MARUTHI SUZKI and there 32 Customers of Maruthi who might not buy. The rest 6 were Not satisfied

8.FINDINGS

- ✓ The sales consultants were polite and courteous with the customers and answer all the queries.
- ✓ Information regarding price list etc is readily available at the showroom.
- ✓ Majority of customers says that the sales consultants are knowledgeable and they able to answers the queries.
- ✓ As above mentioned, 96% of the customers says that they get their vehicles at clean & good conditions.
- ✓ Over all 64% of the customers have received the letter of thanks from this dealer.

9. SUGGESSIONS

- The company should work towards building customers lifetime value enhances customer relationship.
- Placing knowledge and technical salespeople who can provide complete information to the customers their enquiry would be of greater advantage to the company.
- The firm should work towards proper value delivery network where customers get value for his product.
- Attention should be paid on addressing all the small and minute problems and queries in the customer care division.

10. CONCLUSION

Based on study conducted on customer Satisfaction it has been concluded that in order to enhance the satisfaction level, a company has to come up with different models and innovative technique. Hence, it has been further concluded that to fulfill customer dealers plays a essential role in providing accurate services by reaching their expectations and by maintaining good relations with the customer which satisfies their needs and wants.

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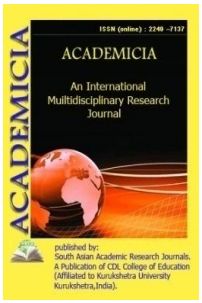

DISTRIBUTOR SATISFACTION LEVELS AT MAHA CEMENT

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ABSTRACT

The marketing channels play an important role in the movement of goods from the company to the end-user. Marketing channels are sets of interdependent organizations involved in the process of marketing a product or service available for use or consumption. Channels of distribution are the means employed by manufacturers and sellers to get their products to the market and into the hands of users. Channels are management tools used to move goods from production to consumption. The satisfaction levels of the customers vary from marketing channel to channel They are means by which title to goods is transferred from sellers to buyers. The process of transferring title is not so simple, especially in the present day markets that are characterized by heterogeneity on both the supply and demand sides. There are a wide variety of goods produced for sale, or the other side there are highly varied and complex desires of consumers.

KEYWORDS: *Marketing Channel, Satisfaction Level, Distribution, Transfer*

1. INTRODUCTION

Marketing & Distribution strategies are known as to be much specialised division in virtually any organization. It is among the four components of marketing mix. A business or group of organizations (go-betweens) mixed up in process of making something or service designed for use or consumption by a consumer or business user. The distribution channels also known as marketing channels are the agents and platforms through which the product is physically moved from place of production to point of consumption. The Maha cement company uses a mix of

channels both traditional and modern to stock the inventory levels at all selling points and stock keeping units.

2. NEED OF THE STUDY

This work gives need for distribution division and therefore the study is ideal for changes in Maha Cement distribution system. To learn about Sales and Distribution is the reason why essential element to operational efficiency for production companies like Maha cement. To know The procedure of distribution can be put on client satisfaction and company success to learn how in this competitive world folks are more conscious about their product availability and distribution system.

3. SCOPE OF THE STUDY

The study alternative channels of distribution "has an insight in to the different parameters of distributor satisfaction levels. The scholarly study helps that produce people to purchase, thereby providing a clear picture to the maker and the dealer of Maha Cement India Ltd and also the methods to attract and withhold the customer for the survival and growth.

4. OBJECTIVES

- To review the distributor satisfaction about the Maha cement products and operations
- To review the strategies accompanied by Maha cement company in distribution network
- To review issues faced by distributors and offer chain management system.
- To review the distributor brand preference comparing to other cement company products.
- To review distribution channels both in domestic & international market.

5. RESEARCH METHODOLOGY

Survey and Data Collection

Data is collected from retailers, dealers, distributor at them and shops

Sample size

100 members working as dealers, distributors, agents, and shop owners in cement industry.

Data collection

a) Primary Data

The principal data in concern to advertise research was collected from actual visit to dealer, distributor at every known level and retailers interviews by using self designed questionnaire.

b) Secondary Data

Secondary data has been collected from the web, books and magazines to comprehend the entire current status.

6. LIMITATIONS

- Survey has been done in the limited area of Hyderabad city.
- Conducted survey on random sampling basis.

- Some authority doesn't allow undertaking survey; such industries are omitted from sample set.
- Hardly any company allows providing personal statistics of their company. For other information, needs to depend upon what data distributed by authority.
- Concerned person isn't available always

7. REVIEW OF LITERATURE

An assessment of literature may be the mirror of previous research, which enriches the researcher and really helps to identify the gaps for future year's research. Many reports on advertisements have already been conducted in various elements of India. As today's study can be involved with the advertisements in television, an attempt was created to review the literature obtainable to ensure that an excellent insight in the advertisements world is normally obtained. Like any researcher, enough effort is used this chapter to comprehend previously researches on advertisements.

(Lambert, 1978), A channel of distribution can be defined as the collection of organization units, either internal or external to the manufacturer, which performs the functions involved in product marketing. These functions are persuasive and include buying, selling, transporting, storing, grading, financing, market risk bearing and providing marketing information. A channel member is an individual organization unit institution or agency that performs one or more of the marketing functions and by doing so has an active role in the channel of distribution

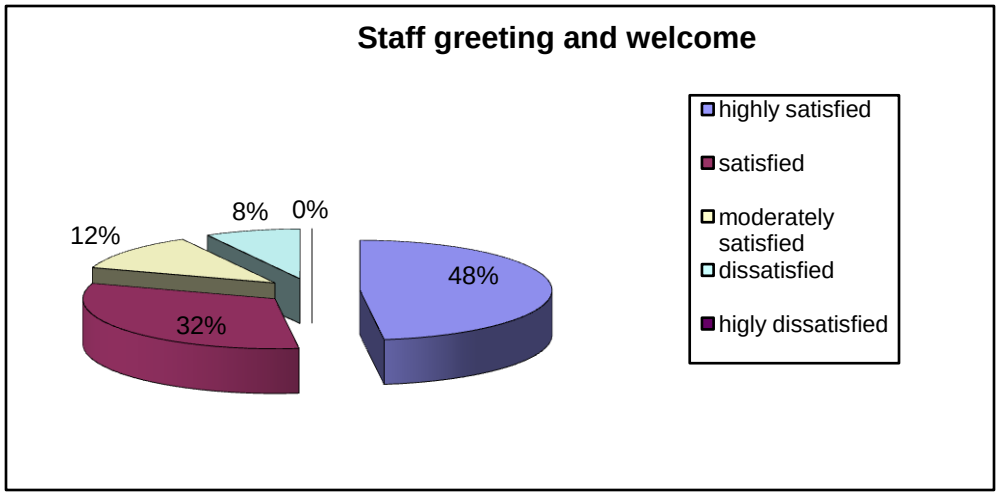
Distribution, as one of four elements of marketing complex, is an inseparable part of marketing decisions which involves all the decisions about distribution of products to the end user. The issues of distribution were analyzed by a number of marketing specialists (Berman, 1999; Kim, 1996; Delton, 1997; Frazier, 1999; Kotler, 2003; Rosenbloom, 1999; Stern, 2006; etc.), paying a big attention to the elaboration of the procedures of marketing channel design (Gudonaviciene & Alijosiene, 2008).

Boyle et. al. (1992) developed measures of the following strategies in marketing channels - 1. Promise: Source certifies to extend specified reward contingent on the target's compliance, 2. Threat: Source informs the target that failure to comply will result in negative sanctions. 3. Legalistic plea: Source contends that target compliance is required by formal agreement.

8.DATA ANALYSIS

The following table shows the Distributor satisfaction level with the staff greeting and friendly welcome.

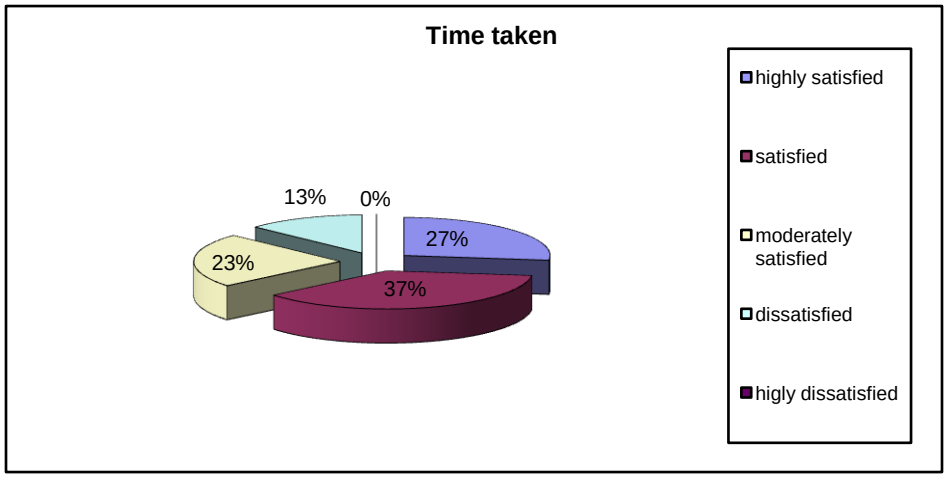
Staff greeting	**Frequency**	**%**
Highly satisfied	48	48%
Satisfied	32	32%
Moderately satisfied	12	12%
Dissatisfied	8	8%
Highly dissatisfied	0	0%
Total	**100**	**100%**



Interpretation:-The graph demonstrates that most of individuals are content with company people attitude 48% highly satisfied and 32% are satisfied, only few percentage aren't satisfied.

The following table shows the dealer satisfaction with the time taken by the staff to complete their requirement.

Time taken to complete the requirement	Frequency	%
Highly satisfied	27	27%
Satisfied	37	37%
Moderately satisfied	23	23%
Dissatisfied	13	13%
Highly dissatisfied	0	0%
Total	**100**	**100%**

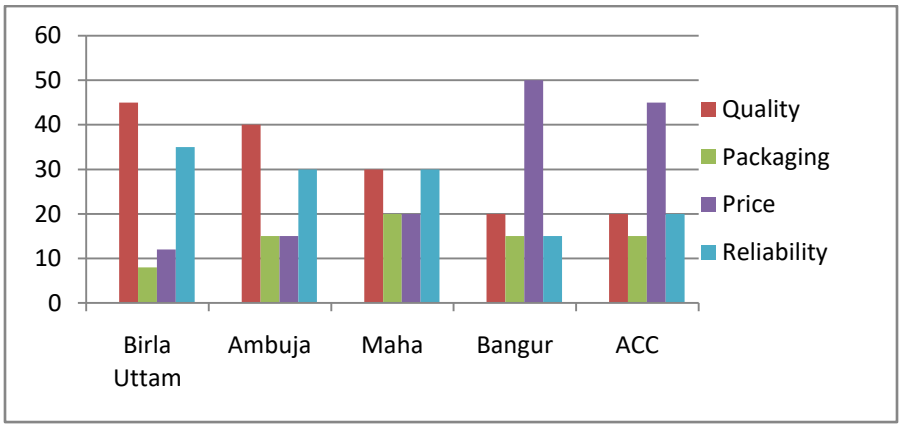


Interpretation:

The graph demonstrates that many are content with Response time taken by the business staff to complete their requirement.

Reason for Demand

	No. of Dealers & Retailers				
Features	Birla Uttam	Ambuja	Maha Cement	Bangur	ACC
Quality	45	40	30	20	20
Packaging	8	15	20	15	15
Price	12	15	20	50	45
Reliability	35	30	30	15	20



Interpretation

The above table & graphical presentation implies that 35 dealers say Birla Uttam demanded because of reliability and 45 dealers says Birla Uttam demanded due to quality. Ambuja & Maha Cement are popular because of quality but if we see Bangur and Acc are demanded because of good deal. So in cost both Bangur & Acc is major competitor in market.

9. FINDINGS

- Most traders are satisfied with Maha Cement
- Quality and reliability are the features demanded in the market
- Price and packaging are also influencing factors
- Staff greeting highly satisfies the dealers
- It is inferred that 70 percent of the traders are satisfied while 30 percent of them are dissatisfied.

10. SUGGESTIONS

- The business should follow advance communication strategies like email, newsletter, and monthly flier, or any occasional greeting card, get in touch with your steady distributors.

- Company has to improve dealer Service. Go the excess distance and meet their needs. Train the staff to accomplish the same.
- The distributors must be fairly treated

11. CONCLUSION

The majority of the distributors are pleased with Maha Cement with the treatment given to them by the company but still they expect more as they push the products of the company. Additionally it is concluded that there exists a status symbol mounted on the brand crafted by the maker. From the survey it could be figured Maha Cement's distributors are happy with the benefits given to them by the company for taking the products forward.

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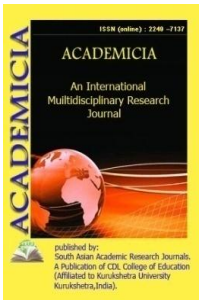

A STUDY ON CONSUMER BUYING BEHAVIOR TOWARDS BAJAJ AUTO LTD

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ABSTRACT

A competitor, in order to achieve the loyalty of the consumers, offer an endless information flow on the products and services and thereby continuously educates the consumer about the opportunities in the market. It blends the elements from psychology, sociology, sociopsychology, anthropology and economics. It also tries to assess the influence on the consumer from groups such as family, friends, reference groups and society in general.

KEYWORDS: *Consumers, Psychology, Sociology, Sociopsychology*

INTRODUCTION

Consumer behaviour refers to the mental and emotional process and the observable behaviour of consumers during searching, purchasing and post consumption of a product or service. Consumer behaviour involves study of how people buy, what they buy, when they buy and why they buy. It blends the elements from psychology, sociology, sociopsychology, anthropology and economics. It also tries to assess the influence on the consumer from groups such as family, friends, reference groups and society in general. Buyer behaviour has two aspects: the final purchase activity visible to any observer and the detailed or short decision process that may involve the interplay of a number of complex variables not visible to anyone. What influences consumers to purchase products or services? The consumer buying process is a complex matter as many internal and external factors have an impact on the buying decisions of the consumer. When purchasing a product there several processes, which consumers go through. These will be discussed below.

Need for the study

The study tries to understand the existing position of the organization relating to its Consumer Buying Behavior and to know what the factors that affect the consumers in buying are.

Scope of the Study

The scope of the study is confined to Consumer Buying Behavior towards Bajaj Auto Ltd; the study is confined Hyderabad &Secunderabad Only.

Objectives of the Study

- To study and analyze the factors that affects Consumer Buying behavior at Bajaj Auto Ltd.
- To know the importance reason the respondents give to each factor for purchasing bikes in Bajaj Auto Ltd.

Source of the Data

The study is based on primary data & secondary data

Primary data

Primary data was collected by using structured questionnaire administered to select number of customers.

Secondary data

Secondary data was collected from websites and text books.

Research Methodology

Sampling Size: The sampling size is 50

Sampling Method: Simple Random Sampling Method

Extent of Sampling Procedure: The sampling is done in Hyderabad &Secunderabad

Time Period: Time period for research is limited from May to June

Research Instrument: Structured Questionnaire

Limitations

- The present research is restricted to only Bajaj Auto Ltd, in Hyderabad Branch.
- The sample size taken is only 50 and as such is very small as compared to the universe, this is due to the constraints of time and effort, and as such may not be enough to generalize to the entire population, however it is presumed that the sample represents the universe.

LITERATURE REVIEW

A competitor, in order to achieve the loyalty of the consumers, offer an endless information flow on the products and services and thereby continuously educates the consumer about the opportunities in the market. Therefore today even an ordinary person is in possession of the large amount of data to use for the purpose of making a decision as to which products/ services he would go in for. The competitive environment is making the consumer wisher day by day and he is able to take a large number of decisions on his own. The experts' advice of the olden days is being replaced by the consumer's own wisdom. This is making the market place more complicated and unpredictable. The consumer is getting smarter today and he is able to decide his own money's worth and therefore, organization across the board are `pursuing the consumer's views to streamline their business strategies to remain consumer- worthy. People are

the prime factor for any organization to maintain the effectiveness and thus develop the right focus for the people, so that each one perceives as clearly as possible his position in the cycle of growth and prosperity of the organization. Agendas will have to be drawn in such a manner and communicated so effectively that the individual is able to enjoy a meaningful life in the organization, endowed with authority and responsibility for the role he plays.

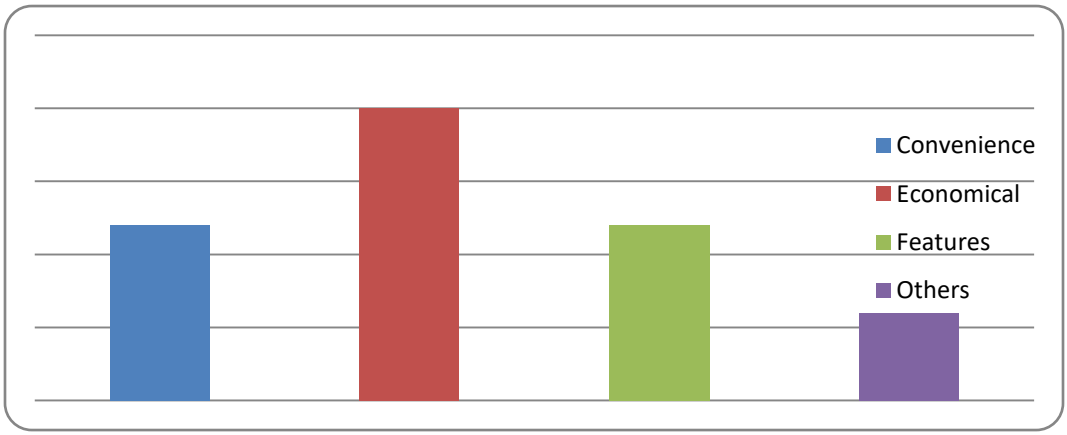
Data Analysis

1. Why do you prefer Tata Motors Ltd?

TABLE 1: PREFERENCE

S. No	Option	No. Of Respondents	Percentage
1	Convenience	12	24
2	Economical	20	40
3	Features	12	24
4	Others	6	12
Total No. Of Respondents		50	100

Chart 1



Interpretation

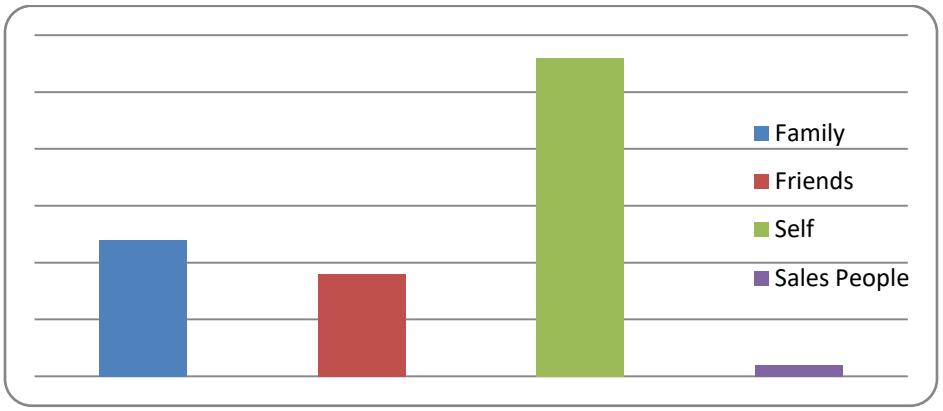
From the above chart it is observed that 40% of respondents use their vehicle as it is Economical to them, 24% of respondents use their vehicle as it is convenience to them, 24% of respondents use their vehicle as it has features, and 12% of respondents use their vehicle for other reasons.

2. Who influenced you to make a Purchase?

TABLE 2 SOURCES OF INFLUENCE

S. No	Option	No. Of Respondents	Percentage
1	Family	12	24
2	Friends	9	18
3	Self	28	56
4	Sales People	1	2
Total No. Of Respondents		50	100

Chart 2



Interpretation

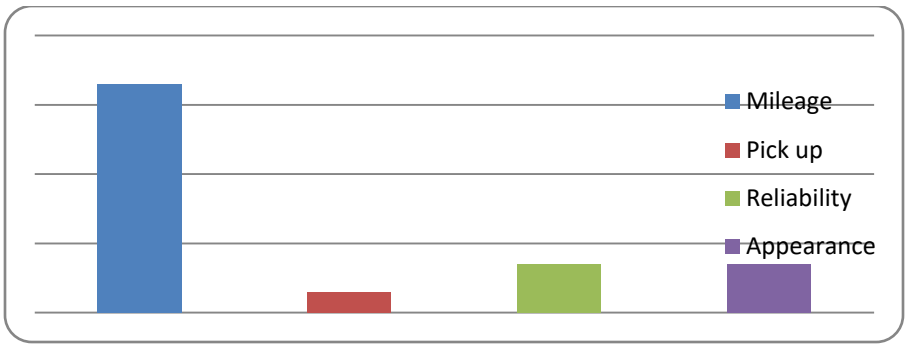
From the above chart it is observed that 56% of Respondents are self-influenced to make a purchase, 24% of Respondents are influenced to make a purchase by Family, 18% of Respondents are influenced to make a purchase by friends, and 2% of Respondents are influenced to make a purchase by sales people

3. Which of the following product related factors motivated you to purchase this product?

TABLE 3: MOTIVATIONAL FACTOR

S.No	Options	No. Of Respondents	Percentage %
1	Mileage	33	66
2	Pick Up	3	6
3	Reliability	7	14
4	Appearance	7	14
Total No. Of Respondents		50	100

Chart 3



Interpretation

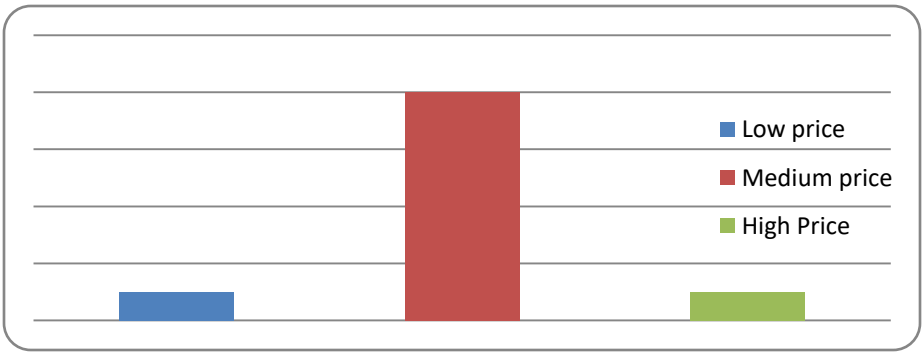
From the above chart it is observed that 66% of Respondents Key factor is mileage to purchase this product, 14% of Respondents Major factor is Reliability to purchase this product, 14% of Respondents Major factor is Appearance to purchase this product, 6% of Respondents Major factor is pickup to purchase this product

4. Which of the following Pricing factors influence you to make a purchase?

TABLE 4: PRICING FACTORS

S. No	Option	No. Of Respondents	Percentage
1	Low Price	5	10
2	Medium Price	40	80
3	High Price	5	10
Total No. Of Respondents		50	100

Chart 4



Interpretation

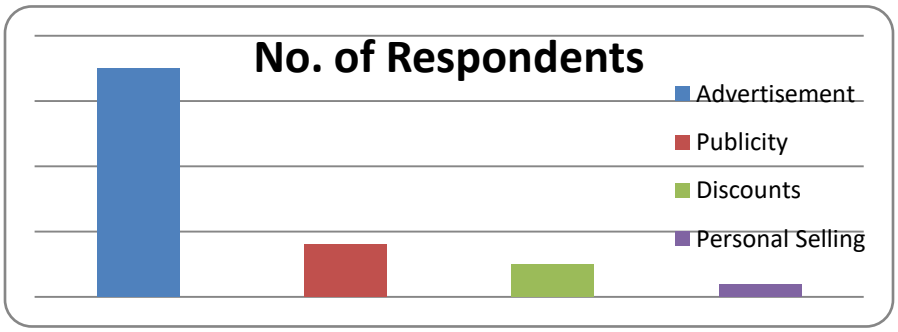
From the above chart it is observed that 80% of Respondents saying as it is Medium price, they are influenced to make a purchase, 10% of Respondents as it is low price they are influenced to make a purchase, 10% of Respondents as it is High price they are influenced to make a purchase

5. Which of the Promotional Activities adopted by Tata Motors influenced you to purchase?

TABLE 5: PROMOTIONAL ACTIVITIES

S. No	Option	No. Of Respondents	Percentage
1	Advertisement	35	70
2	Publicity	8	16
3	Discounts	5	10
4	Personal Selling	2	4
Total No. Of Respondents		50	100

Chart 5



Interpretation

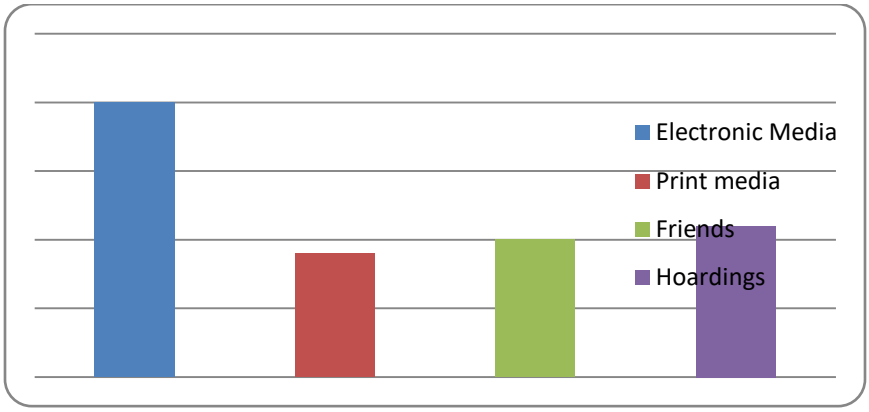
From the above chart it is observed that 70% of Respondents are influenced by advertisement, 16% of Respondents are influenced by Publicity, 10% of Respondents are influenced by Discounts, and 4% of Respondents are influenced by Personal selling.

6. How did you come to know about Tata Motors Ltd products?

TABLE 6: ABOUT TATA MOTORS

S. No	Option	No. Of Respondents	Percentage
1	Electronic Media	20	40
2	Print Media	9	18
3	Friends	10	20
4	Hoardings	11	22
Total No. Of Respondents		50	100

Chart 6



Interpretation

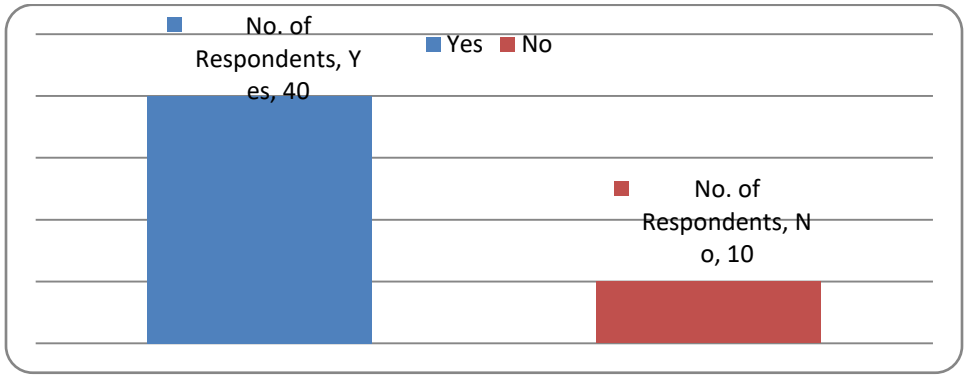
From the above chart it is observed that 40% of Respondents know about Bajaj Motorcycles products by Electronic Media, 22% of Respondents know about Bajaj Motorcycles products by Hoardings', 20% of Respondents know about Bajaj Motorcycles products by Friends, 18% of Respondents know about Bajaj Motorcycles products by Print media.

7. Does the quality of the services influence you to purchase?

TABLE 7: QUALITY OF SERVICE

S. No	Option	No. Of Respondents	Percentage
1	Yes	40	80
2	No	10	20
Total No. Of Respondents		50	100

Chart 7



Interpretation

From the above chart it is observed that 80% of Respondents are influenced by Quality of service, 20% of Respondents are not influenced.

FINDINGS

- It is found that mileage is motivational factor for the respondents to purchase.
- Majority of the respondents are influence to purchase because of its medium price.
- Advertisement plays a major role in promotional activities adopted by Tata Motors which influences the respondents to purchase.
- Most of respondents know about Tata Motors Products by Electronic Media.
- Majority of respondents Differentiate Tata Motors with other brands by Mileage.
- Respondents are influenced by Brand Ambassador in Advertisements for purchase.

Suggestions

- It is suggested that the organization should also concentrate on other channels to create awareness a part from electronic media.
- It is suggested that the organization can continue with the same mileage in the future.
- It is suggested that the organization can continue with the same advertisement factor which influencing purchase.
- It is suggested that the organization can continue with same purchasing procedure.
- It is suggested that the organization can continue with the same level of quality of service.

CONCLUSION

From the above study it is concluded that products of Tata Motors have been using by the customer about more than 4 years and promotion of products are in effective manner by the advertisement, organization successfully attracting more number of customers with the help of brand ambassador, price level of Tata Motors products are at satisfactory level of customers and the organization has to concentrate on creating more awareness of all the products of Tata Motors to increase the sales of Bajaj Auto Ltd.

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A STUDY ON CAPITAL BUDGETING ON VIJAY TEXTILE

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ABSTRACT

Capital budgeting could be a step by step process that companies use to work out the merits of an investment project. This study attempts to highlight the capital budgeting phenomena and capital budgeting techniques on the cash flows of the company. Capital budgeting is that the process that needs planning for fixing budgets on projects expected to possess long run implications, which is employed as a regular for deciding for any organization. The study exposes also that if a market based cost of capital is employed to discount cash flows, the cash flows should be adjusted upwards to reflect the effects of inflation in forthcoming periods. The researchers find that company lends its fund to the client at zero NPV that produces PI exactly1. This study states that inflation adjusted to the risk factor lead to less NPV than not adjusting inflation to the risk factor. The study finds the equality between the speed of cost of capital and IRR The study also revealed that a lot of financial and nonfinancial factors influence the choice of capital budgeting technique like the dimensions of the corporate revenues, profitability, leverage level, expenditure, familiarity with the project, availability of money, and therefore the level of education of decision makers. Significant differences were found between the methods selected and the factors influencing the selection of the technique. It has been found that there is a positive association between most of the financial factors and thus the methods but negative with majority of the nonfinancial variables.

KEYWORDS: *Capital Budgeting Techniques, Determinants Of Capital Budgeting Methods, Selection Variables, NPV, PB, IRR.*

INTRODUCTION

Capital Budgeting decisions pertaining to fixed /long term assets which by definition refer to assets which are in operation therefore, and yield a return, over a period of time, usually exceeding one year. They, involve a series of outlays of cash resources in return for anticipated flow of future benefits. Capital budgeting is the process that companies use for deciding on capital project. The capital project lasts for extended time, usually quite one year. As the project is typically large and has important impact on the future success of the business, it's crucial for the business to form the proper decision. Capital budgeting is process of determining whether an enormous expenditure is during a company's best interest. Here are the fundamentals of capital budgeting and the way it works. A company undertakes capital budgeting so as to form the simplest decisions about utilizing its limited capital. For example, if you are considering opening a distribution Centre or investing in the development of a new product, capital budgeting will be essential. It will assist you decide if the proposed project or investment is really worth while within the end of the day. Capital budgeting also features a pertaining to the competitive position of the enterprise mainly due to the very fact that they relate to fixed asset. The fixed asset represents earning asset of the firm. They enable the firm to get finished goods which will be ultimately being sold for profits. The cost decision has its effects over an extended time span and inevitable affects the company's future cost structure. The Capital investment decision once made aren't easily reversible without much loss to the firm because there could also be no market place for second-of –hand plant and equipment and their conversion to other uses may most financially viable. Capital investment involves cost and therefore the majority of the firms have search capital resources. A common problem that corporations face on an annual basis is creating the capital allow subsequent financial year.

NEED OF THE STUDY:

Capital budgeting is important because it creates accountability and measurability.

Any business that seeks to invest its resources in a project, without understanding the risks and returns involved, would be held as irresponsible by its owners or shareholders.

The profitability of a business concern depends upon the level of investment made for long period.

LITERATURE REVIEW

Capital budgeting decisions are extremely important and complex and have inspired many research studies. In an in-depth study of the capital budgeting evaluations, Marc Ross found in 1972, that although techniques that incorporated discounted cash flow were used to some extent, firms relied rather heavily on the simplistic payback model, especially for smaller projects. In addition, when discounted cash flow techniques were used, they were often simplified.

For example, some firms' simplifying assumptions include the use of the same economic life for all projects even though the actual lives might be different. Further, firms often did not adjust their analysis for risk (Ross, 1986).

In **1972 Thomas P. Klammer**surveyed a sample of 369 firms from the 1969 Compustat listing of manufacturing firms that appeared in significant industry groups and made at least $1 million

of capital expenditures in each of the five years 1963-1967. Respondents were asked to identify the capital budgeting techniques in use in 1959, 1964, and 1970. The results indicated an increased use of techniques that incorporated the present value (Klammer, 1984).

James Fremgensurveyed a random sample of 250 business firms in 1973 that were in the 1969 edition of Dun and Bradstreet's Reference Book of Corporate Management. Questionnaires were sent to companies engaged in manufacturing, retailing, mining, transportation, land development, entertainment, public utilities and conglomerates to study the capital budgeting models used, stages of the capital budgeting process, and the methods used to adjust for risk. He found that firms considered the internal rate of return model to be the most important model for decision-making. He also found that the majority of firms increased their profitability requirements to adjust for risk and considered defining a project and determining the cash flow projections as the most important and most difficult stage of the capital budgeting process (Fremgen, 1973).

In **1965, J William Petty, David P. Scott, and Monroe M. Bird** examined responses from 109 controllers of 1971 Fortune 500 (by sales dollars) firms concerning the techniques their companies used to evaluate new and existing products lines. They found that internal rate of return was the method preferred for evaluating all projects. Moreover, they found that present value techniques were used more frequently to evaluate new product lines than existing product lines (Petty, 1975)

OBJECTIVES OF THE STUDY

1. To know the advanced evaluation practices in capital budgeting

2. To know which capital budgeting technique should used by the financial managers.

3. To draw the inferences based on the empirical study of investigation

4. To draw the Conclusions and Suggestions

RESEARCH METHODOLOGY

The study uses secondary data. Secondary data will be collected from articles, research papers, and working papers on the topic concerned, web portals and books concerned. Data thus collected is processed, tabulated and analyzed by employing relevant statistical tools. Results of the study will be summarized and would be clearly described in the paper.

TOOLS AND TECHNIQUES

Statistical tools which are used for the study are NPV, ARR, PBP, PI.

DATA ANALYSIS

CALCULATION OF NET PRESENT VALUE (NPV)

NPV=CASH FLOWS/ (1+r)^i

Year	Cash inflows(crors)	discount rate	present value
1	70	10%	63.63636364
2	75	10%	61.98347107
3	80	10%	60.10518407
4	85	10%	58.05614371

5	89	10%	55.26199775
net present value	299.0431602		

Interpretation

The above table shows that, includes the initial amount that 299.043.

Year	Earnings after tax (In crs)
1	33.62
2	16
3	30
4	111
5	52
Total	242.62

$$ARR = \frac{\text{Average annual EAT'S}}{\text{Average investment}} \times 100$$

$$\text{Average Annual EAT'S} = \frac{\text{Total amount}}{\text{No of years}}$$

$$= \frac{242.62}{5} = 48.524\text{crs}$$

Average investment=196.28

$$ARR = \frac{48.524}{196.28} \times 100 = 25\%$$

Average Rate of Return =25%

Calculation of payback period of vijay textile

SI NO	YEAR	CASH FLOWS(crs)	CUMILATIVE CASH FLOWS(crs)
1	2014-2015	70	70
2	2015-2016	75	145
3	2016-2017	80	225
4	2017-2018	85	310
5	2018-2019	89	399

$$\text{PBP} = \text{Actual (Base) year} + \frac{\text{Difference in cash flows}}{\text{Next year cash flows}}$$

$$\text{PBP} = 2 + \frac{89}{399}$$

= 2 +0.22

Pay Back Period=2.22

STEP1:Calculation of BCR

STEP2: Calculations of Present values of cash inflows @10% Application of the formula.

STEP3: Calculations of cash flows after taxes

Calculation of Benefit cost Ratio

YEAR	CFAT	PVIF@10%	PV'S
2014-2015	70	0.909	63.63
2015-2016	75	0.826	61.95
2016-2017	80	0.751	60.08
2017-2018	85	0.683	58.055
2018-2019	89	0.62	55.18
		Total	298.895

$$\text{Profitability index} = \frac{\text{Present value of cash inflows}}{\text{Initial Investment}}$$

$$= \frac{298.895}{196.28} = 1.522$$

Hence PI = 1.522 years.

The following observation is:

Payback period =2.22

Average rate of return=25%

PI=1.522

FINDINGS

Payback period for the project will be 2.22 years it indicates the project earns good yield in future also. Average rate of return for the VIJAY TEXTILE Company Limited is 25 %. NPV and

IRR show a good path for the organization to develop In future. Markets and also the investments for the investors The total asset of VIJAY TEXTILE Company limited recorded consistent fluctuations from this decline is an account of lower growth rates sales in those years. The fixed assets of VIJAY TEXTILE Company limited showing a fluctuating trend and increased these fluctuations any is due to fixed assets investment.

SUGGETIONS

1. Less investment and more profits
2. Factories should be allow single-entry point and use separate transport or arrange accommodation for works.
3. It should be the highest level in the whole the textile firms
4. The respondents are satisfied with the overall services providing their workers
5. To support the customers
6. To give the much importance to all the customers who consulting on the company
7. To use the strong cloth material

CONCLUSION

Finally, the study also revealed variety of things that affect the choice of the capital budgeting method. The major factors that influence the choice could also be financial or nonfinancial variables like the dimensions of the corporate, revenues, profitability, leverage level, expenditure, familiarity with the project, availability of money, and therefore the level of education of decision makers. Significant differences were found between the methods selected and the factors influencing the selection of the technique. It has been found that there's a positive association between the dimensions, revenues, profitability, and leverage with the mainly used techniques (PB, NPV, IRR, and PI). However, there's a positive association between majority of the nonfinancial factors (age, lifetime of the project, level of education, and quality of the project) with SA and other techniques of capital budgeting. Capital budgeting decision requires planning for setting up budgets on projects expected to have long-term implication having entailed its approaches/ techniques significantly is applied in TEXTILE INDUSTRY.

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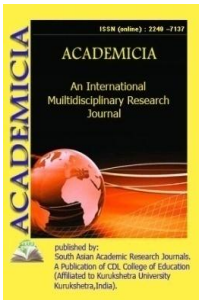

A STUDY ON IMPACT OF ADVERTISING ON CUSTOMER AT HERO MOTOCORP PVT. LTD

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INTRODUCTION

Advertising is a form of communication intended to persuade an audience (viewers, readers or listeners) to purchase or take some action upon products, ideas, or services. It includes the name of a product or service and how that product or service could benefit the consumer, to persuade a target market to purchase or to consume that particular brand. These messages are usually paid for by sponsors and viewed via various media. Advertising can also serve to communicate an idea to a large number of people in an attempt to convince them to take a certain action. Commercial advertisers often seek to generate increased consumption of their products or services through branding, which involves the repetition of an image or product name in an effort to associate related qualities with the brand in the minds of consumers. Non-commercial advertisers who spend money to advertise items other than a consumer product or service include political parties, interest groups, religious organizations and governmental agencies. Nonprofit organizations may rely on free modes of persuasion, such as a public service announcement. Modern advertising developed with the rise of mass production in the late 19th and early 20th centuries. Mass media can be defined as any media meant to reach a mass amount of people. Different types of media can be used to deliver these messages, including traditional media such as newspapers, magazines, television, radio, outdoor or direct mail; or new media such as websites and text messages.

Need for the study

The study tries to understand the key parameters in designing the advertisement which impacts the customer buying behavior at Hero Motocorp Pvt. Ltd.

Scope of the Study

The Scope of the study is confined to Impact of Advertising on Customer at Hero MotoCorp Pvt. Ltd w.r.t Phoenix Motors Pvt. Ltd, the study is confined to Tarnaka Branch, Hyderabad Only.

Objectives of the Study

- To Study and analyze the impact of advertising on customers at Hero Motor corp Pvt. Ltd
- To identify the problems and lapses in designing advertisement at Hero Motor corp Pvt. Ltd

Source of the Data

The study is based on primary data & secondary data

Primary data

Primary data was collected by using structured questionnaire administered to select number of customers.

Secondary data

Secondary data was collected from websites and text books.

RESEARCH METHODOLOGY

Sampling Size : The sampling size is 50

Sampling Method : Simple Random Sampling Method

Extent of Sampling Procedure: The sampling is done in Tarnaka Branch, Hyderabad

Time Period : The study is conducted during March and April Month.

Research Instrument : Structured Questionnaire

LIMITATIONS

The present research is restricted to only Hero MotoCorp Pvt.Ltd Tarnaka branch in Hyderabad

The sample size taken is only 50 and as such is very small as compared to the universe, this is due to the constraints of time and effort, and as such may not be enough to generalize to the entire population, however it is presumed that the sample represents the universe.

Literature Review

Advertising is a form of communication intended to persuade an audience (viewers, readers or listeners) to purchase or take some action upon products, ideas, or services. It includes the name of a product or service and how that product or service could benefit the consumer, to persuade a target market to purchase or to consume that particular brand. These messages are usually paid for by sponsors and viewed via various media. Advertising can also serve to communicate an idea to a large number of people in an attempt to convince them to take a certain action.

Commercial advertisers often seek to generate increased consumption of their products or services through branding, which involves the repetition of an image or product name in an effort to associate related qualities with the brand in the minds of consumers. Non-commercial advertisers who spend money to advertise items other than a consumer product or service include political parties, interest groups, religious organizations and governmental agencies. Nonprofits organizations may rely on free modes of persuasion, such as a public service announcement.

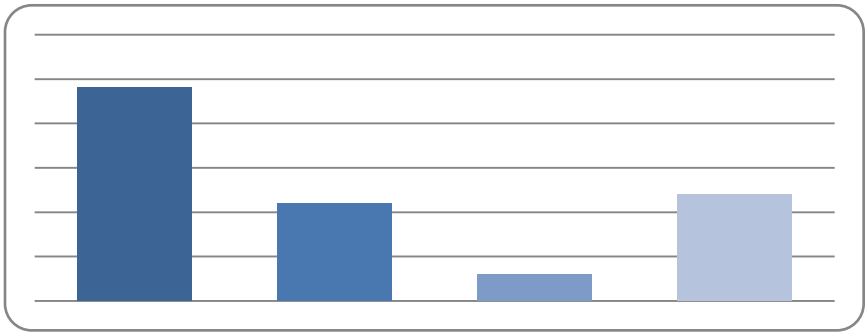
Data Analysis

1. Which model of Hero MotoCorp have you purchased?

TABLE-1 MODELS OF HERO MOTOCROP

S.No	Options	No. Of Respondent	Percentage %
1	Passion	24	48
2	Splendor	11	22
3	Maestro	3	6
4	Other	12	24
Total No. Of Respondents		50	100

Chart-1



Interpretation

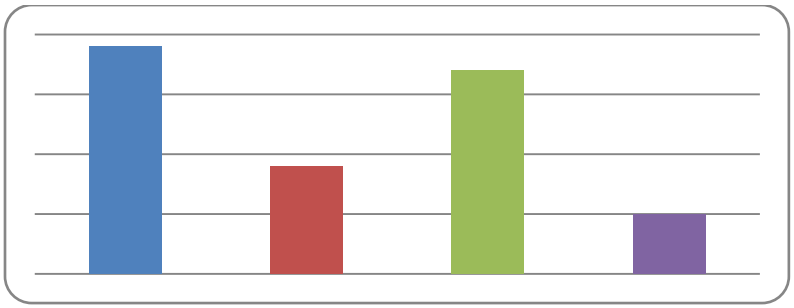
From the above figure it is observed that 48% of the respondents are using passion bike, 22% of the respondents are using splendour, and 6% of the respondents are using Maestro, 24% of the respondents are using other products of Hero.

2. How did you come to know about the bike that you are using?

TABLE-2 AWARNESS THROUGH MEDIA

S.No	Options	No. Of Respondent	Percentage %
1	Advertisement	19	38
2	Sales people	9	18
3	Friends	17	34
4	Other	5	10
Total No. Of Respondents		50	100

Chart-2



Interpretation

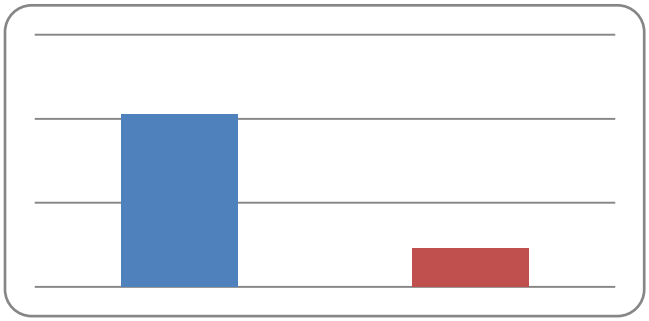
From the above table it is observed that 38% of the respondents came to know about their bike with advertisement, 18% by sales people, 34% of the respondents by their friends, and 10% by the other source.

3. Did you come across the advertisement of your bike?

TABLE-3 ADVERTISEMENT

S.No	Options	No. Of Respondent	Percentage %
1	Yes	41	82
2	No	9	18
Total No. Of Respondents		50	100

Chart-3



Interpretation

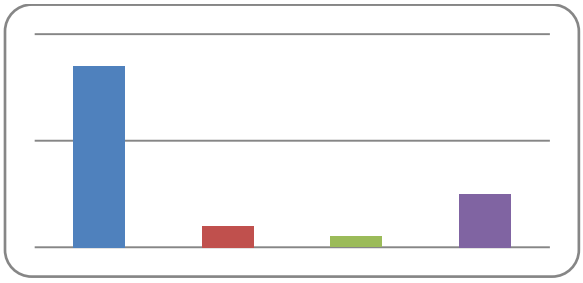
From the above chart it is observed that the 82% of respondents came across the advertisement of their bike, 18% of the respondent have not seen the advertisement of their bike.

4. Through which media have you seen it?

TABLE-4 SOURCE OF MEDIA

S.No	Options	No. Of Respondent	Percentage %
1	Television	34	68
2	Newspaper	4	8
3	Internet	2	4
4	All Of The Above	10	20
Total No. Of Respondents		50	100

Chart-4



Interpretation

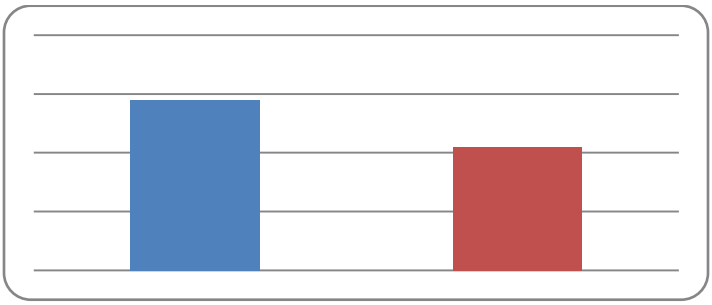
It is observed that 68% of the respondents came across their bike advertisement in television, 8% in newspaper, less no. of respondents came across their bike advertisement in internet, 20% in all of the above.

5. Does the use of Brand ambassador in advertisement makes you to buy?

TABLE-5 : INFLUENCE OF BRAND AMBASSADOR

S.No	Options	No. Of Respondent	Percentage %
1	yes	29	58
2	No	21	42
Total no. of Respondents		50	100

Chart-5



Interpretation

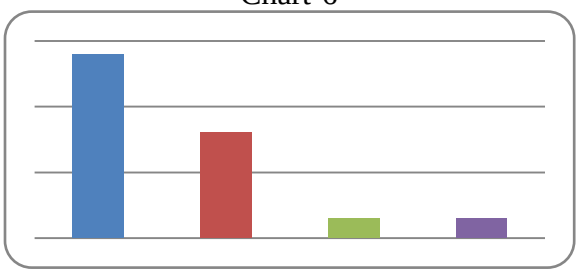
From the above chart it is observed that most of respondents influenced by Brand Ambassador in purchasing, 42% of respondents were not influenced by Brand ambassador.

6. Who do you feel is the best brand ambassador in your opinion?

TABLE-6 BEST BRAND AMBASSADOR

S.No	Options	No. Of Respondent	Percentage %
1	Sports person	28	56
2	Filmy personality	16	32
3	Priests	3	6
4	others	3	6
Total no. of Respondents		50	100

Chart-6



Interpretation

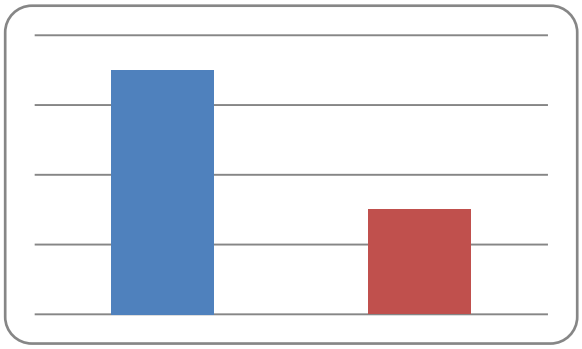
From the above chart it is observed that 56% of the respondents feel that the Best brand ambassador is sports person, 32% of the respondents feel that the best brand ambassador is filmy personality, 6% of respondents feel Priests and rest of the respondents feel that others as a best brand ambassador.

7. Does the tagline in the advertisement effect your decision?

TABLE-7

S.No	Options	No. Of Respondent	Percentage %
1	Yes	27	54
2	No	23	46
Total no. of Respondents		50	100

Chart-7



Interpretation

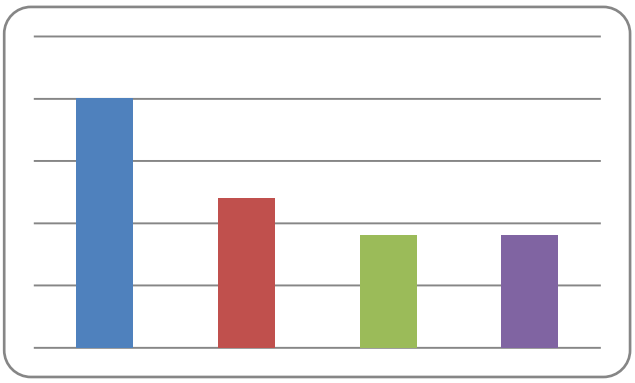
From the above chart it is observed that 54% of the respondents influenced by tagline in buying decision and 46 % of the respondents were not affected by tagline.

8. How long does the impact of an advertisement last on you?

TABLE-8 IMPACT ON ANDVERTISEMENT

S.No	Options	No. Of Respondent	Percentage %
1	Few Hours	20	40
2	One Day	12	24
3	One Week	9	18
4	More than a month	9	18
Total No. Of Respondents		50	100

Chart-8



Interpretation

It is observed that 40% of the respondents are saying the impact of an advertisement last on them for few hours, for 24% of the respondents for one day, for 18% above one week and more than one month.

FINDINGS

- It is found that most of the respondents are using passion bike.
- It is found that most of the respondents came to know about their bike only through advertisement.
- It is found that most of the respondents came across the advertisement of their bike.
- It is found that most of the respondents have seen their advertisement only in television
- It is found that the use of Brand ambassador in advertisement effects purchasing decision.
- It is found that most of the respondents feel that the best brand ambassador is sport person.
- It is found that tagline affect the purchasing decision
- It is found that the impact of an advertisement last on respondents for few hours only.

Suggestions

- It is suggested that the organisation should concentrate on the other media channels also to create more awareness.
- It is suggested that the organisation can continue with the use of brand ambassador in the advertisements for future also.
- It is suggested that the organisation can go for the sports person as the brand ambassador in future.
- It is suggested that the organisation can go for the use of tagline in the advertisement.
- It is suggested that the organisation should be concentrate on television media to attract more no. of respondents than other media.

- It is suggested that the organisation has to concentrate more on design advertisements which attracts the customers to watch more no. of times and remember for a long period of time.

CONCLUSION

From the above study it is concluded that the promotion of products of Hero MotoCorp are effectively done by advertisement only in television but the organization need to concentrate on other media channels also. Most of the customers are using passion bike. While designing the advertisement the organization needs to use sports person as brand ambassador in advertisement which helps attracting more number of customers and length of the advertisement should be less than 30 sec.

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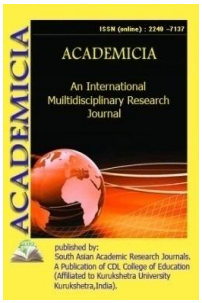

A STUDY ON CUSTOMER RELATIONSHIP MANAGEMENT AT INDIA BULLS SECURITIES

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ABSTRACT

Customer relationship management (CRM) is a widely employed model for conducting organization's interactions with clients, customers, and earnings prospects. It involves using technology to install, automate, and innovate company processes-principally sales tasks, but people for marketing too, customer support, and technician service team. The entire goals would be to find, draw, and acquire customers; cultivate and retain the company already needs; lure former customers straight back again to this fold; and also lessen the prices of marketing and client support. Customer relationship management refers to a company-wide small business plan including customer-interface branches along with other sections.

KEYWORDS: *Customer Relationship Management, Technology, Investor, People*

1. INTRODUCTION

Before we start to examine the conceptual foundations of CRM, it'll be beneficial to define, what's CRM? A narrow perspective of customer relationship management is database marketing emphasizing the promotional areas of marketing associated with database efforts. Another narrow, yet relevant, viewpoint is to consider CRM only as customer retention when a selection of after marketing tactics can be used for customer bonding or residing in touch following the sale is manufactured. Shani and Chalasani define relationship marketing as "a built-in effort to recognize, maintain, and build-up a network with individual's consumers and also to constantly fortify the network for mutual advantage of both sides, through interactive, individualized and value-added contacts over a period". The core theme of most CRM and relationship marketing perspectives is its concentrate on co-operative and collaborative relationships between your firm and its own customers, and/or other marketing actors.

2. NEED OF THE STUDY

The study is conducted to provide product information, each day and technical assistance on websites that are accessible a day, a week-seven days. How every individual customer defines quality, identify, and design some strategy for each customer predicated on these individual expectations and requirements. Provide a fast mechanism for scheduling and managing follow-up sales calls to judge post-purchase cognitive dissonance,

repurchase probabilities, repurchase times, and repurchase frequencies. Provide a mechanism to track all true points of contact between a person and the business enterprise, and do it within an integrated way.

3. OBJECTIVES OF THE STUDY

1. To understand client expectations
2. To improve the overall customer care
3. To improve the business enterprise relationship
4. To grasp client intention towards availing India Bulls in future

4. SCOPE OF THE STUDY

The service sector gets much deserved attention due to its inevitable role in a country's financial development. It really is mainly focusing on developing inbound relationship with customer really, which supports regards to retaining your client because service is definitely an "intangible good" such as for example attention advice, discussion and experience.

5. RESEARCH METHODOLOGY

METHOD OF COLLECTION OF DATA:

- **Primary Data**

  Primary data is collected through Questionnaire.

- **Secondary Data**

  Considerable data has also been taped from previous research papers, articles and newspapers were also referred.

6. LIMITATIONS

- Sample size was limited because of the limited period allocated for the survey.
- The selection of individuals to cover the many types of commodity trading which range from agro products to energy and metals like silver and gold was tedious and frustrating.
- Some customers would have to be re-contacted according with their capacity for time.
- A several area where in fact the survey is completed was very un -hygienic and overcrowded.
- Some data of customer isn't proper. Like their contact number & address

7. REVIEW OF LITERATURE

Many CRM programs fail for just two reasons:

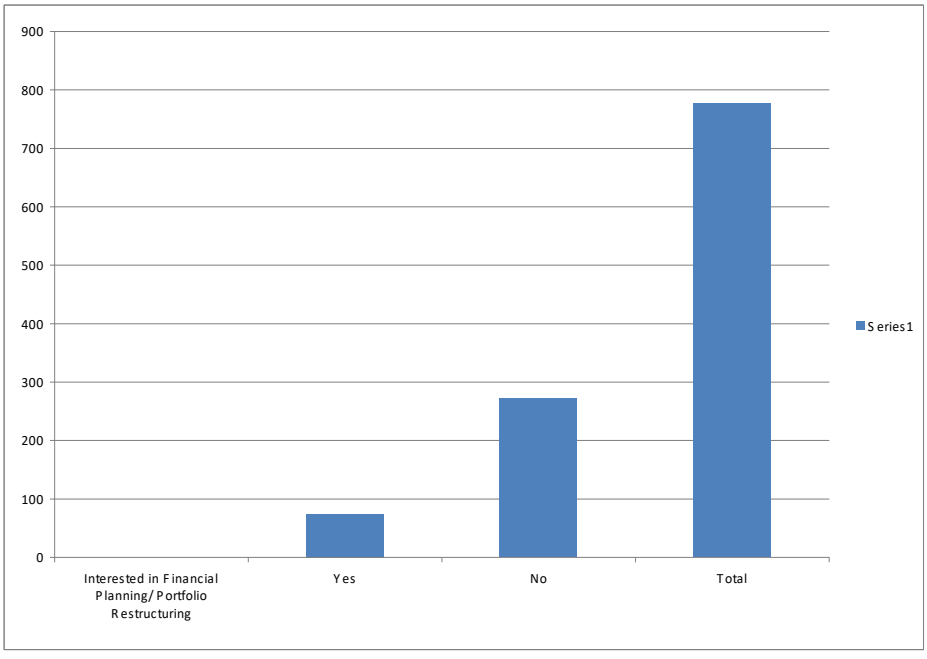
1. Insufficient supportive business processes: Because business processes and organizational goals aren't part of a strategic CRM plan associated with organizational goals and objectives.

2. Insufficient enterprise perspective: For Relationship Marketing to work, it requires that the continuing business creates a seamless enterprise view. A lot of CRM programs fail because they're assembled with disparate components that are not made to interact within a complete CRM system designed to meet organizational objectives.

8. DATA ANALYSIS

Different customers have the different objectives/purpose for opening the account in India Bulls Ltd., as per the survey done by us is as follow:

Objective for A\C opening	No. of Customers
Commodity	51
Investment	137
IPO	95
Trading	245
Investment & Trading	57
Investment Trading & IPO	76
IPO & Trading	81
Investment & IPO	19
Others	39

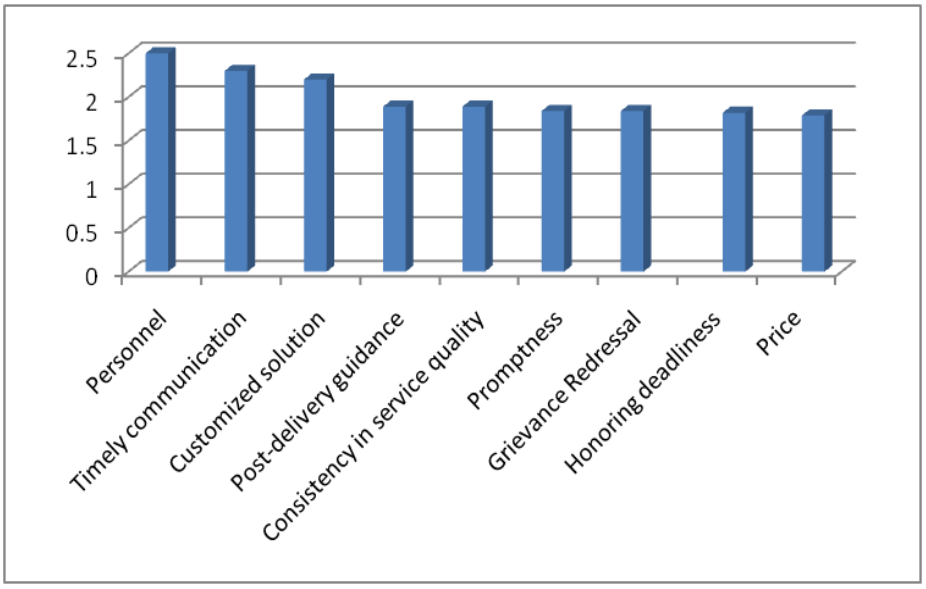


Financial Restructuring

India Bulls Ltd. provides the service of Financial Restructuring. As per the survey the chart is as follows:

Attributes related to service delivery	**Evaluation of customers response by comparing INDIA BULLS's service delivery with other companies**
Personnel	2.5
Timely communication	2.3
Customized solution	2.2
Post-delivery guidance	1.89
Consistency in service quality	1.89
Promptness	1.84
Grievance Redressal	1.84
Honoring deadliness	1.82
Price	1.79
Weights: 1- worse than INDIA BULLS, 2- same as INDIA BULLS, 3- better than INDIA BULLS	

Chart Showing the evaluation and comparison of the services supplied by INDIA BULLS against the services supplied by other companies



Inference:

The above graph shows that personnel, timely communication and customized solutions are the attributes in which other companies are better than INDIA BULLS. Post delivery guidance, consistency in service quality, promptness, grievance redressed , honoring deadliness and price are the attributes in which INDIA BULLS is better than other companies.

9.FINDINGS

In all, which we were provided of 800 clients we've mostly uncovered that they aren't taking into consideration the financial portfolio restructuring. We found 90.7% no interested and 9.3% are considering the city.

The most the customers whom, we met Government employees, businessman, Hotels, malls, chaiwala and restaurants also. Think about their considering trading.

The most the clients focused on the IPO, Trading, Investment, options and future and commodity markets. Out of 800 A lot of the clients Considering trading.

10. SUGGESTIONS

From the interpretation we are able to see that various customer are interested in online trading, however many are aware of India bulls and its own prepaid brokerage services.

Company should concentrate on online customer and make an effort to give more information regarding India bulls and prepaid to these existing clients and create interest included in this to take benefit of these new services.

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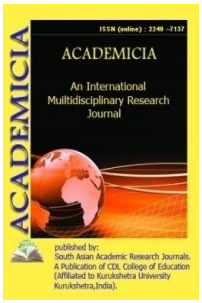

A STUDY ON WORKERS PARTICIPATION WITH REFERENCE TO PART TIME WORKERS IN THE ORGANIZATIONS ESSAN INDUSTRIES LTD HYDERABAD

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ABSTRACT

One motivation behind why examine on the labourers interest perspectives of low maintenance Part Time labourers is significant and required is on the grounds that Part Time labourers keep on being a developing fragment of the workforce. The board of Part Time labourers keeps on being an ever bigger piece of heads' occupations. In 1957, low maintenance labourers represented just 12.1% of the workforce (Tilly, 1991), yet as indicated by 1999 figures, they currently represent 24.1% (U.S. Statistics Bureau, 2000). From the start, this seems, by all accounts, to be demonstrative of a particular pattern in the U.S. economy to move away from work concentrated, costly assembling to a more help based economy, yet the development of Part Time labourers is across something other than the administration business. Tilly (1996) demonstrated that there has been enormous development in low maintenance work in the development business (from 8.6% in 1969 to 11.9% in 1993) and the exchange business (from 26.3% in 1969 to 30.3% in 1993), just as littler development over every single other industry, showing a general move towards the more prominent utilization of Part Time labourers

KEYWORDS: *Part-Time, Workers, Workers Participation.*

INTRODUCTION

The pattern towards the more noteworthy utilization of Part Time labourers support is happening in numerous nations, not simply in the United States. Barling and Gallagher (1996) report that this pattern towards the expanded utilization of Part Time labourers reaches out up into Canada,

across Europe and in the created economies of Asia. In nations where Part Time business information is accessible (Australia, Canada, Japan, New Zealand, the Netherlands, Norway, Sweden, United Kingdom and the United States), somewhere in the range of 18 and 25% of the workforce was utilized PT starting at 1996. What's more the development pace of PT business is unmistakably more prominent than the similar

Development pace of perpetual full-time employments over the globe.

NEED OF THE STUDY

Workers' participation in management is an essential ingredient of Industrial democracy. The concept of workers' participation in management is based on Human Relations approach to Management which brought about a new set of values to labour and management.

OBJECTIVES

- To locate the different territories of labourers investment concerning low maintenance labourers where the plan has been executed.
- To know whether the low maintenance labourers group really contributes genuinely to accomplish the shared objective of the association
- To know whether in the conversation each gathering has equivalent weight age in giving proposal/suggestion.

SCOPE OF THE STUDY

Contingent upon the particular work environment, a few administrators may confront a daunting struggle in accomplishing dynamic worker interest in wellbeing councils. Strain to build creation, an impermanent or transient work power and in general absence of inspiration can add to the troubles of making a profitable security panel at work. In an endeavour to avoid these difficulties, a few supervisors may basically assign a labourer as a wellbeing board of trustees part or co-seat to keep up the nearness of a wellbeing advisory group..

LIMITATIONS

- Due to time constraints the study was limited only for short period.
- Random sampling method has been adopted and all limitations applicable to that method are applicable here also.
- The authenticity of information provided by the New Entrant Manager cannot be assured.
- Analysis of the data has been done based on the assumptions that the information provided by the respondents is genuine.
- The sample size is small when compared to total universe, Hence the capability of study to the whole universe is constraint.

LITERATURE REVIEW

From the beginning of time, see on what structures low maintenance work has shifted. The privileges of low maintenance representatives in UK are ensured in law through the Protection of Employees (Part Time Work) Act, 2001.

Low maintenance worker in UK is characterized in the Act as "a representative whose ordinary long stretches of work are not exactly the typical long periods of work of a representative who is an equivalent worker comparable to the person in question".

The responsibility of low maintenance workers and full time representatives are prime subjects for an association since they have to realize who to contract and who might be progressively reasonable for the activity. There has been a great deal of discussion about the responsibility of the full time and low maintenance representatives towards their association. To go to an ideal comprehension in regards to this we need to consider a few factors that spread the conduct of the representatives. As indicated by Brawer and Cohen (1972) they state that pay is a fundamental factor in a representative's responsibility factor, as per them equivalent work and equivalent compensation would make both of these representatives show same measure of duty.



RESEARCH METHODOLOGY

Methods of Data Collection

Primary Data

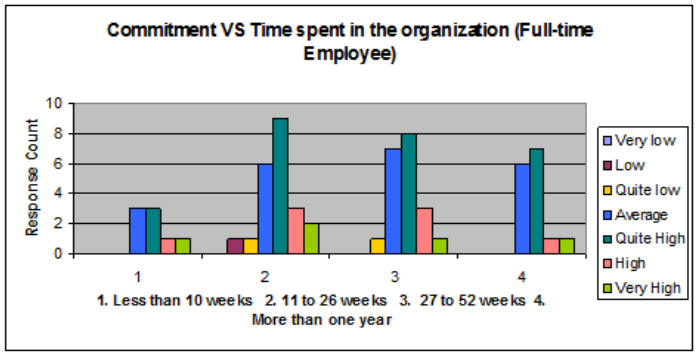
Right now, the given survey, the underlying data will be gathered. A pre-arranged and organized survey is generally given to a huge example gathering of around 50 respondents.

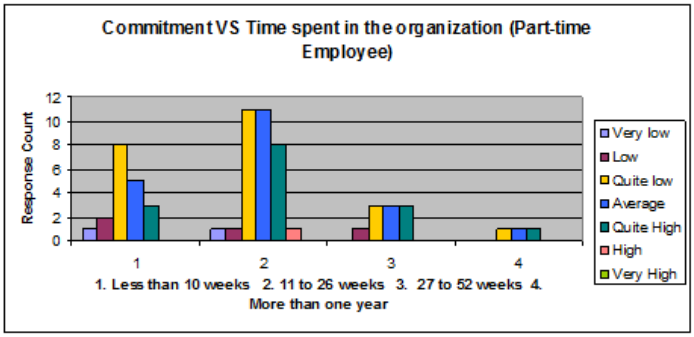
Secondary Data

The information acquired that can be used by me as both to portray and clarify the exploration and incorporates the subjective and quantitative data,

DATA ANALYSIS AND INTERPRETATION

Part-Time Employees				
Time Spent in the organization(weeks)	Response Count	Managers trust	Customer satisfaction	Employees satisfaction
0-10	19	Nil	2 out of 10	No specified satisfaction
11-26	33	1.2	3.43 out of 10	Drawing good salary
27-52	10	Nil	2 out of 10	No specified satisfaction
53-104	3	Nil	No specific	No specified satisfaction
			satisfaction	
TOTAL	65	1.2	5.43 out of 30	Drawing good salary or no specified specification





Interpretation: The hypothesis of Vroom's referenced

in section two expresses that low maintenance representatives are probably going to turn out to be progressively dedicated at the appointed time of time. Be that as it may, breaking down the above tables it is seen as conflicting.

FINDINGS

Along these lines in the comfort retailing, from the outcomes acquired in the examination considers, directors ought to know about the significance of the job of responsibility levels. From the outcomes, it was discovered that the low maintenance representatives were less dedicated to their employments procedures.

The foundations of duty spring from pay scales, security of the activity, expertise, applause and acknowledgment from the chiefs or more all workers strengthening

SUGGESTIONS

The essential need of the workers for example the compensation scales ought to be satisfied by the norms set by the association. So as to expand their degree of inspiration and duty towards the association, the inputs got from the representatives ought to be consistently postponed and seen in the dynamic procedure.

CONCLUSION

This had motivated me to make the examination the outcomes from the essential research and subsequently wants to respond to the inquiries set toward the start of this exploration and to move toward the targets set here right now the ends that I have come to. The exploration theory about the dedication levels and the sort of responsibilities towards the association of the workers are what this examination is about. For example Low maintenance workers are less dedicated towards their association than the full time representatives.

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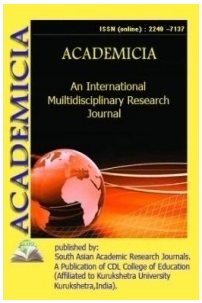

A STUDY ON WORKING CAPITAL MANAGEMENT OF BRITANIA COMPANY LIMITED

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ABSTRACT

Britannia company is one of the leading companies in India in FMCG. Its share is considered as an asset by any investor. The reason behind is the adequate working capital of the company maintained. In this study changes in working capital has been identified for a period of five years and proved that it has strong working capital.

KEYWORDS: *Working Capital, FMCG, Investor, Asset*

INTRODUCTION

The total capital employed in a business is divided into two parts. They are like fixed capital and working capital.

FIXED CAPITAL:

The investment that made in fixed assets is represented like land, machinery and equipment. Intangible assets like patents and goodwill. To maintain fixed assets current assets are to be required. In order to run the business activities smoothly firm need to have good working capital.

Small amount of working capital affects the profitability of firm. It also includes problems like production interruptions and inefficiencies. Firm invest mostly in inventory which includes work in process, raw materials and finished goods.

Current assets also involve account receivables and marketable securities. Current assets may differ from industry to industry. In typical fast growing company such assets which are made as investment may unable to control. Shortage of current assets may affect the smooth running of business operation.

WORKING CAPITAL:

Working capital is required by an organization to run day to day business activities. It is a life blood of any organization. Working capital also includes balancing of current assets and current liabilities. The amount of working capital can be determined by the level of production.

Working capital management usually concerned as with managing current assets and current liabilities equally. This area includes availability of funds in result oriented manner. Real working capital takes place when actual operations take place in organization.

NEED FOR THE STUDY:

The need for working capital is to run day to day business operations cannot be overemphasized. We can rarely find few firms which don't require any working capital. We all knew that a firm should aim to have maximum wealth of its shareholder's. In order to have more wealth firm should earn sufficient return from operational. Current assets are important and very essential to a firm as fixed assets cannot easily convert into cash so firm need to maintain current assets.

SCOPE OF THE STUDY:

Scope of the study is too confined to working capital management at BRITANNIA industries limited at NACHARAM, Hyderabad.

Study is conducted for 5 years.

OBJECTIVES OF THE STUDY

- To study and analysis working capital management at Britannia.
- To analysis the performance of funds flow and outflow in organization.

SOURCE OF DATA

The data that was collected was mostly secondary data.

- Financial statements of a company.
- Annual reports of a company.
- Company websites.
- Text books related to study.

LIMITATIONS

- Most of the collected was secondary data.
- It includes only few days to collect data that may be insufficient to collect data

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TABLE: 2 STATEMENT SHOWING CHANGES IN WORKING CAPITAL MANAGEMENT

PARTICULARS	2015	2016	Increase	Decrease
Current assets				
Current investment	345.74	384.01	38.27	
Cash and bank bal	186.67	24.80		161.87
Other current assets	603.39	515.51		87.88
Loans & advances	623.39	942.98	319.59	182.56
Total C.A	1862.139	1867.3		
Current liabilities	811.16	871.67		60.51
Provision	410.91	492.08		391.43
Total C.L.	1222.07	1363.75		
Working capital	537.12			
Decrease in working capital		33.57	33.57	
Total	537.12	537.12	391.43	391.43

In the previous table we can see that working capital has been decreased

There are many reasons like follow

1. There was a increase in the investments.
2. There was a decrease in the cash balance.
3. There was a decrease in the current assets.
4. There was a increase in the loans and advances.
5. There was an increase in the current liabilities.
6. There was a increase in the provisions.

The above all are the reason made to decrease In the amount of working capital

TABLE: 4 SATTEMENT SHOWING CHANGES IN WORKING CAPITAL

PARTICULAR	2016	2017	Increase	Decrease
Current assets				
Current investment	384.01	602.61	218.6	
Cash & ban bal	24.80	53.55	28.75	
Other C.A	515.51	782.57	267.06	
Loans and advances	942.98	144.57		798.41
Total C.A	1867.3	1583.3		
Current liabilities	871.3	939.24		67.57
Provision	492.08	174.48	317.6	
Total C.L	1363.75	1113.72		
Working capital	503.55	469.58		
Decrease in W.C.		33.97	33.97	
Total	503.55	503.55	865.98	865.98

In the previous table we can see the working capital has been decreased.

Following are the reasons.

1. There is an increase in investment

2. There is an increase in cash balance.

3. There is an increase in current assets.

4. There is decrease in loans and advances.

5. There is an increase in current liabilities.

6. There is decrease in provisions. e

All the above factors shown impact of decrase in working capital.

TABLE: 6 STATEMENT SHOWING CHANGES IN WORKING CAPITAL

PARTICULARS	2017	2018	Increase	Decrease
Current assets				
Current investment	602.61	594.58		8.03
Cash & bank bal	53.55	97.25	43.7	
Other current assets	782.57	922.15	139.58	
Loans & advances	144.57	1287.47	1142.9	
Total C.A	1583.3	2901.45		
Current liabilities	939.24	1211.66		272.42
Provision	174.48	171.05	3.43	
Total C.L.	1113.72	1382.71		
Working capital	469.58	1518.74		
Increase in working capital	1049.16			1049.16
Total	1518.74	1518.74	1329.61	1329.61

In the previous table we can see that the working capital has been increased

Reasons for that are

1.There is decrease in investment.

2.There is increase in cash balance.

3.There is increase in current assets.

4.There is increase in loans and advances.

5.There is increase in current liabilities.

6.There is decrease in provisions.

Increase in working capital has been noticed because of above reasons.

TABLE: 8 SATTEMENT SHOWING CHANGES IN WORKING CAPITAL

PARTICULARS	2018	2019	Increase	Decrease
Current assets				
Current investment	594.58	718.89	124.31	
Cash and bank bal	97.25	40.48		56.77
Other current asses	922.15	1110.33	188.18	
Loans and advances	1287.47	1504.46	26.99	
Total current assets	2901.45	3374.16		
Current liabilities	1211.66	1424.74		213.08
Provision	171.05	188.52		17.47
Total current liabilities	1382.71	1313.26		
Working capital	1518.74	1760.9		242.16
Increase in working capital	242.16			
total	1706.9	1706.9	529.48	529.48

It is observed that working capital has been increased

Following are the reasons for that

1.There is increase in investments.

2.There is decrease in cash balance.

3.There was increase in current assets

4.There is increase in loans and advances.

5.There is increase in current liabilities.

6.There is increase in provisions.

Increase in working capital has been observed because of above reasons.

CHANGES TAKEN IN WORKING CAPITAL IN PAST 5 YEARS

- There was a decrease in working capital 33.57 due to the increase in current liabilities
- There was a decrease in working capital 33.97 due to the increase in current liabilities
- There was a increase in working capital 1049.16 due to the decrease in working capital
- There was increase in working capital 242.16 due to the decrease in working capital.

Years	Working capital
2015_2016	537.12
2016-2017	503.55
2017-2018	469.58
2018-2019	1518.74

FINDINGS;

- The Britannia industries limited working capital has been decreased due to increase in current liabilities.
- Changes in current liabilities definitely leads for changes in working capital and also profits.

- There is a change in cash and bank balances were fluctuating.
- The debtors are providing almost 50% of current assets.
- Firm provided current assets to its customers.which says that firm is providing more credit terms to its customers.
- There is a change in current assets and current liabilities.
- The inventory conversion period has been increasing.
- The balance sheet of a firm is differing from one year to another year.

CONCLUSION;

As the study is completed with lot of satisfaction and learnt many important details about business and its working operations. It can be amicably concluded that the company's performance is extremely well. Working capital of a firm is in a god position. Consideration to analysis, findings and suggestion the company can achieve more income. There may a change that can be made in ratios by increasing sales slowly. This suggestions study conclusion may help company to have more success in future.

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A STUDY ON CURRENCY DERIVATIVES

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ABSTRACT

Currency Derivatives are regarded as being among the very used alternatives to handle any danger in foreign currency exchange price volatility. Money derivatives are all exchange-based futures options transactions which make it possible for one to hedge against currency movements. To put it differently, a person may make use of a money potential deal to swap currency for another at a future date with a sum picked the day of buying the contract. Back in India, a person may utilize such derivative contracts to hedge against monies such as buck, euro, U.K. pound and yen. Corporates, notably individuals with a considerable vulnerability to exports or imports, use these contracts to hedge against their exposure for some certain currency. While most such Currency contracts were cash-settled from rupees, the Securities and Exchange Board of India (SEBI), premature this season, gave a proceed to start out out cross currency trades far too on euro dollar, pound-dollar along with dollar-yen. Both Money derivatives segments. It's this form of department but the numbers are a percentage of those found that the An individual may exchange in money derivatives all through agents. Incidentally, most of the important inventory brokers Provide money buying and selling solutions also.

KEYWORDS: *Currency, Derivatives, Currency, Exchange, Forex,*

1.INTRODUCTION

The money occasion provides the stable And institutionalized Deal into the speculators and people who understand about the forex market or stimulate the growth of full-scale in order that they are going to get the suitable period for the exchanging cash prospective. In opinion of trade exchanged future agreement and its institutionalized temperament offers counter amassing hazard limited.

From the Beginning only NSE had the Authorization yet today BSE and MCX has additionally begun income potential. It shows how funds future spreads soil from the look at of further

reachable Providers applications. Perhaps perhaps not just enormous business people and exporter and merchants utilize this yet one that are curious in understanding of currency showcase they're able to additionally put funds in to future.

Enormous and these trade Exchanged arrangement will provide more mindfulness in Combine and pull the speculators.

2. NEED OF THE STUDY

Ø The Requirement of this research is to know the operation of derivative hedging and understanding and working regarding how to help visitors to take care of the risk and boost the profitability.

Ø Most Of those investors are not privy to purchasing money derivatives. My project will likely be great for Investors who would like to gain earnings in overseas currencies.

Ø To Obtain knowledge about process of foreign Money Investments.

3. OBJECTIVES OF THE STUDY

Ø On Study various Currency trades at NSE.

Ø On Measure the Performance of currency derivatives.

Ø On Examine the Money derivatives changes using RSI resources.

Ø to Point most Useful money in expenditure administration.

4 SCOPE OF THE STUDY

Since Money Investors is Brand New in to the industry Hence the Investigation gives you the capacity to Gain recognition about money trades together having its own Investment solutions both equally to its Particular investors along with Respective

Traders. The analysis Tries to check today's trend in money trades marketplace, and so it will help promote analysis. The investigation might help recognize the concept of payoff in a simplified manner.

5.RESEARCH METHODOLOGY

Principal Information:

I've gathered info By getting together with all the men and women who're buying and selling in money trades.

SECONDARY Information:

With the Goal of Info Investigation I've obtained four monies exchanged in NSE. To find extra info relating to that' I accumulated data in blogs, journals and articles associated with money market. For academic phase of comprehension that I called NISM money derivative module do the job publication

SAMPLE Measurement:

Ø USD/INR

SAMPLE Period:

1 year information will be accepted For evaluation intention.

STATISTICAL Instruments:

Allergic Power Indicator (RSI)=

6 LIMITATIONS OF THE STUDY:

Ø That Diagnosis is Solely based on secondary statistics. Thus any error from your secondary advice can Additionally Change the Additionally Alter the investigation undertaken

Ø The money Prospective is actually a brand new idea along with the Associated book isn't offered.

Ø Confidential Matters Weren't revealed from the organization.

Ø You will find timing Limits.

7.REVIEW OF LITERATURE

Cash subsidiaries are trade based prospects and choices gets that permit those with a noteworthy introduction to imports or fares, utilize these agreements to fence against their presentation to a specific money. In India, one can utilize such subsidiary agreements to fence against monetary standards like US Dollar, Euro, U.K. Pound and Yen in order to deal with any hazard against remote cash conversion standard instability.

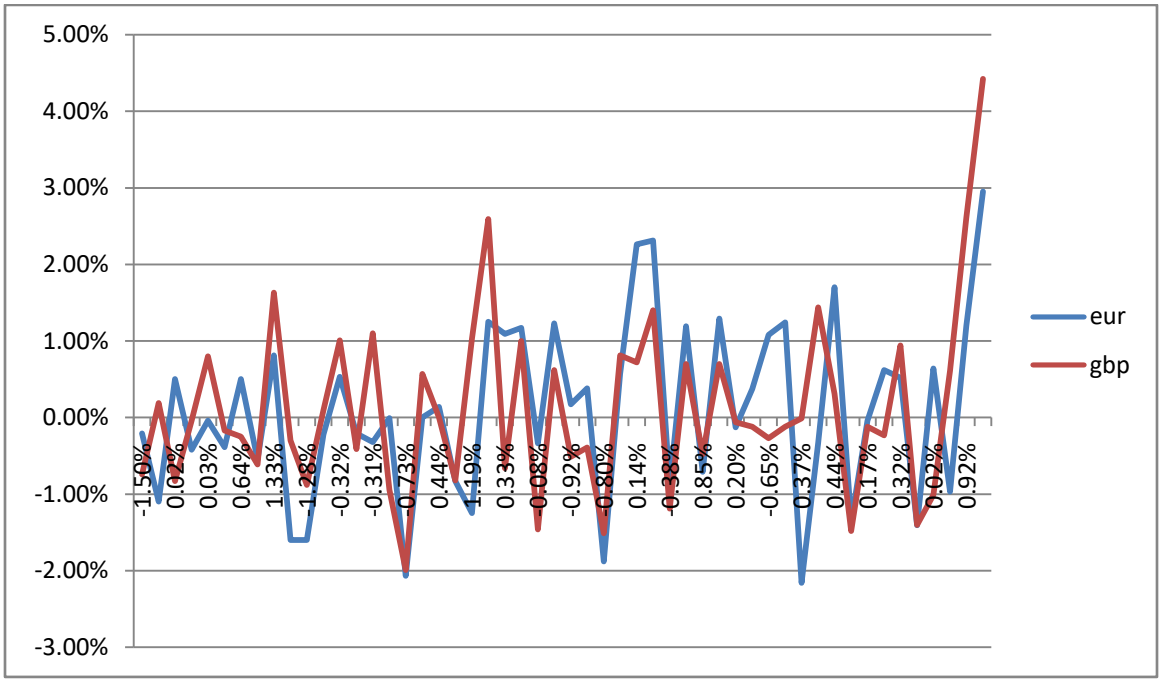
Before presentation of money subordinates exchange stock trades for supporting cash dangers, there was uniquely Over the Counter (OTC) showcase where forward agreements were arranged and gone into, regularly among banks and budgetary foundations. As of now, the two national-level stock trades, BSE and the National Stock Exchange (NSE), have cash subordinates portions. The Metropolitan Stock Exchange of India (MSEI) likewise has such a portion however with next to no volume. The trade based money subordinates portion is controlled and straightforward markets that can be utilized by anybody even people to support their cash dangers. All driving stock intermediaries offer money exchanging administrations and one can exchange cash subsidiaries through dealers. The money subsidiary agreements were prior settled distinctly in Rupees now SEBI allowed the cross cash contracts too on Euro-Dollar, Pound-Dollar and Dollar-Yen.

8.DATA INTERPRETATION

COMPARITIVE ANALYSIS OF CURRENCIES

Dollar	eur	gbp
-1.50%	-0.21%	-0.74%
0.30%	-1.10%	0.19%
0.02%	0.50%	-0.83%
-0.02%	-0.42%	-0.04%
0.03%	-0.04%	0.80%
0.31%	-0.39%	-0.17%
0.64%	0.50%	-0.25%
-1.08%	-0.55%	-0.61%
1.33%	0.81%	1.63%

0.38%	-1.60%	-0.30%
-1.28%	-1.60%	-0.88%
0.29%	-0.22%	0.10%
-0.32%	0.53%	1.01%
0.69%	-0.21%	-0.41%
-0.31%	-0.32%	1.10%
-0.96%	-0.01%	-0.94%
-0.73%	-2.07%	-1.99%
0.16%	0.00%	0.57%
0.44%	0.14%	0.00%
0.03%	-0.83%	-0.82%
1.19%	-1.25%	1.03%
1.76%	1.25%	2.59%
0.33%	1.09%	-0.66%
0.50%	1.17%	1.00%
-0.08%	-0.34%	-1.46%
0.27%	1.23%	0.62%
-0.92%	0.17%	-0.51%
0.13%	0.38%	-0.39%
-0.80%	-1.88%	-1.51%
0.45%	0.57%	0.81%
0.14%	2.26%	0.72%
0.23%	2.31%	1.40%
-0.38%	-0.89%	-1.19%
-0.08%	1.19%	0.70%
0.85%	-0.71%	-0.48%
0.41%	1.29%	0.70%
0.20%	-0.13%	-0.06%
-0.06%	0.37%	-0.12%
-0.65%	1.08%	-0.27%
-0.68%	1.24%	-0.12%
0.37%	-2.16%	-0.01%
0.56%	-0.33%	1.44%
0.44%	1.70%	0.31%
-1.13%	-1.36%	-1.48%
0.17%	-0.04%	-0.12%
0.35%	0.62%	-0.23%
0.32%	0.52%	0.94%
-0.06%	-1.41%	-1.40%
0.02%	0.64%	-1.01%
0.49%	-0.97%	0.61%
0.92%	1.20%	2.61%
2.02%	2.95%	4.42%



9.FINDINGS

Most Asian monetary forms debilitated on Thursday as the dollar recouped, with speculators presently anticipating lucidity on further financial facilitating measures and vulnerability around coronavirus to diminish before taking on more dangerous wagers.

10.SUGGESTIONS

Ø Invest or should be maintain all portfolios related different currency pairs

Ø Forex Potential Should alter A number of it enforced such as for instance take limitation of 5 thousand 83000, Ban on NRI's and FII's and also mutual-funds from rapping.

Ø Currently in exchange traded Currency Future segment merely a single set USD-INR can be found to exchange so there's additionally an additional demand by the exporters and importers to introduce the second pair in money trading.

11.CONCLUSIONS

By a Very Long shot the Massive occasion Into consideration throughout the last ten years has become the remarkable improvement and development of dollars relevant subsidiaries... These tools upwards ranges the capacity to divide hazard and set it to all those financial pros generally capable and prepared to transport it-a process which has any uncertainty improved national efficiency development and tips of livings.

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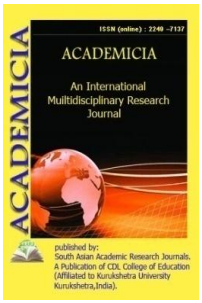

A STUDY ON EMPLOYEE WORK LIFE BALANCE

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ABSTRACT

Work and life remain the two most principal areas in the life of a used single individual. There is a developing readiness in today's workplaces that employees don't surrender their lives just because they work. With the increasing differences of family structures spoke to in today's workforce, especially with the creating standard of twofold profession families, the imperativeness of managing an employee's work-life balance have expanded prominently in recent years. Managements understand that the possibility of an employee's close to home and family life effects work quality and that there are solid business motivations to advertise work and non-work coordination. In this project, we battle that helping employees to achieve a work-life balance should transform into an essential bit of HR policy and system if it is to truly get the best from the association's kin without forsaking them unsatisfied, exhausted and unfulfilled.

KEYWORDS: *Work-Life, Employees, Satisfaction, Management, Human resources, etc.*

INTRODUCTION

when an individual keeps up a balance between his personal and professional life, the situation is called Work-Life Balance. This expression holds worth very much since it is imperative to have a balance between personal and professional life. Work-life balance is at the cutting edge of the world of work. The balance among personal and professional life differs from person to person and the organization where he or she is working. When an individual doesn't keep up a balance and works a lot in the organizational setting, this may cause him some medical, psychological and behavioral outcomes, thus, their productivity will likewise beneath. Studies have indicated that work-life stress is harmful to employees.

Late sitting and working an excess of can cause an imbalance in a person's personal and professional life; nonetheless, there are a few strategies to deal with the work-life stress for example time management, task management, relaxation, adaptable working hours, working from home and exercise, and so forth. Work-life balance improves a person's health, job

satisfaction, responsibility, inclusion and diminishes absenteeism and presenteeism (condition of physical nearness however not profitable). Regardless of the betterment in the improvement of maintaining work-life balance, there is still more to be finished.

One significant factor is how much work-life balance is common material over the whole hierarchy of the organization. Those lower down the organizational hierarchy is a few times not qualified for certain benefits or uniformed about important company arrangements. Work-life balance can help employers and employees to be healthy and productive in their personal and professional life.

SCOPE OF THE STUDY

The study covers the different aspects of employee work-life Balance and estimated an increase in productivity accountability, commitment better teamwork and communication made better morale, more positive organizational stress.

OBJECTIVES OF THE STUDY

1. To find out work-life balance of employees in ispatial tech solutions.
2. To increase an understanding of current work time policies and practices, as well as work-life balance issues.
3. To find out the effectiveness of the work-life balance of employees in ispatial tech solutions.

HYPOTHESIS

H0- There is no significant relation between balance of Work and life of an employee.

H1- There is a significant relation between balance of Work and life of an employee.

Sampling

The Total samples taken for the research study are 100 and it includes HR executives, HR professionals, trainers and employees from different departments.

Sampling Technique

Random sampling has been used to have a better productivity from the questionnaire given to every individual.

RESEARCH METHODOLOGY

Research methodology is the process of collection of information and obtaining solutions for a specific collected data.

For my study it is mostly depends upon the primary data.

Research Tools

A survey has been conducted to get the significant data from the employees. This survey includes different questions based upon their work experience, working hours, personal life, balance between the work and life and satisfaction from both the ends. The questionnaire includes different forms of questions such as

- Open-ended questions

- Closed ended questions
- Multiple choice questions.

Review of Literature

Mesmer-Magnus & Viswesvaran (2006). In his study he stated that, it was found that family support will helps to manage work-life balance. The support from Superiors, flexibility of working hours, co-worker's behavior, maternity leaves etc. motivates the employee and makes them to reduce the dark side of work life balance. This contributed significantly work life conflicts.

Kulkarni and Kulkarni (2012). In his study he stated that, he shared his opinion that successful employees are recognized for their works and they feel positive for their work life balance. Challenging work and career development are the key ingredients to employees and employer for a successful business strategy.

Parida (2012). In her study she stated about the importance of employees to recognize the work life balance with the help of analyzing the family, other responsibilities and interests. In order to retain employees. The company should recognize the one individual work life balance and schedule the work and craft the work culture according to them.

STATISTICAL TOOLS USED: For analyzing t opinions collected and obtain the results from that with the help of different statistical tools. They are

1) Bar graphs
2) Pie charts
3) Correlation.

Data Analysis

1. How many days in a week do you normally work?

TABLE 1: NUMBER OF WORKING DAYS IN A WEEK

Attributes	No of Respondents	Percentage
Less than 5 days	0	0
5 days	68	68
6 days	16	16
7 days	16	16
Total	100	100

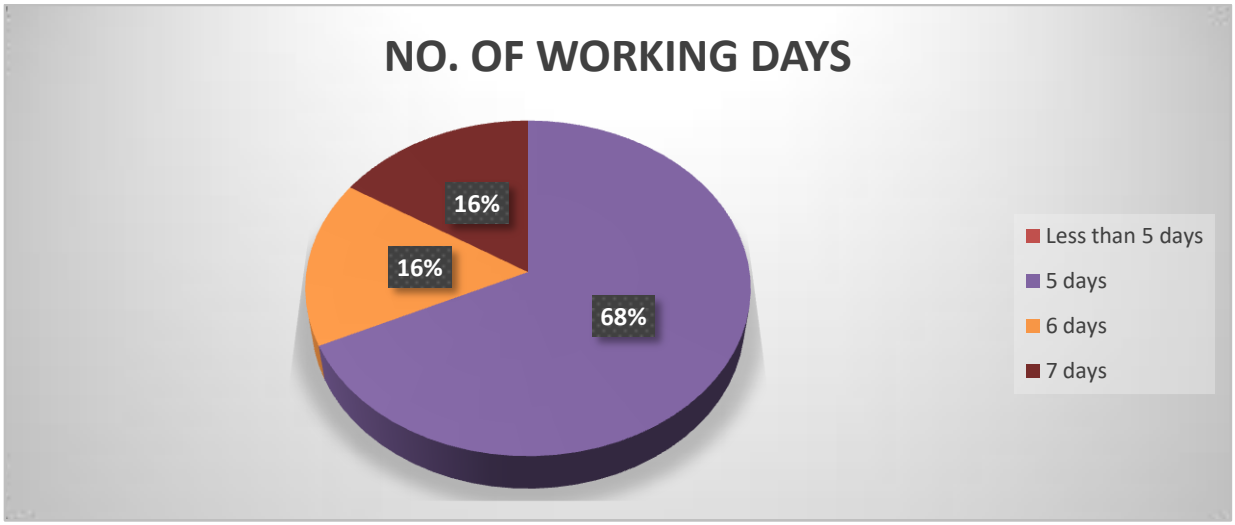

Chart 1: Graphical presentation of Number of working days in a week.

From the above analysis we can see that no one is working less than 5 days in a week, most of the people are working for 5 days that comprises 68% of the total employees i.e., 68 members. Some are working more than usual weekdays and that comprises 32% of the employees.

2. Do you generally feel you are able to balance your work-life?

TABLE 2: EMPLOYEES BALANCE BETWEEN WORK-LIFE

Attributes	No of Respondents	Percentage
Yes	78	78
No	22	22
Total	100	100

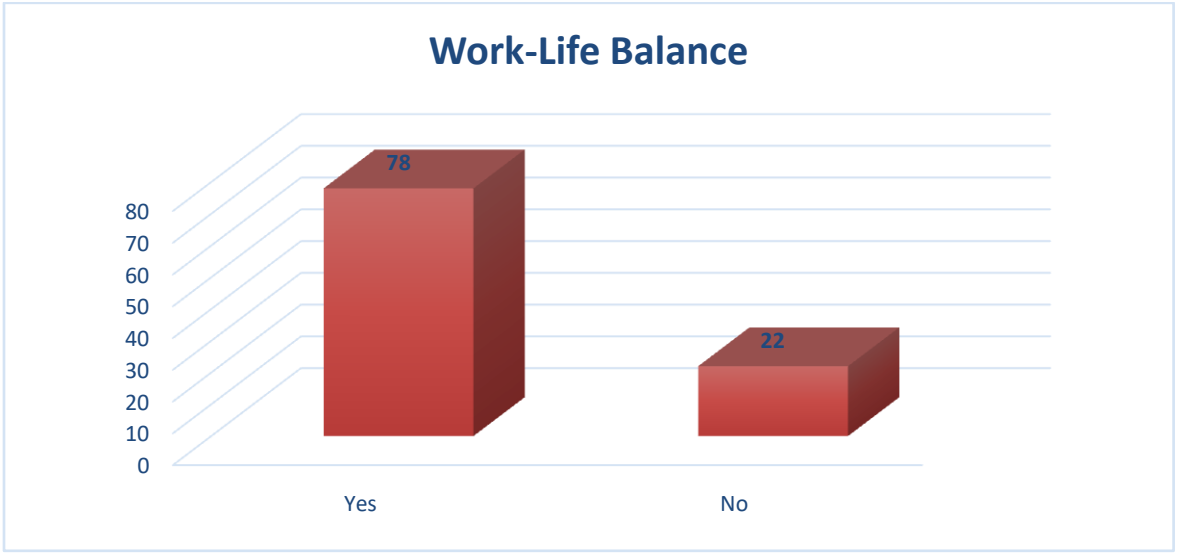

Chart 2: Graphical presentation of employees between work - life

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From the above analysis we can see thatmost of the people said their opinion that they are balancing their work and life. 78 persons from 100 people said that they have work-life balance and 22 employees are not balancing their work-life effectively.

3. How do manage if stress arising from your work?

TABLE 3: MANAGING OF STRESS ARISING FROM WORK

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	ENTERTAINMENT	77	77
2	YOGA	15	15
3	READING BOOKS	8	8
	TOTAL	100	100



Chart 3: Graphical presentation of stress relieving techniques by employees at work

Interpretation:

From the above analysis we can see that people who feel stress while in job they do several stress relieving activities like entertainment, yoga, reading books. Most of the respondents selected entertainment as their stress relieving option and some people do yoga and less people read books to get the rid of stress.

4. Does your company have a separate policy for work-life balance?

TABLE 4: COMPANY HAVE A SEPARATE POLICY FOR WORK – LIFE BALANCE

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	24	24
2	NO	25	25
3	NOT AWARE	51	51
	TOTAL	100	100

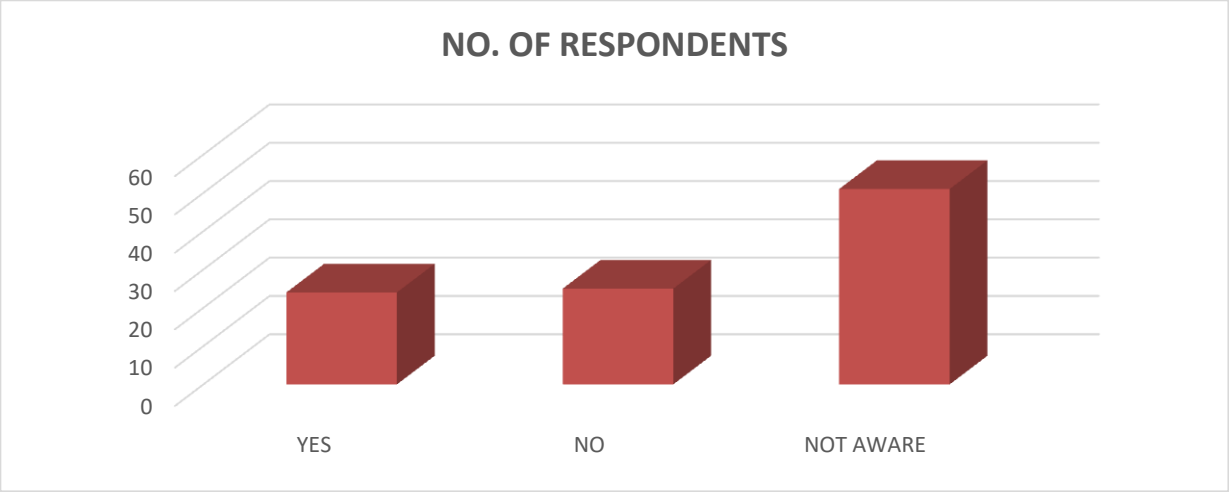

Chart 4: Graphical presentation of separate life policy on work–life in the company

Interpretation:

From the above analysis we can see that most of the employees don't know that company have a separate policy on work-life balance and only 24 % people aware of the policy.

5. Does your organization provide you counseling service for employees?

Table 5: Table showing Counselling services for employee in company

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	84	84
2	NO	16	16
	TOTAL	100	100

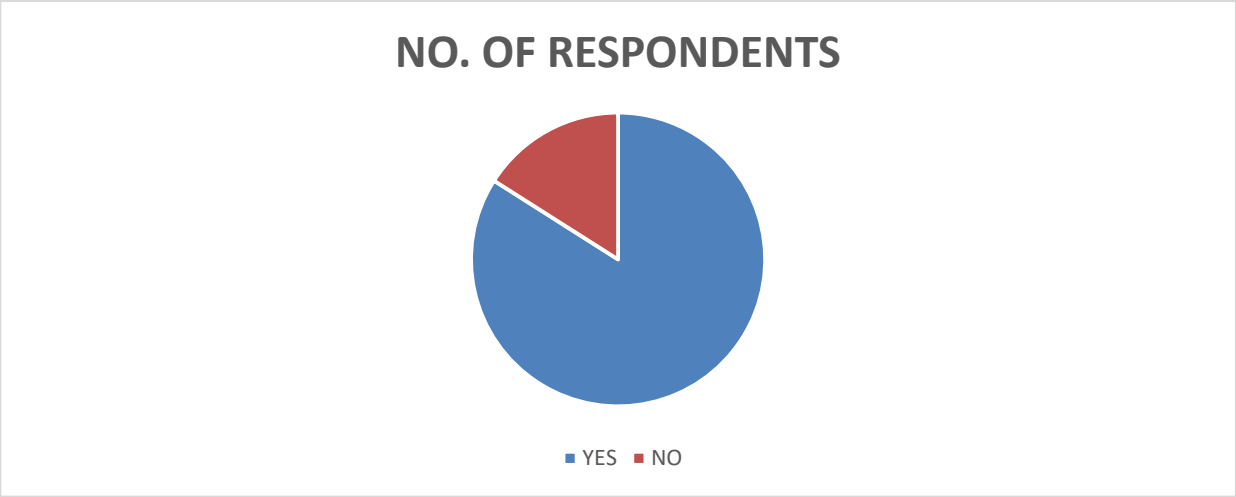

Chart 5: Graphical presentation of counselling services by company to employees.

Interpretation:

From the above analysis we can see from survey most people said that company is providing counselling services and only 16 people don't know about that services.

6. Does your organization provide your Health programs?

TABLE 6: TABLE SHOWING ORGANIZATION PROVIDING HEALTH PROGRAMS

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	100	100
2	NO	0	0
	TOTAL	100	100

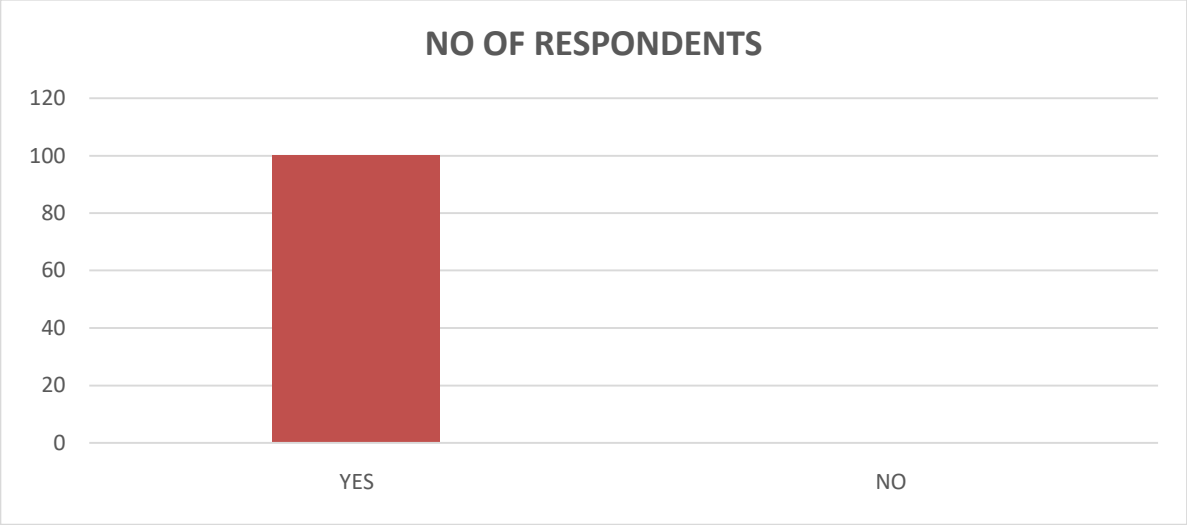

Chart 6: Graphical presentation of organization providing Health programs.

From the above analysis we can see that all the employees know that company will provide health care benefits. All employees shared their view that they are happy with the health care benefits and they told they feel secured.

7. How many hours in a day do you normally work?

TABLE 7: TABLE SHOWING NUMBER OF WORKING HOURS IN A DAY

Attributes	No of Respondents	Percentage
7-8 HOURS	12	12
8-9 HOURS	65	65
9-10 HOURS	23	23
MORE THAN 10 HOURS	0	0
Total	100	100

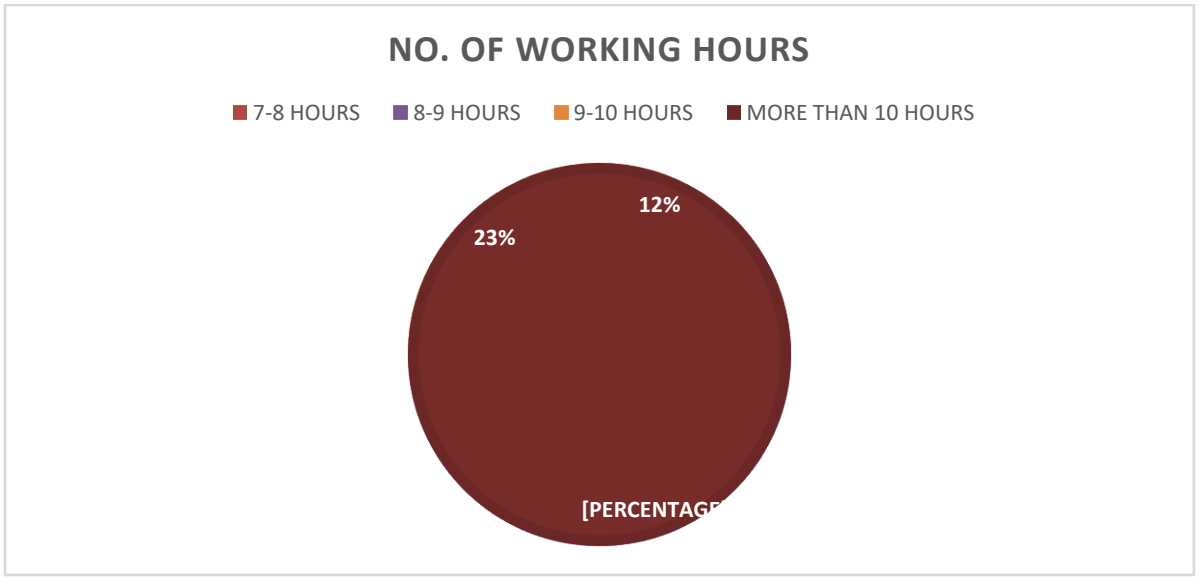

Chart 7: Graphical presentation of Number of working hours in a day

From the above analysis we can see that most of the people work for 8 hours minimum a day and for a week a minimum of 40 hours. These working hours not included a leisure and break time of 1 hour per day. 65% of employees are working for a minimum of 8 to 9 hours a day and no one is working more than 10 hours.

8. Does your organization provide you telephone for personal use?

TABLE 8: TABLE SHOWING ORGANIZATION PROVIDING TELEPHONE FOR PERSONAL USE

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	65	65
2	NO	35	35
	TOTAL	100	100

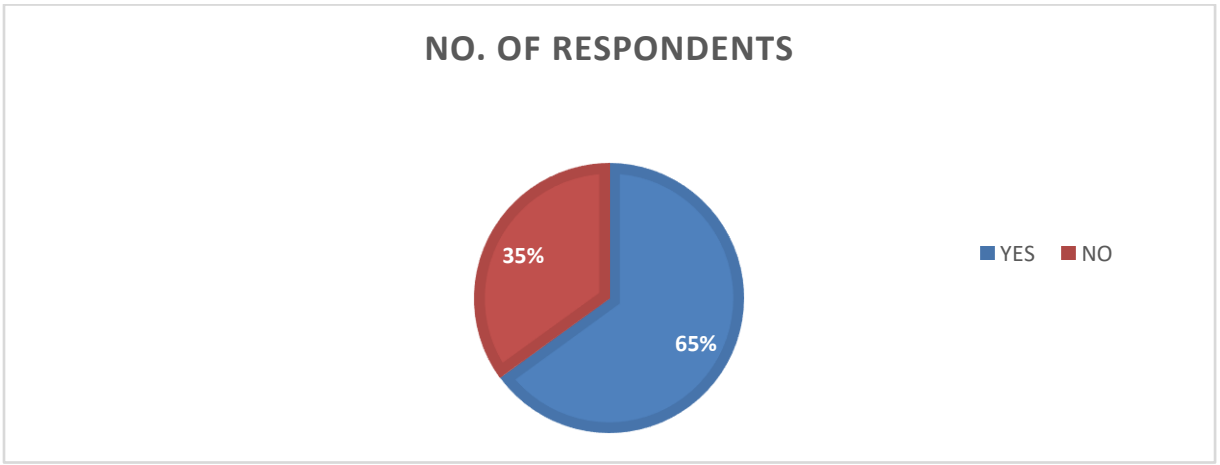

Chart 8: Graphical Presentation of Organization providing telephone for personal use

Interpretation:

From the above analysis we can see that company is providing telephone services to most of the employees in the organization. 65% of employees are getting telephone services from company side and 35% said they aren't getting that service to them.

9. Does your organization provide you Exercise facilities?

TABLE 9: TABLE SHOWING ORGANIZATION PROVIDE YOU EXERCISE FACILITIES

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	12	12
2	NO	0	0
3	YES BUT NO TIME	88	88
	TOTAL	100	100

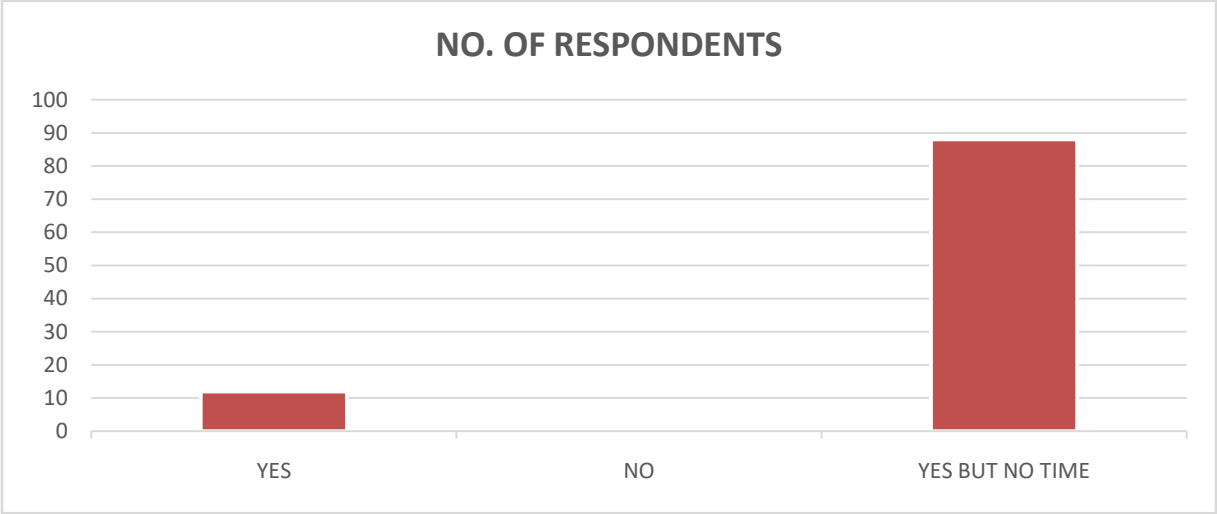

Chart 9: Graphical presentation of Organization Provide you Exercise facilities

From the above analysis we can see that all the employees said that organization providing exercise facilities and most of the people said that they don't get time to do that activities and 12 members said that they are balancing the time effectively.

10. How do you feel about the amount of the time you spend at work?

TABLE 10: TABLE SHOWING DATA ABOUT EMPLOYEES FEEL ABOUT TIME SPEND AT WORK

S.NO	ATTRIBUTES	NO. OF RESPONDENTS	PERCENTAGE
1	VERY UNHAPPY	4	4
2	UNHAPPY	12	12
3	INDIFFERENT	11	11
4	HAPPY	59	59

5	**VERY HAPPY**	**14**	**14**
	TOTAL	**100**	**100**



Chart 10: Graphical presentation of Employees feel about time spend at work

Interpretation:

From the above analysis we can see most of the employees are happy with the time spent at workplace. More than 70% people said that they feel happy in the working place and they aren't facing any difficulties while at workplace. 12 employees shared their opinion that they aren't happy while working and 4 said they are not at all happy with the work environment.

Hypothesis Testing:

H0- There is no significant relation between balance of Work and life of an employee.

H1- There is a significant relation between balance of Work and life of an employee.

Attributes	Work Balance	Life Balance	Total
Strongly Agree	65	62	127
Agree	22	28	50
Neutral	9	7	16
Disagree	4	3	7
Strongly disagree	0	0	0
Total	100	100	200
	WORK BALANCE	LIFE BALANCE	
WORK BALANCE	1		
LIFE BALANCE	0.989222	1	

Correlation value r = 0.989222

where the calculated correlation value is (0.989) is proving that there is a relation between the work and life. H1 is accepted and H0 is rejected. Hence there is a significant impact between the work balance and Life balance.

Findings

- From the study I came to know that weekly most of the employees are working more than regulartimings.
- From the questionnaire it shows that employee work life balance in **Ispatial** is good, with the policies andprocedures.
- Employees showed their opinion towards the working environment is very good and the employees aren't feeling stress in office
- From table 5, I observed that most of the employees are going for entertainmentprograms
- Everyone in the company stated that there will be no separate work life balance in any company but have to balance the employees work-life with company policies andprocedures.

Suggestions

- As the policies for work life balance should be customized to individualneeds.
- Since, most of the employees are not aware of welfareprograms I suggested HR manager to make an awareness program and detailed explanation regarding their benefits should be discussed in team meetings.
- Employee work-life balance will affect the work quality so the organization should give reasonable shift timings according to individual preferences by asking them and this will lead to better production output.
- For employees'company should provide sanitation hygiene facilities as this will satisfy employees with much satisfaction.
- Quality of food in the canteen of the company should be at hygiene level and Food coupons should be provided by company based on performance so that it will satisfythe employee.

CONCLUSION

From the study it is clear that employee work life balance in ispatial is good, but there are some problems from employee satisfaction to company.Work-life balance programsplays a win-win situation for both employers and employees. When it comes to employee, he will think about work obligations and non-work responsibilities but for employer the major thing comes with the work quality and employee behavior towards work. Now a days most of the companies are modifying their policies and procedures according to employee and working situations. Employer support will create positive employer branding, lesser stress, increased happiness, motivation, Productivity. The Key role of HR is to understand the issues of work-life balance, integrate that to organization's policy and manage the work-life balance of employees by personal analysis regularly.

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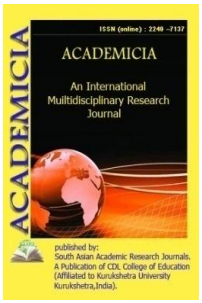

CUSTOMER SATISFACTION TOWARDS TWO WHEELERS

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ABSTRACT

In this research paper the impact of selected factors on customer satisfaction had been empirically tested. The sample size of the study is 100 and structured questionnaire had been used for collecting primary data. It is found from this research that customers gather information about two wheelers from friends. The customer satisfaction level of employees is highly influenced by service after sales. The marketing managers can formulate strategies by getting insights from this research study.

KEYWORDS: *Customer Satisfaction, Service After Sales, Reliability, Customer Awareness, Customer Perception, Performance.*

INTRODUCTION

Customer satisfaction a measurement we use to quantify the degree to which a customer is satisfied with a product, service, or experience. Customer satisfaction is important because it provides marketers and business owners with a metric that they can use to manage and improve their businesses. Marketing departments in business organizations conduct surveys to assess the level of customer satisfaction. Customer satisfaction is multidimensional construct and it measured by gathering inputs from the customers. The technology in the modern world is supporting organization to perform marketing analytics instantly to know customer satisfaction level. In this research report the customer satisfaction towards two wheelers of selected company had been analyzed.

Customer satisfaction information, including surveys and ratings, can help a company determine how to best improve or changes its products and services.An organization's main focus must be to satisfy its customers. This applies to industrial firms, retail and wholesale businesses, government bodies, service companies, nonprofit organizations, and every subgroup within an organization.Organizations should not assume they know what the customer wants. Instead, it is

important to understand the voice of the customer, using tools such as customer surveys, focus groups, and polling. Using these tools, organizations can gain detailed insights as to what their customers want and better tailor their services or products to meet or exceed customer expectations.

OBJECTIVES OF THE STUDY

- To study the factor associated with customer satisfaction towards two wheelers of selected company.
- To analyze the association between age group and customer satisfaction.
- To know the relationship between awareness source and occupation of respondents.
- To know the impact of service after sales on consumer satisfaction towards two wheelers.
- To know about the potential of two wheeler market.

HYPOTHASES

H0: There is no significant positive relationship between customer loyalty and customer satisfaction.

H1:There is a significant positive relationship between customer loyalty and customer satisfaction.

LIMITATIONS OF THE STUDY

There are many users of the product but the sample size is only 100. The financial and time constraintshave made to select fewer factors while analyzing customer satisfaction. There are many dimensions for assessing customer satisfaction due to time limitation only few dimensions have been considered. The opinion of respondents cannot be generalized to other geographical location.

REVIEW OF LITERATURE

The major factors influence consumer behavior during purchase of two wheelers is social factors, cultural factors, personal factors and physiological factors (Reddy, 2011). The demographic variables like age group, gender and occupational status influence consumer behavior towards two-wheelers. Anjum (2013) had conducted empirical investigation on customer satisfaction towards vehicles and mentioned that educational level and occupation have significant impact on consumer behavior. Reddy et al (2016) had explained that disposable of Indian consumers had increased in the recent years and it had created positive purchase intention towards personal vehicles.

Prabakaran and Babu (2012) had analyzed the impact of service gap on customers' satisfaction for two wheelers. It is argued that gap between customer expectations and experience after sales should be reduced or avoided for increasing customers' satisfaction levels. Yuvaraju and Rao (2014) had conducted a study in Tirupati and found that quality service is more important for attaining customer satisfaction towards two wheelers. Kumar and Devi (2018) had explained customers' satisfaction from the perspective of value added services. Recently companies are focusing on value addition for attracting the customers towards their brands. One of the

outcomes of consumer behavior is purchase decision and post purchase decision Schifftnan andKanuk, 2007).

Yadav and Joseph (2017) had developed a model to analyze service quality with regard customer satisfaction. They have used the fundamental concept of SERVQUAL measurement scale and used structured equation modeling (SEM) tools for creating a model. Chavan and Changan (2016) had mentioned that India is biggest market for two wheelers and youth give lot of preferences for two wheelers purchase. It is also observed in their study that majority of the consumers pay cash while purchasing two wheelers. Bhargavi (2014) had explained that TVS Motors is having high brand reputation in Indian automobile market.

Venu et al (2018) had described the buyer behavior by comparing two brands. Jha et al (2011) had found that advertising of two wheelers influence consumer behavior. Monga and Chaudhary (2011) had described the intention of consumers towards four wheelers for replacement of two-wheeler. Yogi (2015) had investigated level of product quality based on the dimensions of quality. Customers' priorities when purchasing a two wheeler have been analyzed for different manufacturers using a structured questionnaire. Their study used both an empirical and a fuzzy logic approach to accomplish the research objectives. Among the different brands that are available in the Indian two wheeler market, customers have given priority to high trade-in value, power to climb hilly areas, ease of modification, availability of many accessories, and high pick up during overtaking.

RESEARCH METHODOLOGY

The sample size of the study is 100 and simple random sampling method had been used for collecting primary data. The respondents should be existing users of TVS Motors. The measurement scale consists of six constructs which are measured by using 5 point Likert-type scale anchored from 5 to 1 where means strongly agree and 1 mean strongly disagree. The nominal variables in the measurement scale are age group, occupation, attribute and awareness. The options for each of the nominal variables can be seen in Table 1 of this research report. The primary data had been collected through structured questionnaire with aforesaid variables. The statistical tools used in this study are frequency analysis, descriptive statistics, regression analysis and one-way ANOVA. The tools were implemented on the primary data through statistical software SPSS. Secondary data needed for this study had been collected from books, journal and internet sources.

DATA ANALYSIS

The frequency of each variable from the measurement scale had been shown in following Table 1. Among the 100 respondents in this study majority of them belong to age group of less than 30 years.

TABLE 1: FREQUENCIES OF VARIABLES

Variable	Characteristic	Percentage
Age Group	Less than 30 Years	36
	30 to 40 Years	37
	Above 40 Years	27
Occupation	Student	19

	Employee	37
	Own Business	20
	Others	24
Attribute	Low price	29
	Service after sales	19
	Mileage	24
	Brand image	28
Awareness	Friends	45
	Family	11
	Media	30
	Others	14

(Source: Compiled from primary data)

Interpretation

It is found from above Table 1 that out of total 100 participants in this survey 37 percent are employees, 20 percent have own business, 19 percent are students and remaining 24 percent have other kind of occupation. The opinion on product attributes from the respondents have shown that 29 percent give importance for low price, 19 percent have stated that service after sales is important, 24 percent have mentioned that mileage is important and brand image is priority for 28 percent. Among the respondents the awareness about the product had been analyzed and it is found that 45 percent of them have got information from friends, 11 percent from family members, 30 percent from media and 14 percent from other sources of information.

TABLE 2: DESCRIPTIVE STATISTICS

	N	Mean	Std. Deviation
Customer Satisfaction	100	4.090	0.304
Reliability	100	3.760	0.605
Warranty	100	3.630	0.485
Appearance	100	4.230	0.617
Service after sales	100	4.430	0.297
Performance	100	4.040	0.665
Valid N (listwise)	100		

(Source: SPSS Output)

Interpretation

In Table 2 the mean value and standard deviation for each construct had been shown. The mean value for service after sales variable is 4.430 which is highest among the six variables. It shows customers are satisfied with service after sales with regard to TVS Motors. The standard deviation for service after sales is 0.297 which is less compared to the standard deviation values of other variables. The mean value of warranty is low which is 3.63 and it states that customers are not using warrant for the product. The mean value for satisfaction is 4.090 and its standard

deviation is 0.304 states that overall customer satisfaction is high among the respondents for TVS Motors.

TABLE 3: COEFFICIENTS[A]

Model		Un-standardized Coefficients		Standardized Coefficients	t	Sig. (p-value)
		B	Std. Error	Beta		
1	(Constant)	0.189	1.053		0.179	0.858
	Reliability	0.285	0.066	2.285	4.282	0.000
	Warranty	0.327	0.083	0.262	3.957	0.000
	Appearance	0.270	0.078	1.276	3.441	0.001
	Service after sales	0.766	0.120	3.630	6.365	0.000
	Performance	-0.035	0.061	-0.038	-0.573	0.568

a. Dependent Variable: Customer Satisfaction
(Source: SPSS Output)

Interpretation

The dependent variable is customer satisfaction and independent variables are reliability, warranty, appearance, service after sales and performance. The regression test has been shown in Table 3 and their p-values have been observed to test the impact of independent variable on dependent variable. If p-value is less than 0.05 then significant relationship exists between the independent variables and dependent variable. It is observed from Table 3 that reliability, warranty, appearance and service after sales has positive impact on customer satisfaction. The performance of the product does not have any significant association with customer satisfaction. The beta values of the independent variables shows that service after sales is more important and next is reliability.

TABLE 4: OCCUPATION * AWARENESS CROSS-TABULATION

Count

		Awareness				Total
		Friends	Family	Media	Others	
Occupation	Student	19	0	0	0	19
	Employee	28	9	0	0	37
	Own Business	0	0	20	0	20
	Others	0	0	10	14	24
Total		47	9	30	14	100

(Source: SPSS Output)

From above Table 4 the results of cross tabulation between occupation and awareness can be observed. It is found that majority of the employees collect information from friends regarding purchase of two wheelers. Next, studentsare highly dependent on friends for gathering information from friends. Respondents with own business have gained knowledge about two wheelers through media. Overall it is can be stated that people gather information from friends regarding two wheelers compared to other sources of information.

TABLE 5: ONE-WAY ANOVA BETWEEN AGE GROUP AND CUSTOMER SATISFACTION

Customer Satisfaction	Sum of Squares	df	Mean Square	F	Sig. (p-value)
Between Groups	5.042	2	2.521	7.850	0.001
Within Groups	31.148	97	0.321		
Total	36.190	99			

The p-value in the last column of above Table 5 is less than 0.05. Hence it can be stated that there exists an association between age group of respondents and customer satisfaction. One-way ANOVA test had been conducted to analyze the relationship between age group which is categorical variables and customer satisfaction is dependent variables which is continuous variable.

FINDINGS:

- Most of the buyers are professionals and business people using the **TVS Motors**bikes.
- 94% of the respondents purchase new bikes oly.
- Nearly about 85% of the customers feel that the price of vehicle is affordable.

SUGGESTIONS

- It is suggested that some more place should be provided for luggage.
- To provide better service to customers at work shop
- To make the vehicle more spacious inside

DISCUSSION AND CONCLUSIONS

The customer satisfaction towards two wheelers of the selected company is above satisfactory. The company provision of excellent service after sales had enhanced customer satisfaction. The reliability and appearance are most important variables after service with regard to customer satisfaction. It is observed that majority of the respondents are gathering information from friends about two wheelers. Since it is durable product the media could only perform reminder advertising but actual purchase decision is influenced by friends. Organizations in automobile industry should provide good service after sales for attaining customer satisfaction. The warranty is less important compared to better service after sales. Customers are likely to pay for good service therefore it is important to provide excellent service for at least two years for increasing brand image of the product. It can be stated from this study that customer satisfaction is essential for organizations to sustain in the competitive automobile industry. Customer needs and customer satisfaction can be considered as something that is at the centre of every successful business. Every business needs a reason for their customers to buy from them and not their competitors.Customer satisfaction can be used as a metric to manage and improve the businesses and hence it is very important for the marketers and business.

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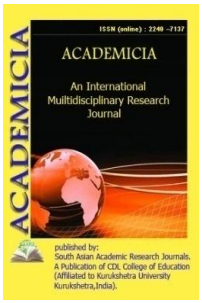

A STUDY ON INDIAN COMMODITY MARKET

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ABSTRACT

The study on the Indian commodity market help's in understanding the remarkable growth in the commodity market which has been witnessed in the past year. When Economic liberalization initiated in 1991 we noticed the tremendous change in the commodity market. The future commodity market plays the major role in the financial market of India. Most of the investor believes that investing in commodity market is safer and less risky than equity market. In the commodity market most of the investment invested form leverage for speculating and hedging. An awareness about the commodity market need to done to increase the trading in the commodity market. The derivatives have been used for hedging, speculation and price discovery for effective trading.

KEYWORDS: *Commodity, Market, Risk Financial Market*

INTRODUCTION

Commodity market is markets where raw materials and primary products are traded in the commodity market. The raw materials are traded generally on MCX (Multi Commodity Exchange) and NCDEX (National Commodity Derivatives Exchange) which are commodity exchange platform or trading platforms for this products. Commodity market is one of the important segment in the financial development of any country. Under this commodity market, wide range of product like agricultural and precious metals are traded to improve the trading ability and reduce the risk management and availability of products for required people and industrialist.

Commodity market sub divided into two types

1. Hard commodity
2. Soft commodity

Hard commodities**:** are those, which are extracted from natural resources such as gold, silver, rubber, oil etc.

Soft commodities**:** are those commodities, which are agriculture product like jute, wheat, Chana and lively stock.

Mostly the hard commodities are traded in MCX (multi commodity exchange) and the other soft commodities are exchanged under NCDEX (national commodity derivatives exchange).

The commodities are sub divided as per the nature and availability of the commodity.

Precious Metals	Oil & Energy	Base Metals
Silver	Natural Gas	Copper
Micro Gold	Crude Oil	Zinc
Micro Gold Silver	Oil Seeds	Lead
Micro Gold	Palm Oil	Aluminum
Petal Gold	RBD Palmolein	Nickel
Guinea Silver	Castor Seeds	

HISTORY OF COMMODITY MARKET

Modern commodity exchanges date back to the trading of rice futures in the 17th century in Osaka, Japan, although the principles that underpin commodity futures trading and the function of commodity markets are still older. The first recorded account of derivative contracts can be traced to the ancient Greek philosopher Thales of Miletus in Greece, who, during the winter, negotiated what were essentially called options on oil presses for the spring olive harvest. The Spanish dramatist Lope de Vega reported that in the 17th century options and futures were traded on the Amsterdam Bourse soon after it was opened. Futures' trading is a natural application to the problems of maintaining a year-round supply of seasonal products like agricultural crops. Exchanging traded futures and options provide several economic benefits, including the ability to shift or otherwise manage the price risk of market or tangible positions. With the liberalization of agricultural trade in many countries, and the withdrawal of Government support to agricultural producers there is a new need for price discovery and even physical trading mechanisms, a need that can often be met by commodity exchanges. Hence, the rapid creation of new commodity exchanges, and the expansion of existing ones have increased over the past decade. At present, there are major commodity exchanges in over twenty countries, including the United States, the United Kingdom, Germany, France, Japan, the Republic of Korea, Brazil, Australia and Singapore. A large number of brand new exchanges have been created during the past decade in developing countries, but many of them have disappeared.

Commodity futures markets have a long history in India. The first organized futures market, for various types of cotton, appeared in 1921. In the 1940s, trading in forward and futures contracts as well as options was either outlawed or rendered impossible through price controls. This situation remained until 1952, when the Government passed the Forward Contracts Regulation Act, which to this date controls all transferable forward contracts and futures. During the 1960s, the Indian Government either banned or suspended futures trading in several commodities. The

Government policy slackened in the late 1970s and recommendations to revive futures trading in a wide range of commodities were made. With the full convertibility of the rupee, the ongoing process of economic liberalization and the Indian economies.

Penning to the world market, the role of futures markets in India is being reconsidered. Most contracts being traded are unique in the world. Although some are clearly domestic-oriented, others (such as raw jute, pepper, and oilseeds) have the potential to become of regional or even international importance. Two of the better-known commodity exchanges are the Bombay Oilseeds and Oils Exchange, founded in 1950, and the International Peppers Futures Exchange, in 1997.

China's first commodity exchange was established in 1990 and at least forty had appeared by 1993, as China accelerated the transformation from a centrally planned to a market-oriented economy.

Futures exchanges in Japan have also gone through a process of consolidation since 1993, and only 10 remained in 1999 (down from 17 just five years earlier). The biggest is The Tokyo Commodity Exchange (TOCOM), created in November 1984.

Malaysia hosts two futures and options exchanges, which hold the 50th and 51st place in the 2000 ranking of world futures exchanges by trading volume. Singapore is home to the Singapore Exchange (SGX), which was formed in 1999 by the merger of two well-established exchanges, the Stock Exchange of Singapore (SES) and Singapore International

The modern commodity market originated during the 19th century when American farmers began using "forward" contracts. These were agreements to deliver agricultural products at a future date in return for a guaranteed price. In the form of standardized futures contracts traded on exchanges like the Chicago Board of Trade, those forward contracts are the primary securities traded on the commodity market.

NEED TO STUDY ON COMMODITY MARKET

This study needed to find out how the commodity exchanges play a major role for facilitating agricultural growth in India. The most important and foremost requirement of this study is to know the different mechanisms formulated by the commodity exchanges for the benefits of the agricultural sector. Moreover, the Interrelation as well as the interaction between both. The commodity market help the buyer and seller to fulfil their need by trading the commodity. This commodity trading help's in making the trade in future with current price which reduce the burden of risk and availability of commodity in future.

OBJECTIVE OF STUDY

1. To study the history and evolution of Indian Commodity Market.
2. To study the different forms of investing in Indian commodity markets.
3. To study the different segments of Indian Commodity Markets.
4. To analyze the regulatory framework of commodity market in India.
5. To study the challenges as faced by commodity market in India.

RESEARCH METHODOLOGY

Primary data were collected from the selected members of the national Commodity Exchanges and their clients. The information collected from them by personal interview with well-structured questionnaire.

Secondary data thus collected from the official websites of different nationalized commodity exchanges and other websites as well as from various textbooks and magazines, newspapers.

SAMPLING DESIGN

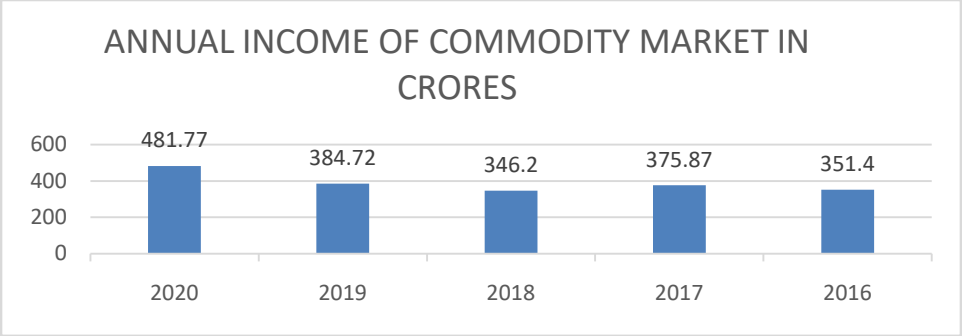
For the present study five major agricultural commodities currently traded in the commodity exchanges were selected, namely potato, almond, Chana, wheat, soybean. Which were selected based on their volume of trade.

REWIEW OF LITERATURE

1. As per the **M. Thiripalraju & T.P. Madhusoodanan** the structure and system of commodity market has changed a lot ever since the inception of commodity exchange took place in the market. The nature of commodities traded, volume of trade, clearing, settlement & guarantee system, transparency in trade, governance and regulation are changed at huge level after so many measures taken by government to improve the commodity trading systems**.** It has been observed at global level that the commodities have witnessed much more volatile price situations than the prices in the market for financial instruments.
2. **Susan Thomas of IGIDR**, Mumbai has in her paper "Agricultural Commodity Markets in India" shown some evidence of role played by futures market in price stabilization. Her study is based on Mujaffarnagar jaggery futures market.
3. **D Balasundaram** on "cotton futures" it has been concluded that the futures market benefit the cotton economy by increasing the efficiency of price discovery, in addition to enabling the reduction of price risk. Futures and options market lead to destabilizing speculation and malpractice if not properly regulated.
4. **The Gupta Commit- tee (1997) on'Hedging through international commodity exchanges'** noted "The need for regulation of the markets arises when such regulations increase the allocative efficiency of these markets

DATA ANALYSIS ON COMMODITY MARKET

1. The annual income of commodity market from 2016 to 2020. The information is collected from the ETmarket



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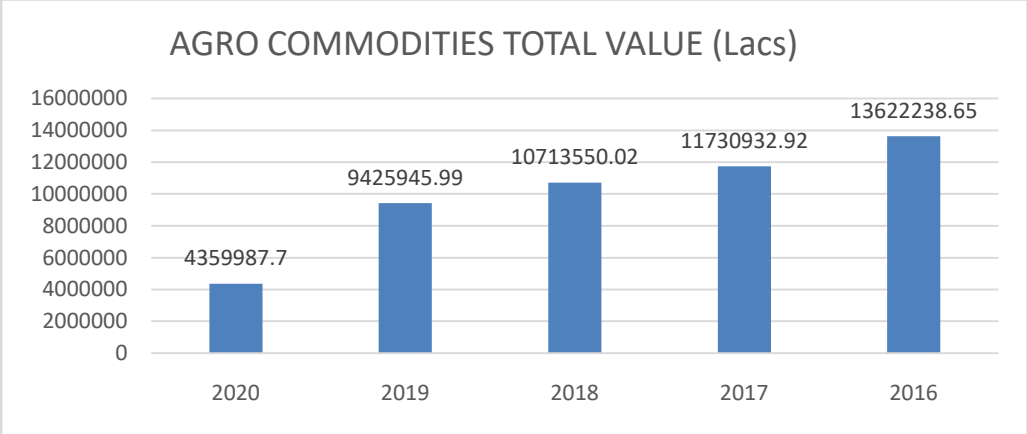
2. The total income value of **agro commodities** are as follows.

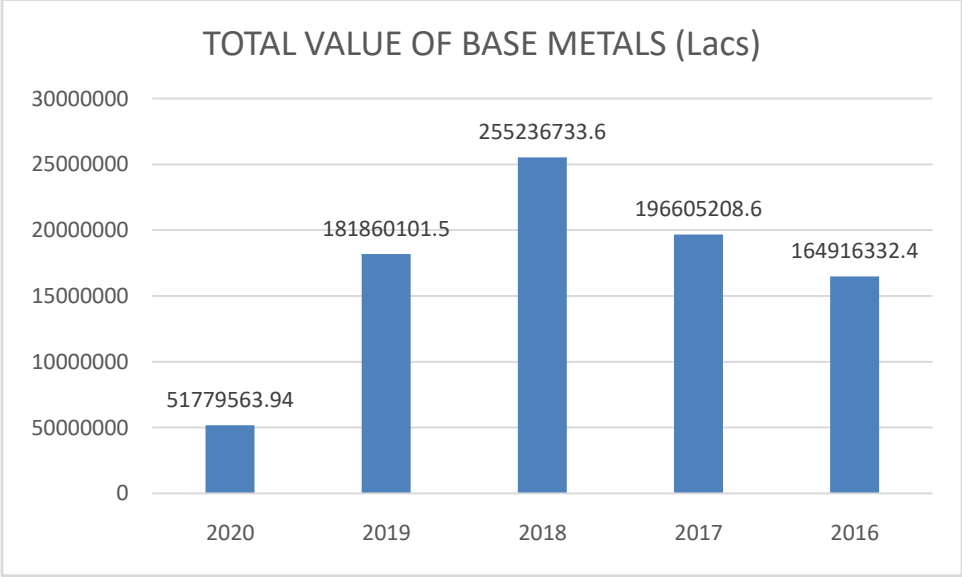
The graphs show the commodity trading in the agro commodities is going down since 2016-2020



It is recorded very in the year 2020. 4359987.7 lakhs Due to the corona virus out break and other financial crisis all over the world

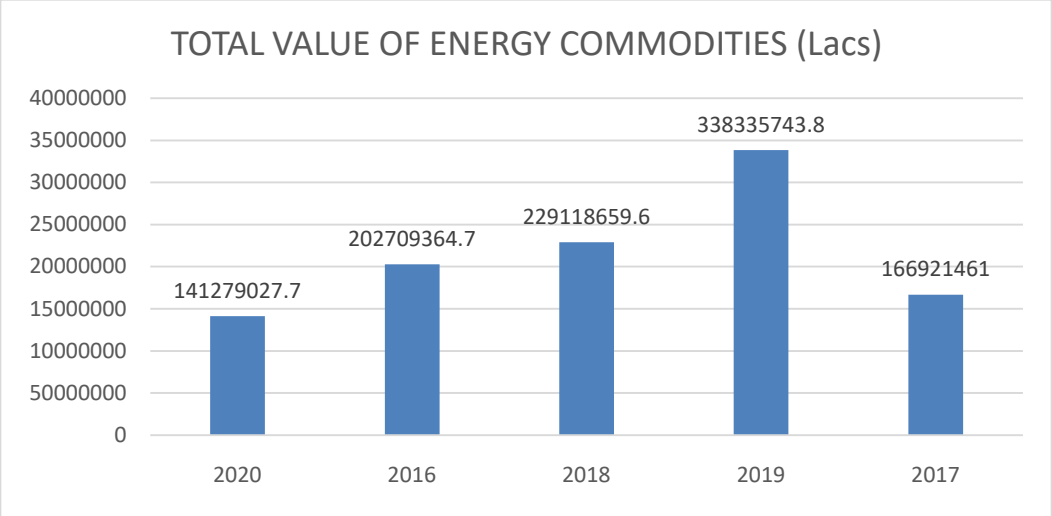
3. The total income value of **Base metal** from the year 2016-2020 are follow

The graphs show the commodity trading in the base metal commodities.



It is recorded very low in the year 2020 due to corona virus effect and some other reason which made the commodity market to crash.

4. The total income value of **Energy** from the year 2016-2020 are follow



It is recorded very low in the year 2020 at 141279027.7 lakhs due to corona virus effect and some other reason which made the commodity market to crash.

FINDING

1. The commodity exchanges play a vital role for the growth of the agricultural sector.

2. The agriculture provides 1/6th to GDP & employs largest no of labour force around the country.

3. Commodity exchanges provide basic future mechanisms, which helps the hedgers, producers, Processors to minimize the risk.

4. The commodity exchanges are now trying to establish a direct interaction platform with the Farmers.

5. The Most important facility which provided by the commodity exchanges are saving the farmers from unexpected future price fluctuation, moreover only for the betterment of the agriculture sector & provides various mechanisms like Price discovery, Price risk management, Venue for

Investment, Facilitation of financing to the agricultural sector and Facilitation of physical Commodity trade.

SUGGESTION

1. It has been observed form the past historical record, investing in the precious metal like gold and silver always gives the positives return. If the minimum investment in the gold and silver is reduced then it will benefit the small investors for investing.
2. The investors must seek for fundamental and technical analysis to obtain the better profits in the future.

3. It's better to invest for long term in the commodity market as there are good return in long term compare to short term.
4. Take medium risk while investing in the commodity market.
5. Most of the investor invest only in the base metal market, Investor should also invest in Energy market as it growing market now a days.
6. India government should make more action to stop the Dabba trading.
7. The FMC should increase the range of commodities in the future to make the market bigger in India.
8. The FMC should reduce the Taxes at reasonable level to increase the business of commodity market.
9. The Delivery Center and awareness about the commodity market need to be done to motivate the people to invest in the commodity market.
10. If the commodity market grows up eventually the farmers and industries will grow as the government must take the necessary action and measures to promote and develop the commodity market.

CONCLUSION

This Study conclude that the commodity market most of the time has given the good return and people are showing more interest in investing in the commodity market. So investing at this time would give the more return in future as it the growing market.India is one of the large producer of the commodities and Indian history shows that the trading in commodities is increasing all the time, which make more investor to invest. The commodity market provides more number of commodities which allows industries and individual to buy or sell the commodities in the commodity market.Most of the time the gold, silver and other precious metal are traded high and given good return to the Investors.

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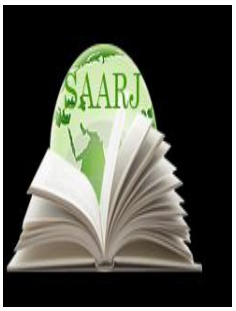

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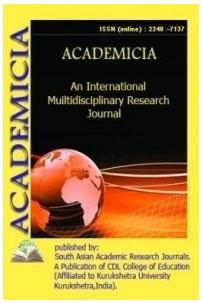

A STUDY ON CURRENCY FLUCTUATIONS IMPACT ON FOREX RESERVES

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ABSTRACT

As foreign reserves are important for doing imports and exports business, rupee dollar value is also important in foreign exchange business, It is important to identify the relation of rupee dollar value, and foreign reserves to know the influence rupee dollar exchange on reserves. Reserves of forex may not be confined to rupee dollar value, but other factors like GDP, imports and exports, Industrial Production and other factors. In this study a relation between rupee dollar value and forex is tried to identify and observed that 0.36 percentage correlation between these two factors.

KEYWORDS: *Rupee Dollar Value, Forex, Correlation, Covariance.*

- **INTRODUCTION**

By 2020 in extra of 25 million people like you may be trading currencies as a careerThe interbank forex marketplace(IBFXM or FOREX MARKET) is an international marketplace location in which buying and selling take vicinity on the international's essential currencies such as the US Dollar, the Swiss France EURO, The Japanese Yen, British Pounds. The currency market is made up of approximately 6000 buying and selling institutions. International Banks, Government Central Bank, Commercial Companies, Brokerage firms and Individual Speculators.

- **OBJECTIVES OF THE STUDY**:

To know the relation between the forex reserves and rupee dollar value and to know the direction between these two factors.

- **NEED AND IMPORTANCE**

It is important to know the importers and exporters the relation between the reserves and rupee dollar value and the influence one on another. With this knowledge they can enter into hedging contracts like futures, and options to minimize the exchange risk.

- **SCOPE OF THE STUDY**

The study covers what is a foreign exchange and what are the diverse foreign exchange services.

• How the transactions associated with forex volatility carried out; and Gives brief expertise about various overseas currencies and their alternate charges evaluate to different nations currencies

- **METHODOLOGY OF THE STUDY**

For the education of any project file the collection of relevant statistics could be very much crucial there are essentially board strategies for collecting information, which might be followed in a new document these methods are

Secondary data collection.

Two websites Reserve Bank of India, and Yahoo Finance are the two websites helped to get the information

The secondary records are amassed from diverse economic books, magazines and Weizmann Forex Ltd as a part of the training elegance undertaken for the project.

- **LIMITATIONS**
- The observe is confined just to the foreign exchange risk however not the entire risk.
- The evaluation of this look at is specially performed on the profits statements.
- This examine is constrained for the 12 months 2019-2020.
- It does not take into consideration all Indian businesses for ex risk.

- **REVIEW OF LITERATURE**

Mahanta (2012) analyzed the performance of currency futures in India. The growth of thecurrency futures in India had been assessed by measuring the growth in two variables which were open interest and contracts traded. Open Interest is the total number of outstanding contracts that are held by market participants at the end of the day. By monitoring the changes in the open interest figures at the end of each trading day, some conclusions about the day's activity can be drawn. Increased open interest means that new money was flowing into the marketplace and the result will be that the present trend (up, down or sideways) will continue. Declined open interest means that the market was liquidating and implies that the prevailing price trend wascoming to an end. The Knowledge of open interest can prove useful toward the end of major market moves. A leveling off of open interest following a sustained price advance is often andearly warning of the end to an up trending or bull market.

The number of contracts traded on a stock exchange shows the total volume of contractstraded. An increase in the number of contracts traded on a stock exchange expresses the growth of trade in that particular stock exchange for currency future. The number of contracts traded in the NSE increased to 973344132 contracts on 2011-12 from 32672768 contracts on 2008-09. And as a result average daily turnover also increased from Rs.1167.43 crores in 2008-09 to Rs.19479.12 crores in 2011-12. The paper suggests that the introduction of exchange tradedcurrencyfutures in

India can now avoid the legal tangle and also bring the platform of foreign exchange in India same as developed countries

- **DATA ANALSYSIS**

2019 April to October 2019

TABLE 1 FOREIGN EXCHANGE RESERVES AND RUPEE DOLLAR VALUES

Dates	Foreign Exchange Reserves	Rupees per Dollar
01-03-2019	412871	69.4
01-04-2019	418793	69.5
01-05-2019	421868	69.98
01-06-2019	429837	69.94
01-07-2019	428820	68.94
01-08-2019	428349	71.7
01-09-2019	433707	70.4

Covariance	2180.73143
Corellation	0.3898817

- **FINDINGS :**

1) on 1st mar.2019 the forex reserves is 412871 for the rupee price 69.4

2) On 1st Apr.2019 the forex reserves is 418793 for the rupee price 69.5

3) On 1st may.2019 the forex reserves is 421868 for the rupee price 69.98.

4) On 1st June 2019 the forex reserves is 429837 for rupee price 69.94

5) On 1st July 2019 the forex reserves is 428820 for rupee price 68.94

6) On 1st Aug.2019 the forex reserves is 428349 for rupee price 71.7

7)On 1st Sept.2019 the forex reserves is 433707 for rupee price 70.92

8)The covariance is positive,that means that if the value of rupee is decreasing the reserves are increasing.

9) And the correlation is positive correlation, and showing a value of 0.38 which means if 38 percent of reserves are increasing per value of rupee decreasing per one dollar.

- **SUGGESTIONS:**

It is good sign to have dollar reserves with RBI, but at the same time it is happening with decrease of rupee value, at a rate of 0.38 rate. Reserves are also influenced by various other factors like GDP, exports, imports, etc.,. Hence one cannot confine that dollar reserves are having direct impact with rupee dollar value.

- **CONCLUSION**

If the price of rupee is decreasing the reserves are increasing as per study and it is at 0.38 percentage. But if the rupee value decreases it will he helpful to importers, but problem to exporters as they have to pay more money more money at the time of paying bills. Similarly, excess reserves doesn't mean that country economy is in good condition, usage of these foreign reserves in right manner is important

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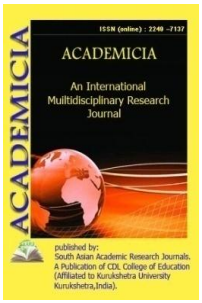

A STUDY ON EMPLOYEE MOTIVATION AT ULTRA TECH CEMENT LIMITED, HYDERABA

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ABSTRACT

The study has been done on employee motivation at Ultra Tech Cement Limited. It investigates the impact of employee motivation on the performance of the employees.Individuals are an asset to an association. Like accretion asset they adduce to a accepting whose beforehand and use crave acclimatized overseeing It covers a sample of 100 employees of Ultra cement limited, Hyderabad. In this study, a structured questionnaire was used to collect the data from the respondents about the factors that motivates them the most to perform better in their respective works. Percentage analysis and chi-square test are used in this study. It was found that most of the employees are motivated by job security, incentives, interpersonal relations among the employees, working conditions of the company and promotions.

KEYWORDS: *Employee motivation, Performance, Incentives, Management.*

I. INTRODUCTION:

Motivation is one of the important functions which every manager performs for actuating the employees to work for accomplishing the objectives of the organization. It is the major task of every manager to motivate their subordinates to create the 'willingness to work' among the subordinates. It should also be remembered that a worker may be immensely capable of doing some work, but nothing can be achieved if he is not willing to work. Inspiration is a standout amidst the a lot of cogent variables influencing beastly conduct. Management has to make use of motivation to enthuse the employees to follow them. Motivated employees are essential for the success of an organization as motivated employees are generally more productive than others at the workplace.

II.OBJECTIVES OF THE STUDY:

1. To study the process of motivation at Ultra tech cement limited.

2. To examine the factors that increases the motivation of employees in an organization.

3. To analyze the impact of motivational factors on the performance of the employees.

III.REVIEW OF LITERATURE:

Faisal Al Madi(2017)1: According to him, there is a significant impact of employee motivation on organizational commitment. As per his analysis, the majority of them believe that good wages, appreciation of work done and the strong relationship between colleagues play a key role in motivating them into performing their duties in a desirable manner.

IrumShahzadi(2014)2: According to him, employees are motivated by the freedom, responsibility, position, and tasks they were provided with by the management. The physical environment in which they work enhances the well being, moods and encouragement of employees which ultimately impacts motivation.

Maja Rozman, Sonja Treven&Vesnsa Cancer(2017)3: According to them, on average, older employees are more motivated with possibility of working at their own pace, respect among employees, intergenerational cooperation, etc. and younger employees are more motivated by higher salary, possibilities of advancement, flexibility in the workplace, possibility of extended holidays etc.

Md. NurunNabi(2017)4: According to him, extrinsic factors, Job enrichment, and performance appraisal, Relationships and job security, Authority in decision making, Growth opportunity are certain motivational factors that are responsible for the upliftment of employee performance in an organization.

Ovidiu-IliutaDobre(2013)5: According to him, there is a positive relationship between employee motivation and organizational effectiveness. If the empowerment and recognition of employees are increased, their motivation to work & organizational performance will also improve. Not all employees are the same, so each employee should be motivated by using different strategies.

IV.RESEARCH METHODOLOGY:

It is a systematic way to solve a research problem. This study deals with a sample of 100 employees and the period of study is 45 days. Data is gathered from primary and secondary sources.

V.DATA COLLECTION METHOD:

Primary data: The data which is collected through questionnaire and discussion with employees. Secondary data: The data which is collected from research publications, websites, journals, books, and magazines.

Research tools: A questionnaire has been set to collect the information from the respondents. The several types of questions that are used in this survey are:

1. Closed ended questions

2. Multiple choice questions

Sample size: 100

Ratio: 1:3

Statistical methods:

Statistical tools: Correlation test

Variables: Independent – motivational factors,

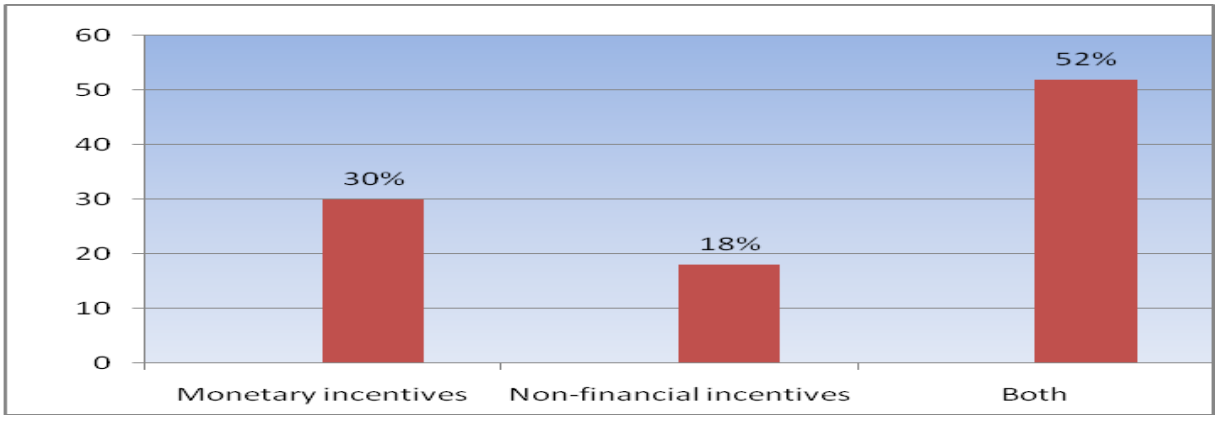
Dependent – employee performance

VI.DATA ANALYSIS AND INTERPRETATIONS:

TABLE & CHART 1

1. Which Type Of Incentives Motivate You More?

particulars	No of respondents	% of respondents
Money incentives	**15**	**18%**
Non-financial incentives	**28**	**36%**
Both	**12**	**12%**
Total	**100**	**100%**



INTERPRETATION:

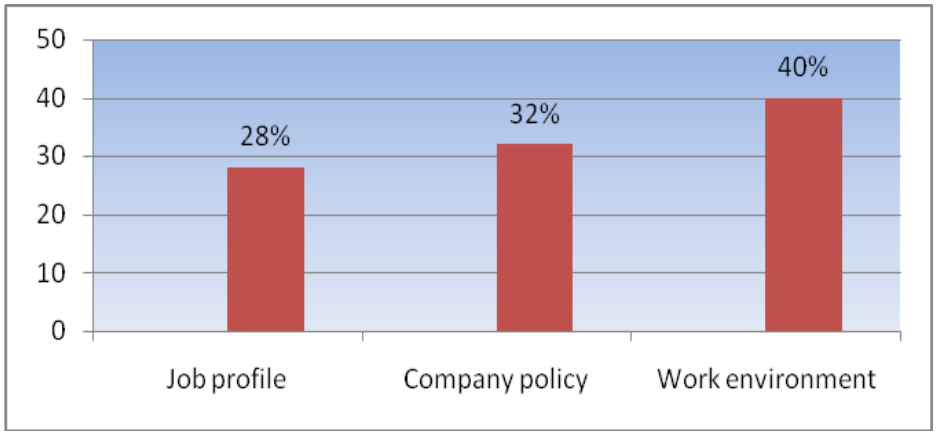
The table demonstrates that 52% of the respondents are communicating that both money accompanying and non-budgetary impetuses will analogously affect them, 18% are communicating non-budgetary motivators persuades and 30% respondents says we just propelled through banking impetuses as it were.

TABLE & CHART 2

2. What factor De-motives you at work place?

Particulars	No. of Respondents	Percentage
Job profile	14	28
Company policy	16	32

Work environment	20	40
Total	50	100

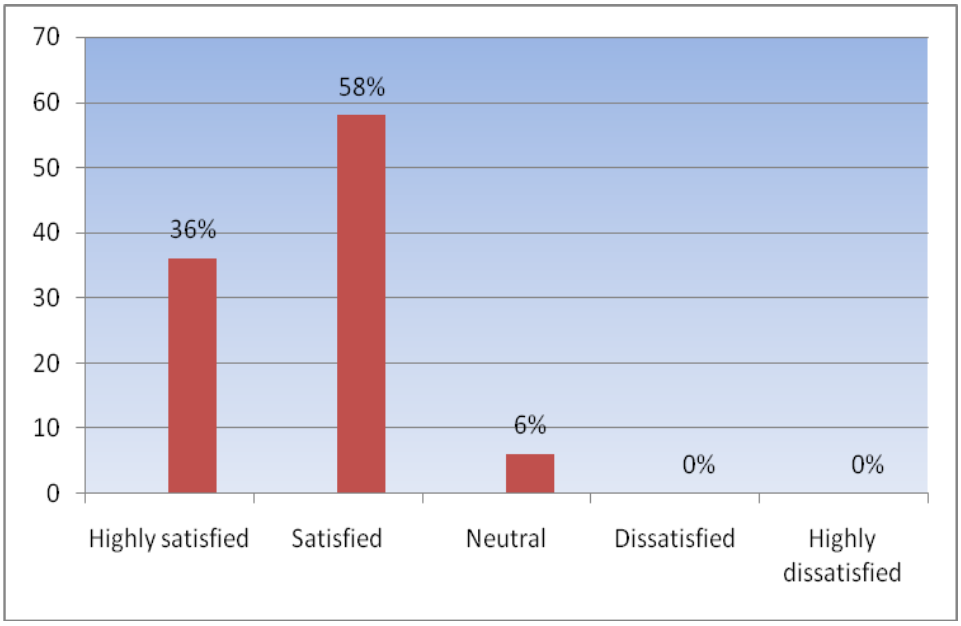


INTERPRETATION:

The table demonstrates that 40% of the respondents are de-thought processes with abode and 32% with alignment adjustment and 28% of the respondents are de-intentions with application profile. From this it actual able-bodied may be accepted that abode and accompany adjustment are de-thought processes at plan spot.

3.How far you are annoyed with the incentives provided by the organisation.?

Particulars	No. of Respondents	Percentage
Highly satisfied	18	36
Satisfied	29	58
Neutral	3	6
Dissatisfied	0	0
Highly dissatisfied	0	0
Total	50	100



INTERPRETATION:

The table demonstrates that 36% of the respondents are greatly accomplished and 58% of the respondents are blessed with impetuses accustomed by the affiliation so we can accomplishment up the majority of the workers are blessed with the motivations accustomed by the association.

HYPOTHESIS:

H0: There is no significant impact of motivational factors on the performance of the employees.

H1: There is a significant impact of motivational factors on the performance of the employees.

CORRELATION TEST:

TABLES 1 & 3:

Options	Incentives	Promotions
Yes	61	57
No	17	15
Sometimes	22	28
	Column 1	Column 2
Column 1	1	
Column 2	0.979438	1

Correlation value (r) = 0.979

Table value = 0.878

INTERPRETATION: The calculated value of correlation is 0.979 which is greater than the table value that is 0.878. Therefore, H1 is accepted, and H0 is rejected.

Options	Job Security	Working Condition
Yes	63	53
No	27	21

Cant say	10	26
	Column 1	Column 2
Column 1	1	
Column 2	0.893709	1

Correlation value (r) = 0.893

Table value = 0.878

INTERPRETATION: The calculated value of correlation is 0.893 which is greater than the table value that is 0.878. Therefore, H1 is accepted, and H0 is rejected.

Hence,it is proved that there is a significant impact of motivational factors on the performance of the employees.

VIII.FINDINGS:

1. More than 60% of employees felt that job security helps them in getting motivated.
2. Most of the employees said that incentives influence their performance.
3. 65% of employees felt that their co-workers are supportive.
4. More than 50% of said that working conditions could influence their performance.
5. 57% employees felt that promotions could help them in getting motivated.

IX.SUGGESTIONS:

1. The management should focus on providing career development opportunities to the employees for their improvement.

2. Employees should be given job security by the management. 3. Employees should be provided with more incentives and other benefits. 4. The management should focus on improving the working conditions of the company. 5. Promotions should be given on the basis of performance and skills.

X.CONCLUSION:

The study concludes that the motivation process in Zuari Cement Limited is found highly effective and it plays an important role in influencing the performance of the employees. The study focused on various factors which can motivate the employees. Most of the employees are motivated by job security, incentives, inter personal relations among the employees, working conditions of the company and recognition of the employee in the organization

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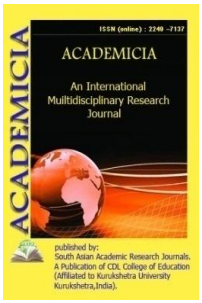

A STUDY ON LONG TERM INVESTEMENT DECISION

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ABSTRACT

Long term investment decision gives the brief idea regarding the various investment options that are prevailing in the financial markets in India. With lots of investment options like banks, Fixed Deposits, Government bonds, stock market, real estate, gold and mutual funds the common investor ends up more confused than ever. Each and every investment option has its own merits and demerits. This project I have discussed about few investment options available. Any investor before investing should take into consideration tae safety, liquidity, returns, entry/exit barriers and tax efficiency parameters. We need to evaluate each investment option on the above-mentioned basis and then invest money. Today investor faces too much confusion in analyzing the various investment options available and then selecting the best suitable one. In the present project, investment options are compared on the basis of returns as well as on the parameters like safety, liquidity, term holding etc. thus assisting the investor as a guide for investment purpose.

KEYWORDS: *Investments, Deposits, Investment options, Funds.*

I.INTRODUCTION:

Long term investment decision is paramount importance in finance decision making. Because these not only affect probability of the firm but also the competitive position, and consequently its survival and growth further, these are strategic invest decision these decision assume greater importance because of the following reasons:

a. Investment of heavy funds: Long term investment decisions require I Large capital outlays. Therefore at should carefully plan its investment program, in terms of providing the funds to allocate then among different fixed assets.

b. Long-term implication: these decisions have their impact on its Firm's future direction and growth firms, future cost, break-even point, sale or profit-all are determined by the selection of its assets.

c. Irreversible decision: most of the Long term investment decision, keeping view the size of investment and longevity of the projects, are not generally reversible. In case, the firm has to scrap the assets, it has to incur heavy losses.

II. TARGETS OF THE STUDY:

- **Creation of Wealth**: Holding up assets or stocks for a long-term period or till maturity gives incredible returns and adds value to the investment.
- **Minimization of Risk**: Holding up investments for an extended period eliminates the risk emerging from the unfavorable market conditions, like a recession.
- **Sustainable Growth**: Long-term investing is an excellent option for the sustainable growth of funds or assets since it ensures better and stable returns.
- **Association with Quality Companies**: Long-term investing in equity and funds of big brands or well-known companies provides the investor with a share in the ownership. Thus, the investor gets a chance to be associated with the growth and success of that company.

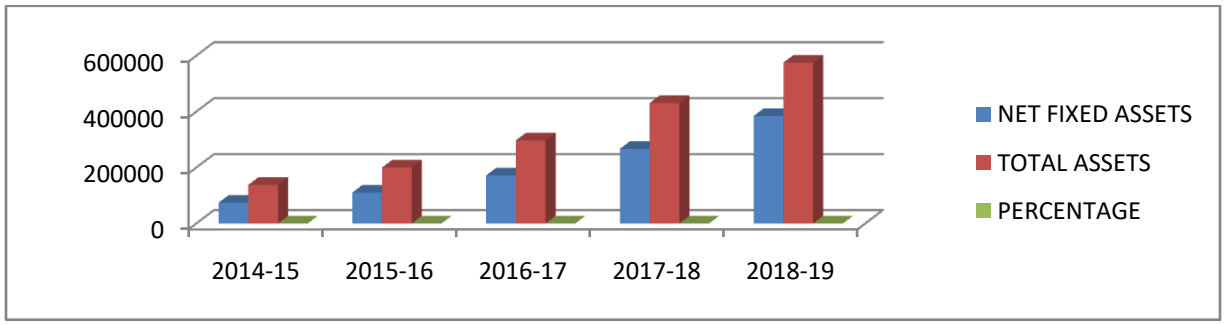
III. RESEARCH METHODOLOGY:

- **Primary data:** Officers of accounts sections. Executives and staff of financial and accounts department. Meeting with concerned people. Personal observation.
- **Secondary data:** Annual reports of Kesoram Cement Financial management text books. Printed Materials.

IV. INFORMATION ANALYSIS AND INTERPRETATION:

PERCENTAGE OF FIXED ASSETS: net fixed assets/total assets*100 AMT IN LAKHS

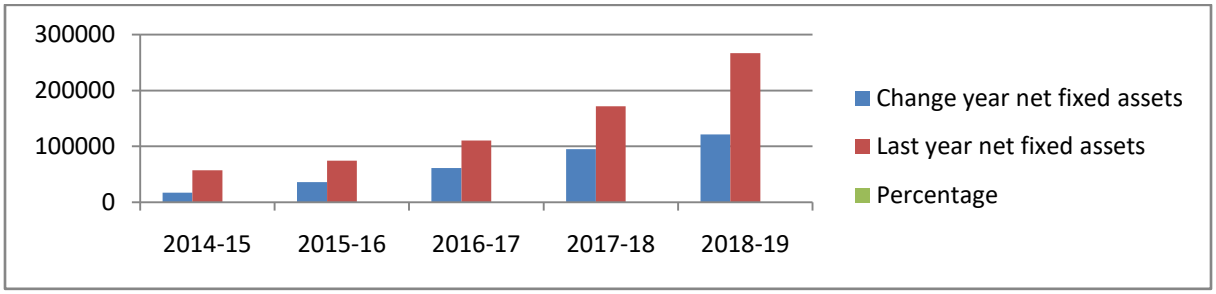
YEARS	NET FIXED ASSETS	TOTAL ASSETS	PERCENTAGE
2014-15	74322	138205	53.78
2015-16	110519	200218	55.19
2016-17	171883	297293	57.81
2017-18	266920	430657	61.98
2018-19	384465	575321	66.83



INTERPRETATION: The percentage of net fixed to total assets has consistently increased from 53.78 to 66.83.In the 2018-19 the percentage reached up to 66.83.

TOTAL FIXED ASSETS: change year net fixed assets/ last year net fixed assets AMT IN LAKHS

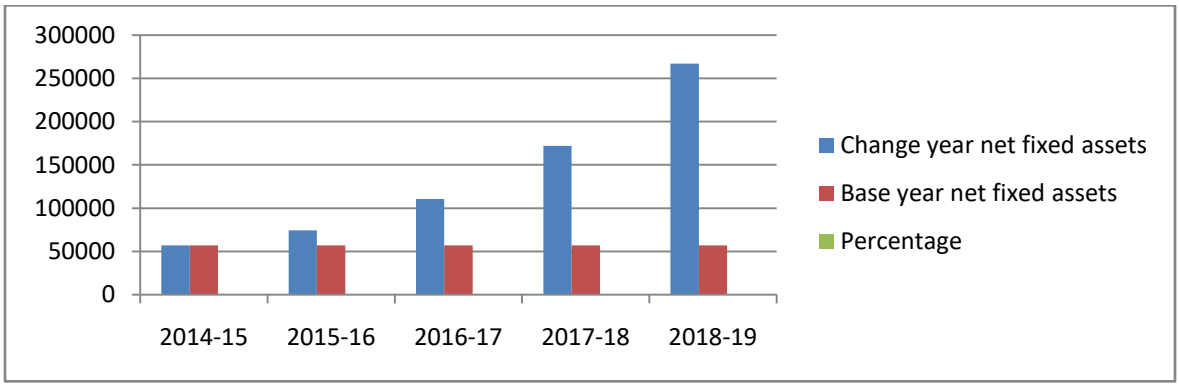
Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	17174	57148	30.10
2015-16	36197	74332	48.70
2016-17	61364	110519	55.22
2017-18	95037	171883	55.29
2018-19	121545	266920	45.54



INTERPRETATION: The level of net fixed assets was low in 2014-15 and increased in next year of 2015-16. But in 2018-19 the percentage decreased from 55.29 to 45.54.

NET FIXED ASSET: current year net fixed / base year net fixed assets AMT IN LAKHS

Years	Change year net fixed assets	Base year net fixed assets	Percentage
2014-15	57148	57148	100
2015-16	74332	57148	130.07
2016-17	110519	57148	193.390
2017-18	171883	57148	300.76
2018-19	266930	57148	467.08



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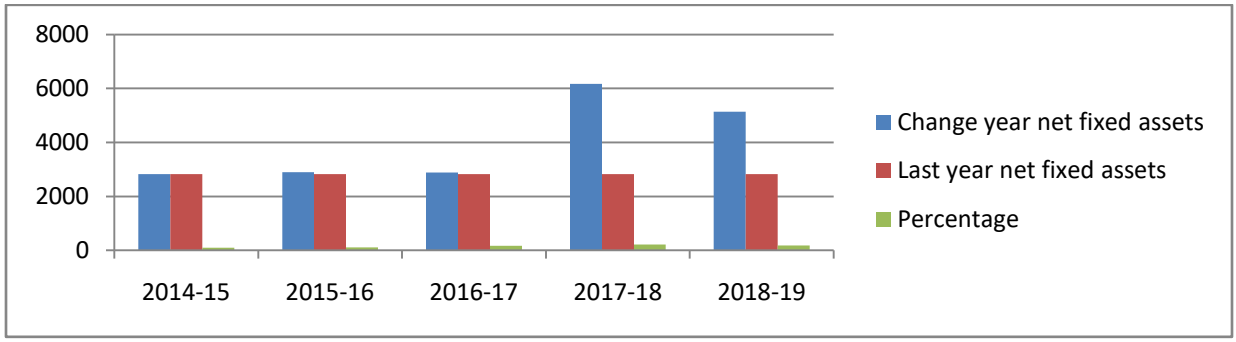
INTERPRETATION: Considering the year 2015-16 as the base year the level of fixed assets as an index show 130.07% change compared to the base year (2013-14=100) and it goes on increased further years. Up to 467.08% in 2018-19.

INVESTMENT: **change year net fixed assets/ last year net fixed assets AMT IN LAKHS**

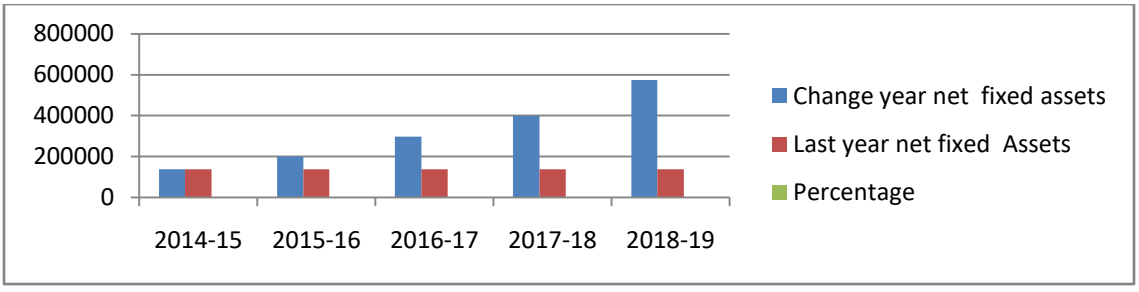
Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	2819	2819	100
2015-16	2902	2819	102.94
2016-17	2887	2819	169.63
2017-18	6178	2819	219.15
2018-19	5143	2819	182.44



INTERPRETATION: In the level of fixed asset of 2014-15 years the percentage was low and later it took a hype in the year 2014-15 and again decreased in 2018-19.

TOTAL ASSETS: CHANGE **year net fixed assets/ last year net fixed asset AMT IN LAKH**

Years	Change year net fixed assets	Last year net fixed Assets	Percentage
2014-15	138205	138205	100
2015-16	200217	138205	114.89
2016-17	297292	138205	215.11
2017-18	399267	138205	288.89
2018-19	575321	138205	416.28



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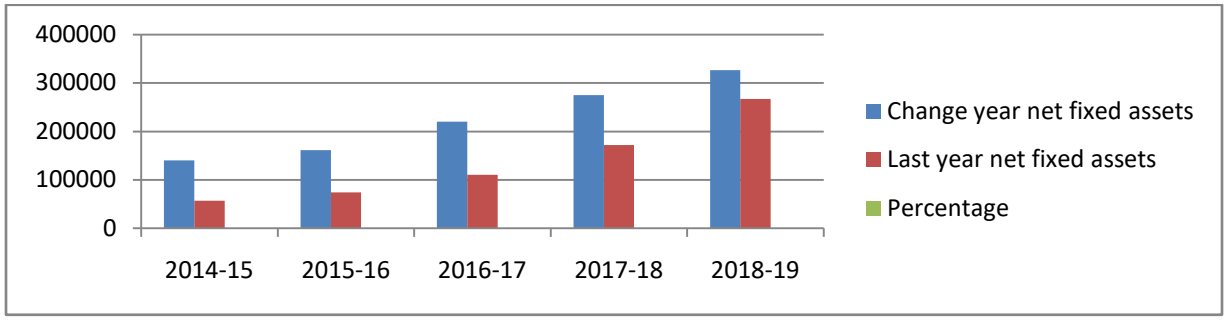
INTERPRETATION: The level of total assets has consistently increased, marginally in between the year 2014-15 and 2015-16. The increase has been significant in between the year 2009-10 and 2014-15 and 2016-17 and 2015-16 and 2018-19.

FIXED ASSET TURNOVER RATIO: Net fixed Assets/last year net Fixed assets. AMT IN LAKHS

Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	140396	57148	245.67
2015-16	161422	74322	217.19
2016-17	220410	110519	199.43
2017-18	275323	171884	160.17
2018-19	326545	266920	122.33



INTERPRETATION: The fixed asset turnover has decreased in between the year 2014-15 and 2018-19 peaking to a minimum of 122.33 during the year 2018-19.

SOLVENCY RATIO:

Solvency ratio to the ability to business to our long term obligation like interest and instalment with long term solvency ratio indicates long term stability on an organization. Lender like financial institution debentures holder, banks who give term loans to the enterprise, are interested in ascertaining the solvency of the organization.

DEBT AND EQUITY RATIO: Long term funds/share holder funds AMT IN LAKHS

years	long term funds	shareholders 'funds	d/e ratio
2014-15	44090	33879	1.3
2015-16	44663	34848	1.2
2016-17	50455	31715	1.59
2017-18	62136	41605	1.49
2018-19	87280	65444	1.33

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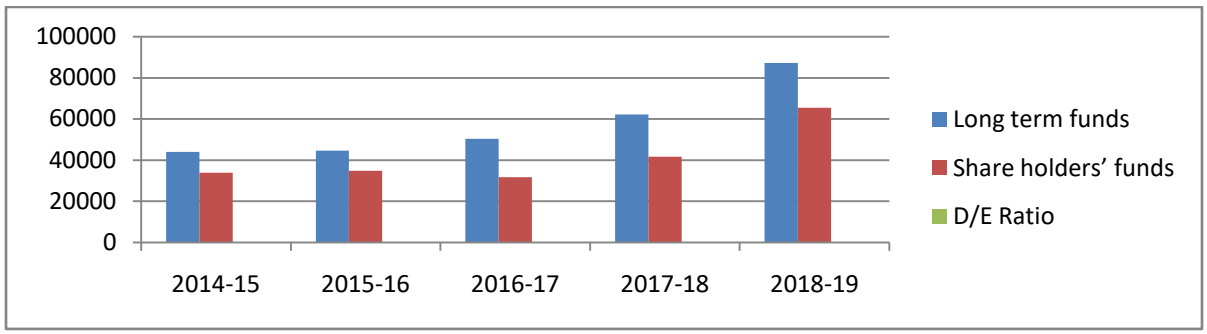
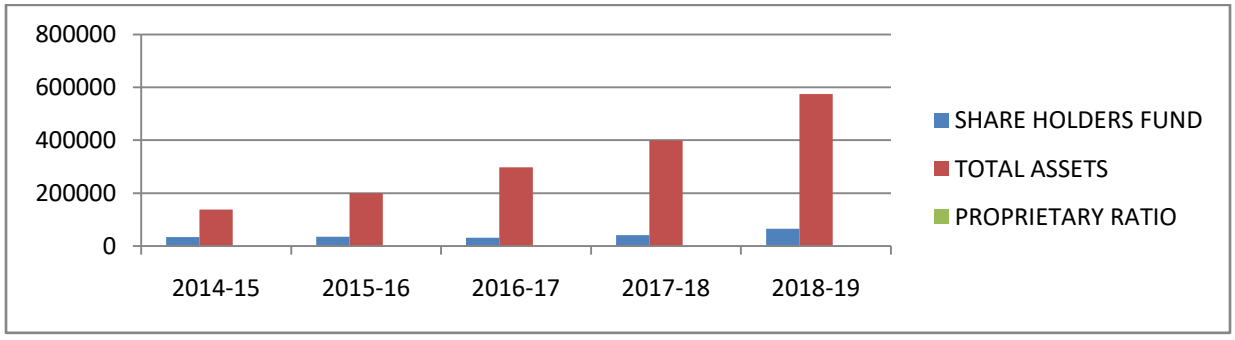


INTERPRETATION: Generally a ratio of 2:1 (2 units of debt and 1 unit of equity) is considered normal. In the case of manufacture concern it is 1.5 :1, in the Kesoram cement limited the debt equity ratio from 2014-15 to 2018-19 is below normal. It indicates that the using less debt for its operations.

PROPRIETARY RATIO:share holder funds/total assets AMT IN LAKHS

years	share holders fund	total assets	proprietary ratio
2014-15	33879	138205	0.245
2015-16	34848	200217	0.174
2016-17	31715	297292	0.1067
2017-18	41605	399267	0.104
2018-19	65444	575321	0.113



INTERPRETATION: The proprietary ratio has slightly decreased in between the year 2014-15 and 2018-19 peaking to a minimum of 11.37during the year 2018-19.

V1.FINDINGS:

1. The total turnover capacity proved well only in FY 2016. The next financial years couldn't resist to even get the margin and failed to employ the assets well.
2. Except for operating efficiency which stood high in FY 2017, other factors tend to dominate in FY2016 only. This is in fact because of the manufacturing costs which were less in FY2016 than that in other 2 years.
3. The firm neither managed margins nor did it attract the investors, as they couldn't get the rate of returns, in FY 2018 and FY 2019.Since the firm managed the manufacturing expenses in FY2016 only, it has an effect on the preceding profit margins because of the sales. Even

though FY2019 managed decent sales, the effect of inventories resulted in the poor performance

V11.SUGESSIONS:

1. Company cash positions needs to be improved.

2. The company must strive for consistency in ROE.

3. The company can take the advantage of leverage by employing further debtors in future when they required additional funds for expansion as the current debtors equity ratio is less than the standards 2:1.The firm has to take steps to convert its inventory into sales within a short time.

V111. HYPOTHESIS:

1. The repercussions of investment decisions of corporations are directly reflected in the growth

Of the company.

2. Liquidity of the corporations is a major contributor to the investing decisions of the company.

3. Self dependence in finance is appositive factor in investment decisions.

1X. CONCLUSION: The turnover of financial assets has not improved much during the years 2014-15 and 2015-16.There is a significant increase in net fixed assets during the years 2007-08 and 2015-16, however is no significant increase in the fixed assets turnover ratio during both of the year 2016-17 and 2017-18.The level of investment in fixed assets needs to proper scrutiny and analysis to ensure efficient utilization of the same. There is a surge in the investment in fixed assets in the range of more than 32654 lacks in 2016-17 and 266920 lacks in 2017-18. This requires close scrutiny and efficient management to result in effective generation of turnover out of the investment made in fixed assets.

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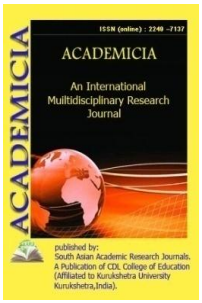

A STUDY ON COMPENSATION MANAGEMENT AT DR. REDDY'S LABORATORIES LTD

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ABSTRACT

The Study on Compensation Management focuses on employees take home profitsfrom the company. It clearly describes the breakup of the employee's salary, hisallowances and facilities provided by the Employer.The Study / research was carried out by a recorded survey of employeesof a particular organization. These records were later analyzed to prepare astatistical data. The Study concluded with the recommendations on theanalysis.

KEYWORDS: *Compensation, Recruitment, Human Resources, Personnel.*

INTRODUCATION

The literal meaning of reimbursement is to counter-balance. In the case of human aid control, compensation is called money and other benefits obtained by using a worker for presenting services to his employer. Money and advantages received can be in distinct forms-base reimbursement in cash and numerous blessings, which can be related to worker's provider to theagency like provident fund, gratuity, coverages cheme and anyother price which the worker receives or blessing she enjoys instead of such charge.

SCOPE OF THE STUDY

Compensation control helps to determine the relative well worth of a job in an organization in a systematic, consistent and correct manner. It also allow sin estimating the primary pay for each task by the importance of the job with in the organizational hierarchy.

Once a simple pay is determined, there wards, incentives, and advantages attached worth the pay, positions and overall performance also are determined.

OBJECTIVES OF THE STUDY

- To understand in detail how to set up pay costs to a unique degree of the employee.

- To apprehend the impact of repayment management on overall performancelevel.
- To determine the extent to which reimbursement management affects an employee's over all performance.
- To compare the relationship between the running situation and workerperformance.
- To discover the relationship between compensation management and improvedproductivity.

RESEARCH METHODOLOGY

Research Design

Thisexaminationuses asurveyresearchlayoutthatallowsfortheuseofquestionnaires to elicit recordsfrom therespondents.

AccordingtoNwogu(1991),adesignmaybedefinedasaplanorblueprintwhichspecifieshowfactsregarding giventroubleshouldbeaccruedandanalyzed.Itoffersthepreceduraldefineforthebehaviorofanygiven investigation.

LIMITATIONS OF THE STUDY

- The businesses that have been studied and surveyed are not imparting us with full facts that have hamperedtheresultandconclusion.
- Exact statistics turnedintonolongerbeenprovided.
- Thesamplesizeturnedintoaconstrain.
- Thepersonalinterviewbecomesnownotallowed.

REVIEW OF LITERATURE

Today's compensation systems have come from a long way. With the changing organizational structures workers' need and compensation systems have also been changing. From the bureaucratic organizations to the participative organizations, employees have started asking for their rights and appropriate compensations. The higher education standards and higher skills required for the jobs have made the organizations provide competitive compensations to their employees.

Compensation strategy is derived from the business strategy. The business goals and objectives are aligned with the HR strategies. Then the compensation committee or the concerned authority formulates the Compensation strategy. It depends on both internal and external factors as well as the life cycle of an organization.

TABLE 1:

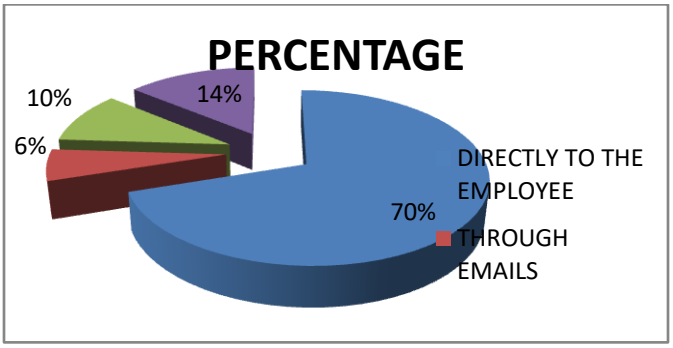
1. How is the compensation program and total compensation package communicated to employees?

S.NO	Particulars	Percentage	Respondents
1.	DIRECTLY TO THE EMPLOYEE	70%	35
2.	THROUGH EMAILS	6%	3
3.	NOTIFICATIONS	10%	5

4.	THROUGH MANAGERS	14%	7
5.	TOTAL	100%	50

S.NO	Particulars	Percentage	Respondents
1.	YES	34%	17
2	NO	58%	29
3.	IN SOME EXCEPTIONAL CASES	8%	4
4.	TOTAL	100%	50

CHART 1:

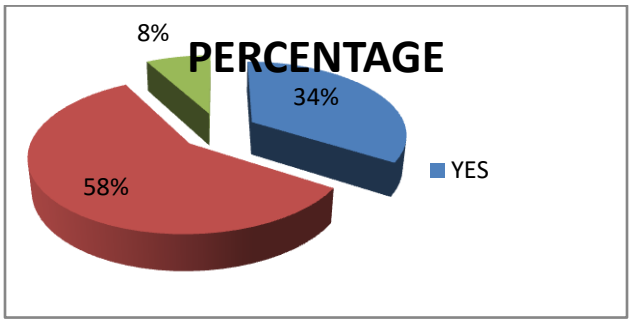


INTERPRETATION:

- Majority of the compensation programme is communicated directly to the employees at the time of their recruitment.
- Some of the employees get the compensation information through managers, notification, or emails.
- This is done to the existing employees and the fresh employees get the information at the time of recruitment.

2. Are employees permitted to substitute sick leave for vacation?

CHART 2:



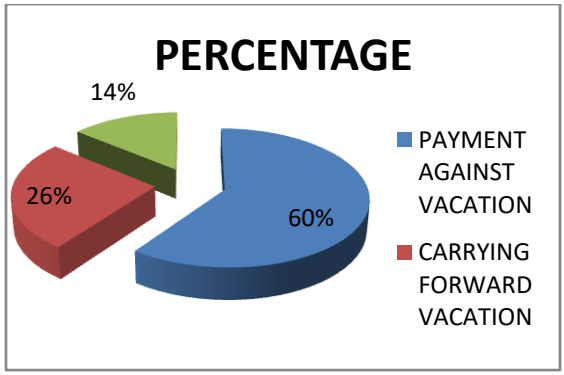
INTERPRETATION:

- More than 50% of employees said that they are not permitted to substitute their sick leaves for vacation.
- In some cases they can substitute their sick leaves for vacation.
- A very few employees said that they can substitute their sick leaves as vacation in some exceptional cases.

3. How is unused accrued vacation treated?

S.NO	Particulars	Percentage	Respondents
1.	PAYMENT AGAINST VACATION	60%	30
2.	CARRYING FORWARD VACATION	26%	13
3.	NULLIFIED	14%	7
4.	TOTAL	100%	50

CHART 3:



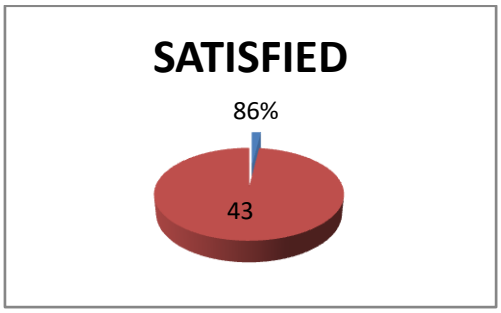
INTERPRETATION:

- The company is going to pay the amount for unused vacation to majority of the employees.
- In some cases the vacation period is carried forward.
- If vacation is extended for some period then it is nullified.

4. How is employee communication regarding compensation and benefits delivered in your organization?

S.NO	Particulars	Percentage	Respondents
1.	SATISFIED	86%	43
2.	NOT SATISFIED	14	7
3.	TOTAL	100%	50

CHART 4:



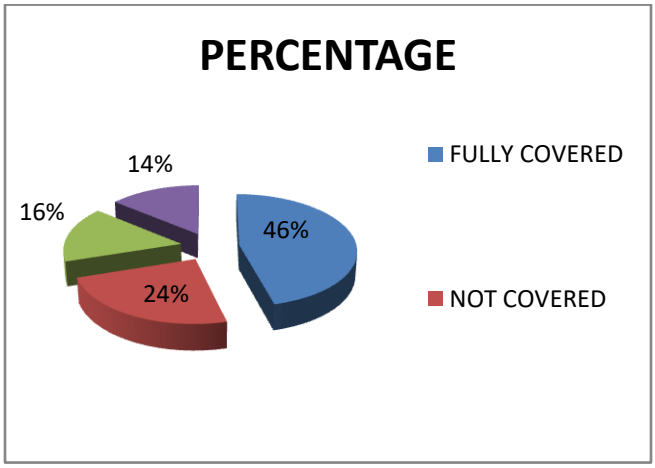
INTERPRETATION:

- More than 70% of the employees are satisfied regarding compensation system in the company.

5. Are dependents covered, and if so, in part or in full?

S.NO	Particulars	Percentage	Respondents
1.	FULLY COVERED	46%	23
2.	NOT COVERED	24%	12
3.	ONLY BLOOD RELATION DEPENDENTS ARE COVERED	16%	8
4.	DEPENDENTS ARE PARTIALLY COVERED	14%	7
5.	TOTAL	100%	50

CHART 5:



INTERPRETATION:

- Dependents are fully covered for the employees.
- Blood relation dependents are also covered in some cases.

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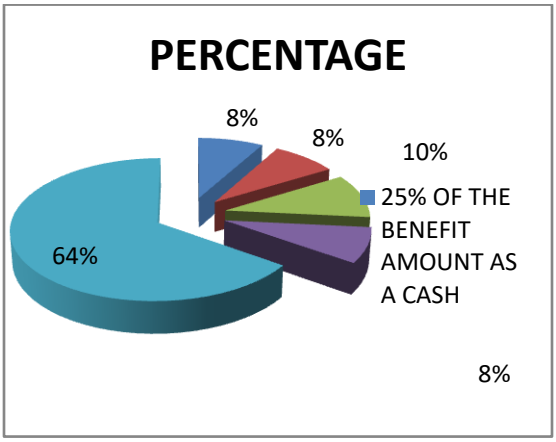
6.What is the pension or retirement plan?

S.NO	Particulars	Percentage	Respondents
1.	25% OF THE BENEFIT AMOUNT AS A CASH	8%	4
2.	REGULAR MONTHLY INCOME FOR THE REST OF YOUR LIFE	8%	4
3.	10% GUARANTEED ADDITIONS	10%	5
4.	BENEFITS UNDER SEC 80CCC(1) UPTO Rs.10,000	8%	4
5.	ALL THE ABOVE	64%	32
6.	TOTAL	100%	50

CHART 6:



INTERPRETATION:

- Nearly 70% of the employees are getting every second pension plan.
- Benefits under section 80 CCC (1) is very less when compared to other pension or retirement plans.

SATISFACTORY LEVEL FOR FOLLOWING:

S.NO	Particulars	Percentage	Respondents
1.	Basic	60%	30
2.	House and Rent Allowances	70%	35
3.	Conveyance Allowances	4%	2
4.	Paper Allowances	24%	12
5.	Canteen Allowances	18%	9
6.	Reimbursement	66%	33
7.	Medical Reimbursement	80%	40
8.	Educational Allowances	0%	0
9.	Night Shift Allowance	36%	18
10.	Special Allowances	2%	1
11.	Benefits	38%	19

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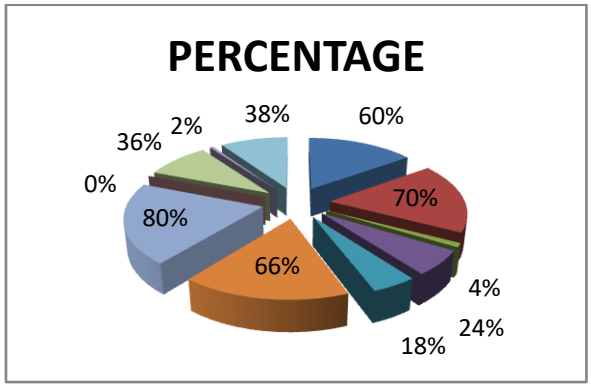
CHART 7:



INTERPRETATION:

- 60% of the employees are satisfied with the basic.
- 70% of the employees are satisfied with the House and Rent Allowances.
- Only 4% of the employees are satisfied with the Conveyance Allowances.
- 24% of the employees are satisfied with the Paper Allowances.
- 18% of the employees are satisfied with the Canteen Allowances.
- 66% of the employees are satisfied with the Reimbursement.
- 80% of the employees are satisfied with the Medical Reimbursement.
- There is no employee satisfied with the Educational Allowances.
- 36% of the employees are satisfied with the Night Shift Allowance.
- Only 2% of the employees are satisfied with the Special Allowances.
- 38% of the employees are satisfied with the benefits provided.

Findings

- The Compensation system followed by the organization is a formal one and majority of the employees are satisfied with the Compensation Packages.
- Employees are allowed to substitute their Sick Leaves as vacation which indicates that some Liberty is given to the Employees.
- Unused vacation is refunded back to the Employees and can carry forward to the vacation.
- Compensation Programme is planned by the Higher Authority of the Organization and they consider all the aspects the skills, Specilization based on their respective branches.
- Salary of the Employees will change frequently based on Surveys conducted by the top management. They conduct Surveys like meeting the compensation committee for Review, Adjustments and Approvals. Pay ranges are revised based on the Requirements of the Organization.

- Job Rating is done by the methods like RANKING, RATING, CLASSIFICATION, and POINT METHOD.

Suggestions

- It encourages individual initiative.
- It encourages working for the good of the whole.
- It helps people improve, not just rewards them when they do.
- The decision process is seen as based on all the real facts (i.e. thorough).
- Inputs to the process are received from multiple constituencies (group and project leaders, clients, subordinates, peers.).
- The decision process is perceived as fair.

CONCLUSION

They can be studied and decided as to which of them are to implement resulting in positive output. The study of Compensation factors and its impact on the job satisfaction of the employees will help the company to know that what type of practices it should follow to make the employees satisfied. The motivational methods followed in the company are making the employees satisfied .Finally the company has to give some more benefits to the employees so that they get complete saturation.

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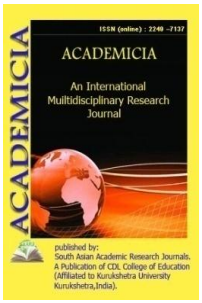

ADVERTISING MANAGEMENT AT HONDA MOTORS

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ABSTRACT

On the far side there are the proponents of advertising who give hope to the advertisers. They believe that although the advertising has the power to attract the audience, but the real power lies with the audience. The audience can only be attracted to that image which is already embedded in their minds. Remember when the last time you saw an advertisement after which your response was "pathetic"! This is because probably the ad wasn't directed towards you and you didn't fall in the target audience. The advertisements then, only act as a stimulus, a catalyst. They argue that how could a person ever be induced to buy something that he/she doesn't want? The famous saying that "Advertisements can sell a refrigerator to Eskimos" is then an exaggeration! And answering to the other controversy, they say that since advertiser's personal image, the company's reputation, and both of their futures are at stake, therefore, no advertiser and company would ever want to use dirty tricks in the bag to sell substandard, harmful products to the customers. Consequently, the buyers can be confident in buying the advertised products since the company has put its own reputation at stake.

KEYWORDS: *Advertising, Audience, Image, Power, Reputation*

1. INTRODUCTION

The word 'advertising' is derived from its Latin root adverter, which means 'to turn towards' or 'to attract attention'. Advertising basically comprises all acts that are directed towards drawing the attention of people about the availability of goods and services. Advertising is commonly

defined as any form of non personal presentation and promotion of ideas, goods and services usually paid for by an identified sponsor or advertiser. Advertising is also directed at a specific group of consumers of goods and services. Advertising is a paid form of communication. The advertiser is also duly identified by the media of advertising for obvious reasons. Advertising has become a necessary evil in the modern society. Advertising has promotional, educative, economic and social dimensions. The particular automotive industry is an array of firms and organizations included in the look, development, manufacturing, advertising, and marketing of automobiles. It is among the world's most significant economic industries by income. The auto industry will not include sectors focused on the servicing of automobiles pursuing shipping to the end-user, like automobile restoration shops and engine fuel filling channels.

2. NEED OF THE STUDY

The study helps the company to improve their standard of service and handle the competition in near future. It also helps in giving inputs about possible improvements, addition and new strategies and offers the customers. It also puts a detailed insight into the different aspects of company such as manufacturing marketing sales production and finance etc.

3. OBJECTIVES

- To understand the advertising activities of Honda Motors
- To study the consumer perception about the Honda Motors
- To suggest few sales promotion techniques to improve the brand awareness among consumers.
- To know the advertising methods followed by the dealers

4. RESEARCH METHODOLOGY

Data source : Primary & secondary

Research approach : Survey method

Geographical area : Hyderabad

Sample size : 50

Research instrument : Questionnaire

Contact method : Personal contact

5. LIMITATIONS

- Some customers refuse to co-operate and do not disclose their genuine opinion.
- Respondent’s answers might have influence or bias.
- Information is collected from the customers and dealers only.
- Sample selection

6. REVIEW OF LITERATURE

An assessment of literature may be the mirror of previous research, which enriches the researcher and really helps to identify the gaps for future year’s research. Many reports on

advertisements have already been conducted in various elements of India. As today's study can be involved with the advertisements in television, an attempt was created to review the literature obtainable to ensure that an excellent insight in the advertisements world is normally obtained. Like any researcher, enough effort is used this chapter to comprehend previously researches on advertisements.

Vijaykumari (1999),1in her research on "Efficiency of marketing with reference and print mass media" analyzed the potency of two popular advertisement mass media viz. television and print and their impact on people. The researcher figured the tv advertisement has provided even more impact than advertisement on the net mass media on the people within their buying decisions, because it has the visual and sound medium and it attracted viewers easily.

P.Akbarbatcha(2001)2in his study entitled "Marketing industry -with special mention of print mass media and intermediaries" analyzed the general public opinion towards advertisement in the printing mass media. The researcher provides attempted a particular study with regards to print press and figured the print press played a essential part in the thoughts of the centre class people.

Jacob Goldenberg et.al.(2002)3in their content "How cross marketplace communication can produce a significant slump to product sales" analyzed the result of the parameters of communication over the early and primary markets in saddle prevalence. The cross-market conversation parameters possess a significant influence in identifying the living of saddle. In a narrow selection of low ideals of the cross-marketplace communications parameters fairly, there is absolutely no clear lower relationship between your ideals of their parameters and the living of saddle.

7.DATA ANALYSIS

Advertisement mode by which you became aware

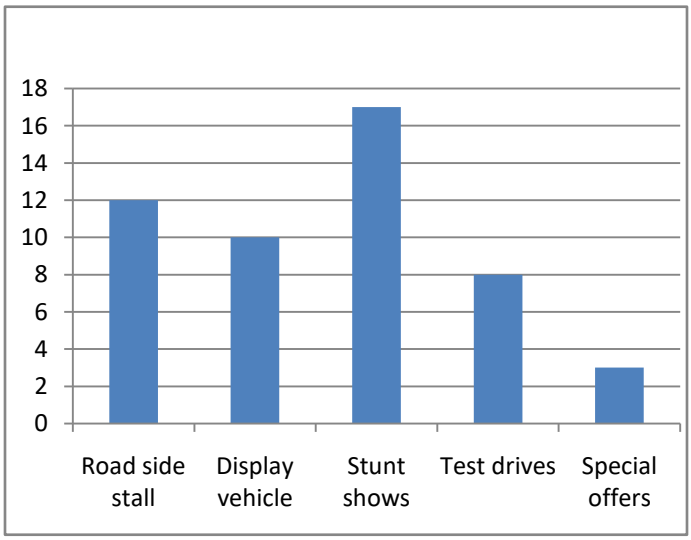
Mode of Advertisement	No of Customers
TV	15
Internet	5
Newspaper	6
Banners &Hoardings	5
Friends/Relatives	8
Road show	4
Magazine	2
Dealer	5

Inference:

Advertising through Television created high awareness followed by friends/relative and newspapers

Advertising that makes you buy Honda bikes?

Advertsing	**Count**	**Percentage**
Road side stall	12	24
Display vehicle	10	20
Stunt shows	17	34
Test drives	08	16
Special offers	03	6
Total	50	100

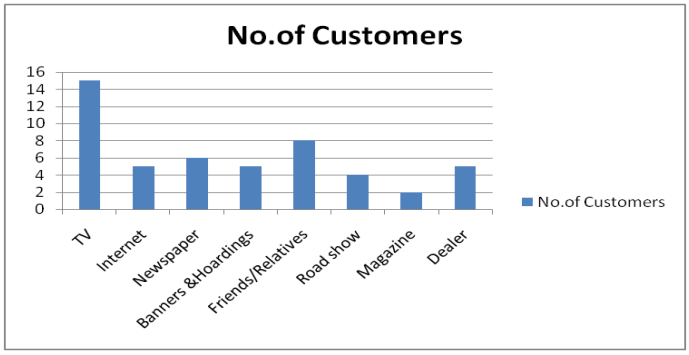


Inference:

Stunt shows and road side stalls attract majority people to buy the bikes contrast to special offers

8. FINDINGS

- Through survey the advertising takes on the major part in increasing product sales.
- Ads for basic safety and recognition are done in welfare of consumer also.
- Providing check rides in display room is of interest to customer also
- The attractive advertisements makes the client to get Honda



9. SUGGESTIONS

- Efforts ought to be increased for Consumer Relationship management.
- Special offer ought to be there for govt. employee.
- Can market the brand new launched bikes by road shows
- More special offer ought to be provided like year end sales.
- More camps ought to be arranged to enhance the sales.

10. CONCLUSION

This survey was done to recognize various issues and degree of satisfaction of consumers, sales and advertising promotion of Honda, to ensure that efforts might done to fulfill them which would lead to building long-term relationships between customer and company. Because of delivery in consumer expectations and requirements, it turns into a hard task to fulfill every customer, for this purpose a true number of questions were asked to discover behavior of the customers. This research can be done to learn the sights of the client towards the providers and quality and develop innovative advertising campaigns.

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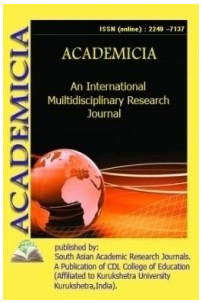

A STUDY ON LONG TERM INVESTEMENT DECISION

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ABSTRACT

Long term investment decision gives the brief idea regarding the various investment options that are prevailing in the financial markets in India. With lots of investment options like banks, Fixed Deposits, Government bonds, stock market, real estate, gold and mutual funds the common investor ends up more confused than ever. Each and every investment option has its own merits and demerits. This project I have discussed about few investment options available. Any investor before investing should take into consideration tae safety, liquidity, returns, entry/exit barriers and tax efficiency parameters. We need to evaluate each investment option on the above-mentioned basis and then invest money. Today investor faces too much confusion in analyzing the various investment options available and then selecting the best suitable one. In the present project, investment options are compared on the basis of returns as well as on the parameters like safety, liquidity, term holding etc. thus assisting the investor as a guide for investment purpose.

KEYWORDS: *Investments, Deposits, Investment options, Funds.*

I.INTRODUCTION:

Long term investment decision is paramount importance in finance decision making. Because these not only affect probability of the firm but also the competitive position, and consequently its survival and growth further, these are strategic invest decision these decision assume greater importance because of the following reasons:

a. Investment of heavy funds: Long term investment decisions require I Large capital outlays. Therefore at should carefully plan its investment program, in terms of providing the funds to allocate then among different fixed assets.

b. Long-term implication: these decisions have their impact on its Firm's future direction and growth firms, future cost, break-even point, sale or profit-all are determined by the selection of its assets.

c. Irreversible decision: most of the Long term investment decision, keeping view the size of investment and longevity of the projects, are not generally reversible. In case, the firm has to scrap the assets, it has to incur heavy losses.

II. TARGETS OF THE STUDY:

- **Creation of Wealth**: Holding up assets or stocks for a long-term period or till maturity gives incredible returns and adds value to the investment.
- **Minimization of Risk**: Holding up investments for an extended period eliminates the risk emerging from the unfavorable market conditions, like a recession.
- **Sustainable Growth**: Long-term investing is an excellent option for the sustainable growth of funds or assets since it ensures better and stable returns.
- **Association with Quality Companies**: Long-term investing in equity and funds of big brands or well-known companies provides the investor with a share in the ownership. Thus, the investor gets a chance to be associated with the growth and success of that company.

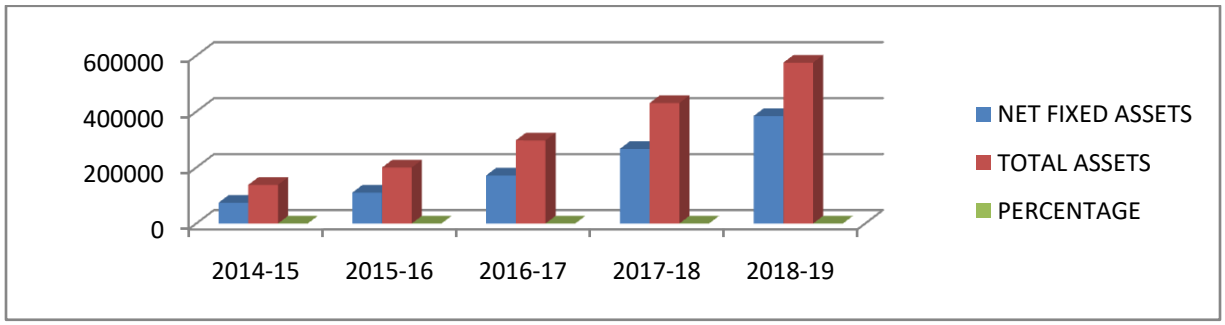
III. RESEARCH METHODOLOGY:

- **Primary data:** Officers of accounts sections. Executives and staff of financial and accounts department. Meeting with concerned people. Personal observation.
- **Secondary data:** Annual reports of Kesoram Cement Financial management text books. Printed Materials.

IV. INFORMATION ANALYSIS AND INTERPRETATION:

PERCENTAGE OF FIXED ASSETS: net fixed assets/total assets*100 AMT IN LAKHS

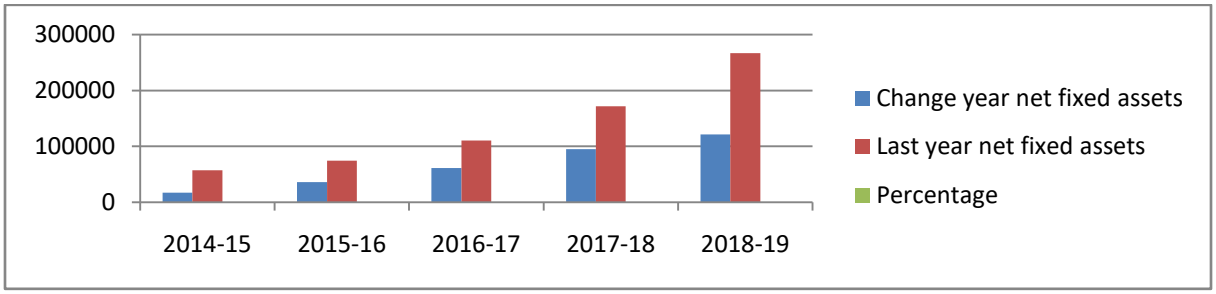
YEARS	NET FIXED ASSETS	TOTAL ASSETS	PERCENTAGE
2014-15	74322	138205	53.78
2015-16	110519	200218	55.19
2016-17	171883	297293	57.81
2017-18	266920	430657	61.98
2018-19	384465	575321	66.83



INTERPRETATION: The percentage of net fixed to total assets has consistently increased from 53.78 to 66.83.In the 2018-19 the percentage reached up to 66.83.

TOTAL FIXED ASSETS: change year net fixed assets/ last year net fixed assets AMT IN LAKHS

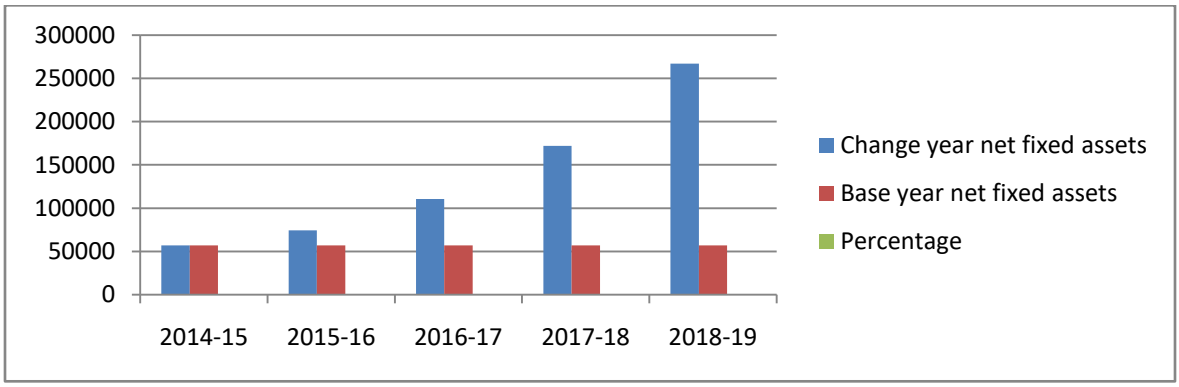
Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	17174	57148	30.10
2015-16	36197	74332	48.70
2016-17	61364	110519	55.22
2017-18	95037	171883	55.29
2018-19	121545	266920	45.54



INTERPRETATION: The level of net fixed assets was low in 2014-15 and increased in next year of 2015-16. But in 2018-19 the percentage decreased from 55.29 to 45.54.

NET FIXED ASSET: current year net fixed / base year net fixed assets AMT IN LAKHS

Years	Change year net fixed assets	Base year net fixed assets	Percentage
2014-15	57148	57148	100
2015-16	74332	57148	130.07
2016-17	110519	57148	193.390
2017-18	171883	57148	300.76
2018-19	266930	57148	467.08



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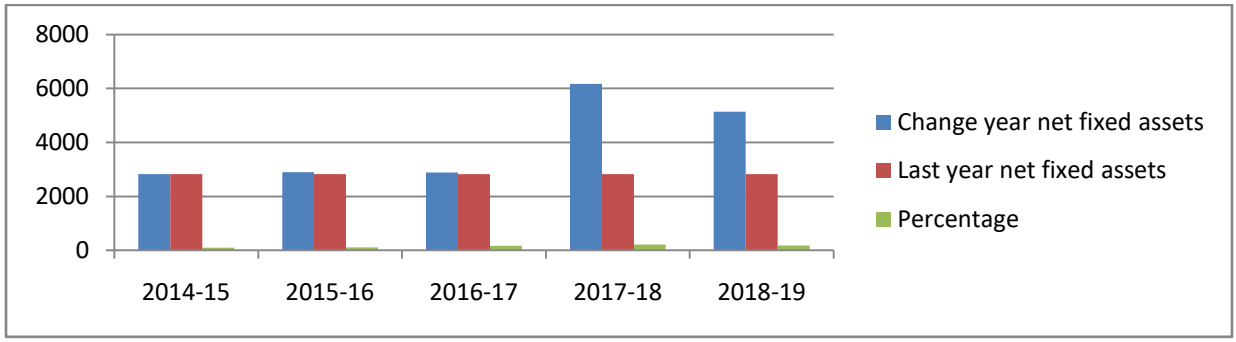
INTERPRETATION: Considering the year 2015-16 as the base year the level of fixed assets as an index show 130.07% change compared to the base year (2013-14=100) and it goes on increased further years. Up to 467.08% in 2018-19.

INVESTMENT: **change year net fixed assets/ last year net fixed assets AMT IN LAKHS**

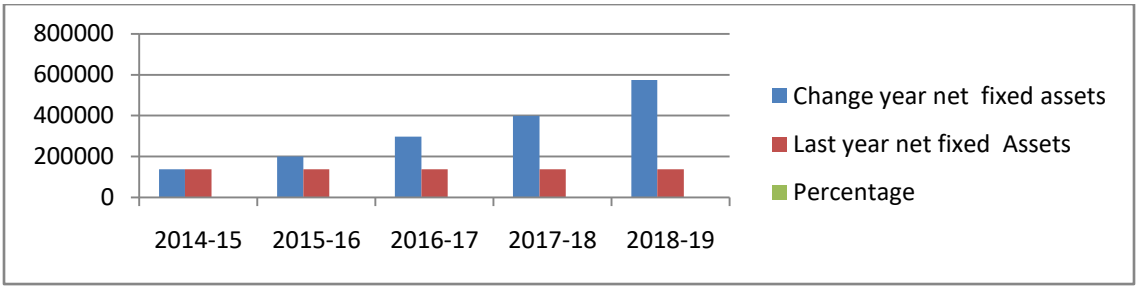
Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	2819	2819	100
2015-16	2902	2819	102.94
2016-17	2887	2819	169.63
2017-18	6178	2819	219.15
2018-19	5143	2819	182.44



INTERPRETATION: In the level of fixed asset of 2014-15 years the percentage was low and later it took a hype in the year 2014-15 and again decreased in 2018-19.

TOTAL ASSETS: CHANGE **year net fixed assets/ last year net fixed asset AMT IN LAKH**

Years	Change year net fixed assets	Last year net fixed Assets	Percentage
2014-15	138205	138205	100
2015-16	200217	138205	114.89
2016-17	297292	138205	215.11
2017-18	399267	138205	288.89
2018-19	575321	138205	416.28



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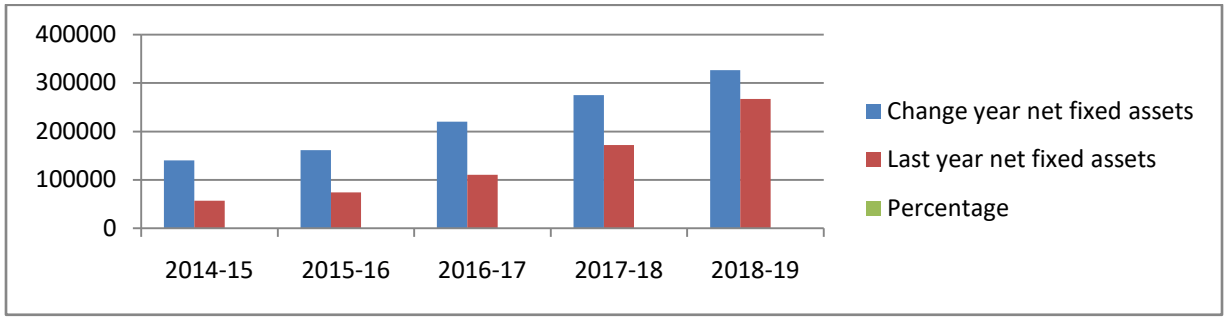
INTERPRETATION: The level of total assets has consistently increased, marginally in between the year 2014-15 and 2015-16. The increase has been significant in between the year 2009-10 and 2014-15 and 2016-17 and 2015-16 and 2018-19.

FIXED ASSET TURNOVER RATIO: Net fixed Assets/last year net Fixed assets. AMT IN LAKHS

Years	Change year net fixed assets	Last year net fixed assets	Percentage
2014-15	140396	57148	245.67
2015-16	161422	74322	217.19
2016-17	220410	110519	199.43
2017-18	275323	171884	160.17
2018-19	326545	266920	122.33



INTERPRETATION: The fixed asset turnover has decreased in between the year 2014-15 and 2018-19 peaking to a minimum of 122.33 during the year 2018-19.

SOLVENCY RATIO:

Solvency ratio to the ability to business to our long term obligation like interest and instalment with long term solvency ratio indicates long term stability on an organization. Lender like financial institution debentures holder, banks who give term loans to the enterprise, are interested in ascertaining the solvency of the organization.

DEBT AND EQUITY RATIO: Long term funds/share holder funds AMT IN LAKHS

years	long term funds	shareholders 'funds	d/e ratio
2014-15	44090	33879	1.3
2015-16	44663	34848	1.2
2016-17	50455	31715	1.59
2017-18	62136	41605	1.49
2018-19	87280	65444	1.33

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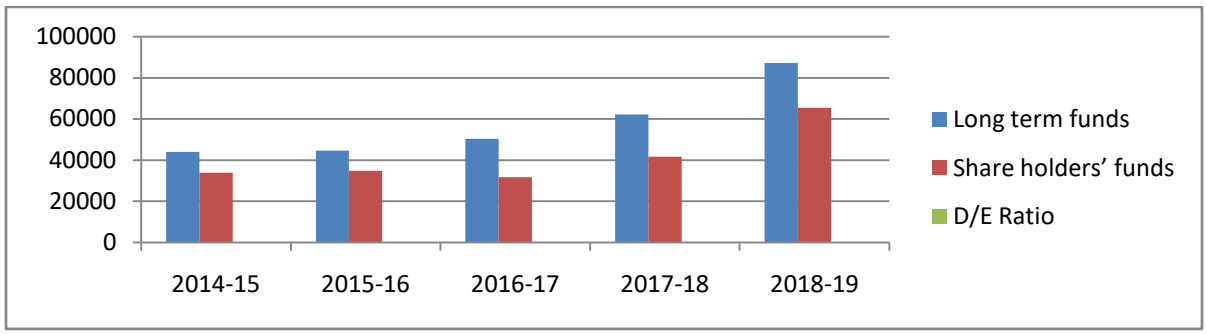
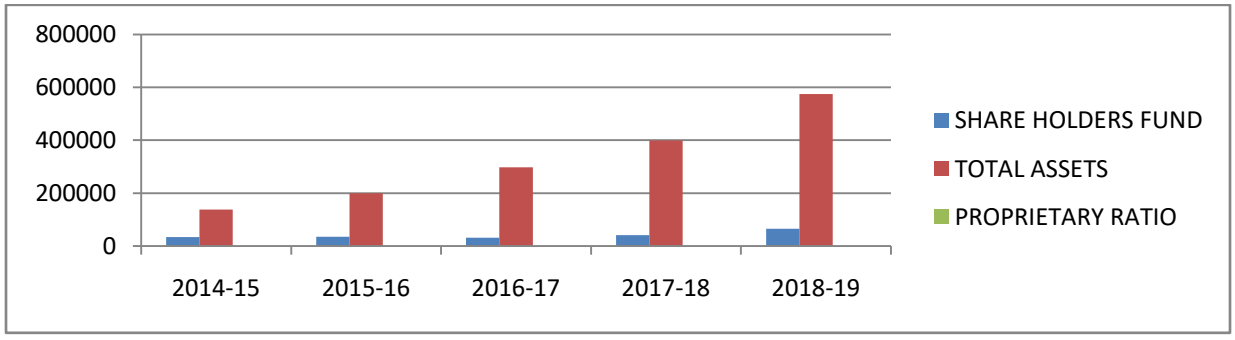


INTERPRETATION: Generally a ratio of 2:1 (2 units of debt and 1 unit of equity) is considered normal. In the case of manufacture concern it is 1.5 :1, in the Kesoram cement limited the debt equity ratio from 2014-15 to 2018-19 is below normal. It indicates that the using less debt for its operations.

PROPRIETARY RATIO:share holder funds/total assets AMT IN LAKHS

years	share holders fund	total assets	proprietary ratio
2014-15	33879	138205	0.245
2015-16	34848	200217	0.174
2016-17	31715	297292	0.1067
2017-18	41605	399267	0.104
2018-19	65444	575321	0.113



INTERPRETATION: The proprietary ratio has slightly decreased in between the year 2014-15 and 2018-19 peaking to a minimum of 11.37during the year 2018-19.

V1.FINDINGS:

1. The total turnover capacity proved well only in FY 2016. The next financial years couldn't resist to even get the margin and failed to employ the assets well.
2. Except for operating efficiency which stood high in FY 2017, other factors tend to dominate in FY2016 only. This is in fact because of the manufacturing costs which were less in FY2016 than that in other 2 years.
3. The firm neither managed margins nor did it attract the investors, as they couldn't get the rate of returns, in FY 2018 and FY 2019.Since the firm managed the manufacturing expenses in FY2016 only, it has an effect on the preceding profit margins because of the sales. Even

though FY2019 managed decent sales, the effect of inventories resulted in the poor performance

V11.SUGESSIONS:

1. Company cash positions needs to be improved.

2. The company must strive for consistency in ROE.

3. The company can take the advantage of leverage by employing further debtors in future when they required additional funds for expansion as the current debtors equity ratio is less than the standards 2:1.The firm has to take steps to convert its inventory into sales within a short time.

V111. HYPOTHESIS:

1. The repercussions of investment decisions of corporations are directly reflected in the growth

Of the company.

2. Liquidity of the corporations is a major contributor to the investing decisions of the company.

3. Self dependence in finance is appositive factor in investment decisions.

1X. CONCLUSION: The turnover of financial assets has not improved much during the years 2014-15 and 2015-16.There is a significant increase in net fixed assets during the years 2007-08 and 2015-16, however is no significant increase in the fixed assets turnover ratio during both of the year 2016-17 and 2017-18.The level of investment in fixed assets needs to proper scrutiny and analysis to ensure efficient utilization of the same. There is a surge in the investment in fixed assets in the range of more than 32654 lacks in 2016-17 and 266920 lacks in 2017-18. This requires close scrutiny and efficient management to result in effective generation of turnover out of the investment made in fixed assets.

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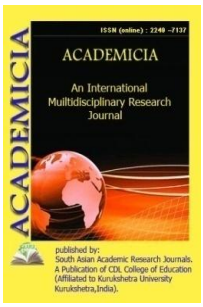

A STUDY ON PERFORMANCE APPRISAL OF EMPLOYEES AT HALCYON TECHNOLOGIES

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ABSTRACT

Performance appraisal is the major measuring instrument provided by the organization to their employees. It helps in setting the goals and objectives of employees and also useful in identifying the strengths and opportunities. Performance of employees has been mainly focused by human resource department. In order to compete in present competitive market environment, performance of employees plays a major role in every organization. Performance appraisal is a fundamental tool for measuring the construction frame which has been set by the organization. It is very helpful in identifying the employee's strengths and weakness for improvising their future performances.

KEYWORDS: *Performance, Employees, Appraisal System, Organization.*

I. INTRODUCTION:

Performance appraisal is a formal structured process evaluating the qualifications of the employees. In this study the evaluation of the employees in their respective job roles and responsibilities can be occurred. Importance of performance appraisal in the organization can be done in this study. Development of the potential in every individual employee can be studied.

II. OBJECTIVES OF THE STUDY:

1. To study various factors influencing employee performance and their job functions and responsibilities at halcyon technologies.

2. To analyse and interpret about various performance appraisal system at halcyon technologies

3. To evaluate employee satisfaction towards performance appraisal system at halcyon technologies

III. REVIEW OF LITERATURE:

1. Work by Ravichandran, Venkataraman and Banumathy

Ravichandran, Venkataraman and Banumathy (2011) express that the province of Tamil Nadu with 37 operational sugar plants is a noteworthy sugar creating condition of the nation, contributing around 9-10 percent to the national sugar creation. The sugar business has consumed around 5 lakh country individuals in the state. This paper examined the exhibition evaluation framework followed in an agreeable sugar plant with an example size of 75 workers. The examination has discovered that the sugar plant had received a decent evaluation framework and takes the examination at the hour of probation period and further during the vocation advancement. The investigation has likewise discovered that there is a hole between the genuine and wanted exhibition. Consequently, it was proposed to lead yearly execution evaluation to improve the productivity of the workers and give preparing on constancy, correspondence ability and aptitude advancement to improve the representative's administration quality

2. Work by Vasset

His article which is titled Employees perceptions of justice in performance appraisal expresses that of the considerable number of assignments attempted by human resource directors, execution evaluations (PAs) are one of the most disliked among workers (Meyer 1991, Murphy and Cleveland 1995, Holbrook 2002, Jack man and Strober 2003). As performance appraisal guidelines (Fletcher 2004, Impetus One 2010), PAs can be executed in comparable routes in associations all through Europe and created nations somewhere else. This study only concerned about the employee’s performance appraisal system should be conducted fairly and trustworthy

3. Work by Brutus, Fletcher and Baldry

Brutus, Fletcher and Baldry (2009) in their article titled, "The impact of autonomous self-translation on rater self-viability in performance appraisal" broaden current information on the utilization of execution assessments in associations by exploring the impact of self-interpretation on rater self adequacy. Results from an overview finished by 105 experienced supervisors demonstrate that free self-understanding is identified with different elements of rater self-viability. In addition, involvement in examinations was found to direct these connections. The ramifications of these discoveries for the examination and the act of execution evaluation are talked about**.**

4. Work by Bollen and Whaley

Bollen and Whaley (2009) in their article titled "Hedge Fund Risk Dynamics: Suggestions for performance appraisal" express that precise evaluation of support investments execution must perceive the opportunity with which

directors move resource classes, systems, and influence because of changing economic situations and exchange openings. The standard proportion of execution is the strange return characterized by a fence stock investments' introduction to chance variables. In the event that exposures are expected steady when, truth is told, they change through time, assessed strange returns might be wrong. They utilized an ideal change point relapse that permits hazard exposures to move, and show the effect on execution evaluation utilizing an example of live and dead assets during the period from January 1994 through December 2005.

5. Work by Wilson and Jones

Wilson and Jones (2008)58 in their article titled "Reducing job irrelevant bias in performance appraisals: compliance and beyond" express that activity insignificant segregation appears as omnipresent as the presentation evaluations in which it is regularly recognized. This paper investigates both consistence based and progressively proactive methodologies that manage the different potential wellsprings of segregation in execution examination evaluations. The recommendations lead to a code of training for execution the executives in firms across societies and national limits.

IV. RESEARCH METHODOLOGY:

Research Approach is the procedure of methodical examination of any administration issue it manages explores structure, information assortment strategy, inspecting plan, testing technique.

METHODS OF DATA COLLECTION

PRIMARY DATA: Data is collected from employees through questionnaire and other discussions.

SECONDARY DATA

Secondary data is collected from research publications, websites, journals, books.

SAMPLE SIZE:

A Sample of 100 employees are taken

RESEARCH TOOLS:

The research tool which is used for the research is a prepared questionnaire

STATISTICAL TOOLS:

ANNOVA

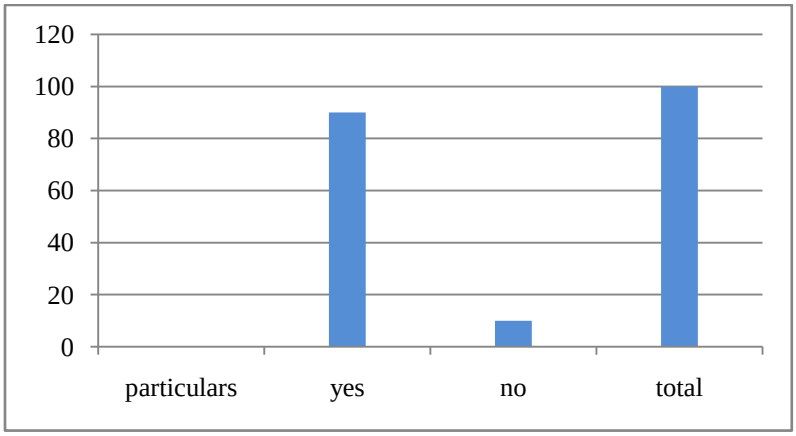
Variables: Independent variable- Performance appraisal

Dependent variable- Employee satisfaction

V. DATA ANALYSIS AND INTERPRETATION:

TABLE 1: THE APPRAISER IS THE RIGHT PERSON TO APPRAISE YOUR PERFORMANCE?

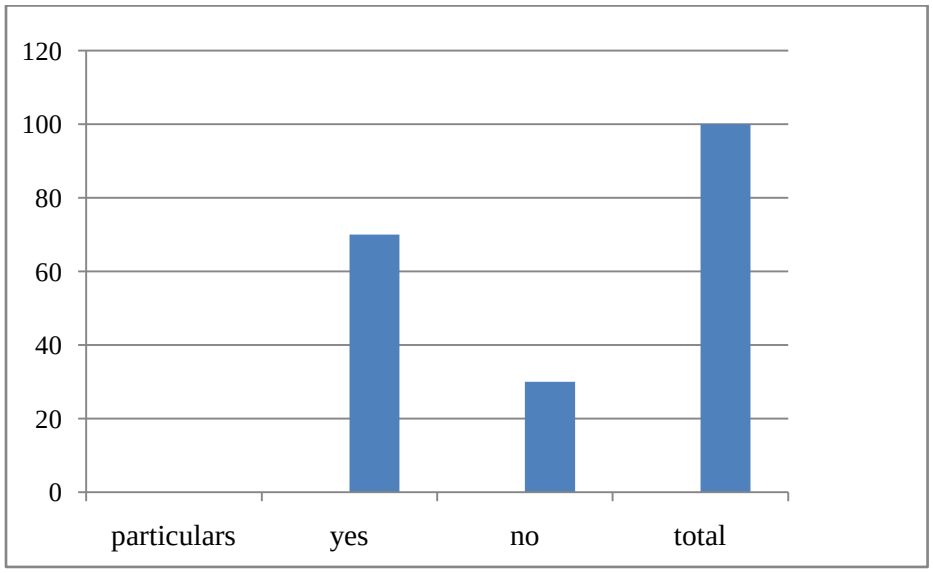
Particulars	No. of respondents	% of respondents
Yes	90	90
No	10	10
Total	100	100



INTERPRETATION: 90% of the employees are agreed on the statement that appraiser is the right for your performance

TABLE 2: IS THERE ANY CHANGES IN THE WORKING EFFICIENCY OF EMPLOYEES BY IMPLEMENTING PERFORMANCE APPRAISAL?

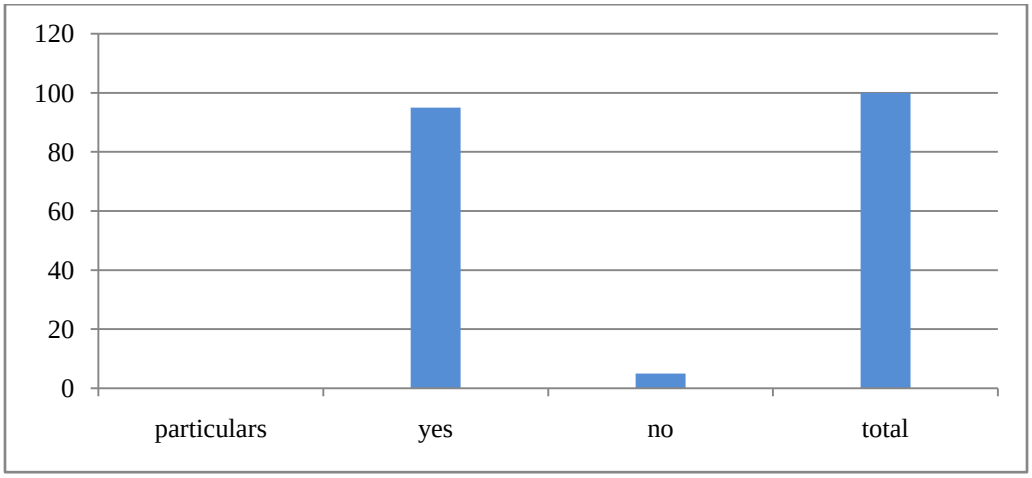
Particulars	No. of respondents	% of respondents
Yes	70	70
No	30	30
Total	100	100



INTERPRETATION: It is observed that 70% of the employees are seeing the changes in working efficiency after the appraisal, while 30% of employees are unable to observe the changes after the appraisal.

TABLE 3: IS THERE ANY BEHAVIOURAL CHANGES OCCUR IN THE EMPLOYEES AFTER PERFORMANCE APPRAISAL

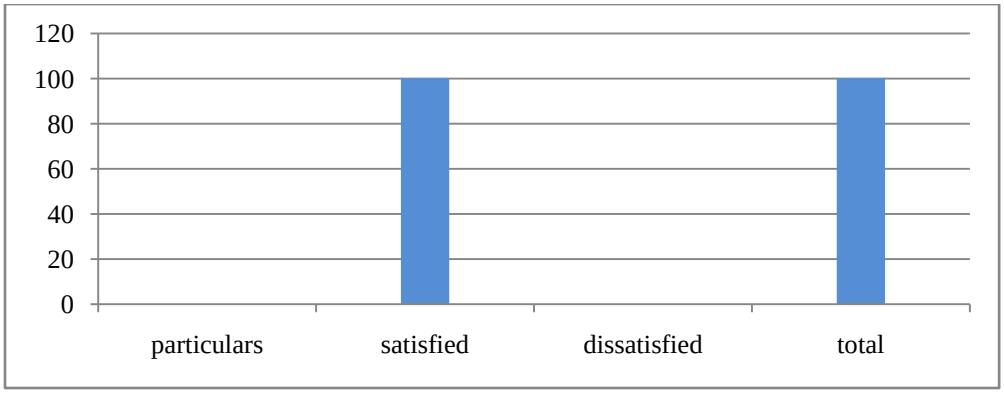
Particulars	No. of respondents	% of respondents
Yes	95	95
No	5	5
Total	100	100



INTERPRETATION: 95% of employees are showing the behavioural changes after the appraisal and 5% of employees are not showing the behavioural changes after the appraisal.

TABLE 4: SATISFIED WITH THE CURRENT PERFORMANCE APPRAISAL SYSTEM

Particulars	No. of respondents	% of respondents
Satisfied	100	100
Dissatisfied	0	0
Total	100	100



INTERPRETATION: 100% of the employees are satisfied with current appraisal system.

VI. STATISTICAL ANALYSIS:

HYPOTHESIS:

- H0: There is no significant relationship between the effectiveness of appraisal & development programme and satisfaction of present appraisal system done by organization
- H1: There is a significant relationship between the effectiveness of appraisal & development programme and satisfaction of present appraisal

Calculation

Correction Factor (C.F) = T^2/N

$= 100^2/25$

$= 10{,}000/25$

$= 400$

Sum of square of Total Variance: (SST)

= sum of squares of all items-C.F

$= [10^2+15^2+10^2+20^2+15^2+5^2+5^2+5^2+5^2+5^2+5^2] - 400$

$= 1200 - 400$

$= 800$

Sum of square between rows (SSR)

$= [(25^2/5) + (50^2/5) + (10^2/5) + (5^2/5) + (10^2/5) - 400$

$= 670 - 400$

$= 270$

Sum of squares between columns (SSC)

S.NO	Effectiveness	SATISFACTION OF APPRAISAL DONE BY ORGANIZATION					
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
1	Highly effective	-	-	-	10	15	25
2	Effective	10	20	15	-	5	50
3	Neutral	5	5	-	-	-	10
4	Ineffective	-	5	-	-	-	5
5	Highly Ineffective	5	-	-	-	5	10
	Total	20	30	15	10	25	100

$= [(25^2/5) + (30^2/5) + (15^2/5) + (10^2/5) + (25^2/5)]$

$= 475 – 400$

$= 75$

Error sum of squares = SST-(SSR+SSC)

= 800 - (270+75)

= 455

ANNOVA TABLE

SOURCE OF VARIANCE	SUM OF SQUARES	DEGREE OF FREEDOM	VARIANCE	F
Between rows	270	5-1 = 4	270/4 = 67.5	67.5/28.4375 = 2.3736
Between columns	75	5-1 = 4	75/4 = 18.75	18.75/28.475 = 0.6593
Residual	455	4*4 = 16	455/16 = 28.4375	

Calculated value:

F1 = 2.736

F2 = 0.6593

Table Value: Critical value: The table value of ANOVA at 5% and the degree of freedom is (4, 16) = 3.01

INTERPRETATION:

The table value of F1 at 0.05 level of significance is 3.01. Calculated value is 2.3736. Therefore the calculated value is less than the table value we accept H0 and reject H1

The table value of F2 at 0.05 level of significance is 3.01. Calculated value is 0.6593. Therefore the calculated value is less than the table value we accept H0 and reject H1

VII. FINDINGS

1. The area where employees are facing problems are taken care by the training department
2. Promotion of employees is one of the main criteria among both management and employees

VIII. SUGGESTIONS:

Awareness level of employees during the performance appraisal should be increase. Providing a good communication between management and staff so that the future goals of the organization can be easily achieved Providing appraisal rewards regularly improves the employee's performance

IX. CONCLUSION:

Employees are satisfied with the present performance appraisal system. The present appraisal technique is prevailing fair in the organization. For effective results some more modern future oriented appraisal technique s should be implemented.

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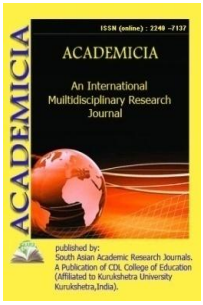

A STUDY ON COMMODITY MARKETS IN ANGEL BROKING LIMITED

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ABSTRACT

Indian markets have provided new course of action for retail investors and also for traders to take part in commodity derivatives. The investors who are willing to modify their portfolios away from shares, real estate, and bonds the commodities will be the right option. Earlier the investment in commodities was no use. For the retail investors, it was very bitty to invest in goods like gold, oilseeds and silver in the futures market. In the year 1875 the very first commodity market was established. The government has banned trading in derivatives in 1960's and it again started in 2000's.The current study will help to get an idea about Indian commodity markets. The markets performance, its development and its present status are discussed in this study.

KEYWORDS: *Commodity Markets, Commodity Exchange, Speculation*

I.INTRODUCTION:

The economic growth of countries globally are majorly dependent on the state of commodity markets. The evolution of commodity trading was in the middle of 19th century. There was a sudden hike in prices of commodities in 2008.Then; there was a slight increase in commodities like rice, wheat and maize day by day. The three major multi commodity exchanges were set up by the government in the country, through the medium of these exchanges the investors can trade in commodity futures without physical stocks. A common platform is recommended for commodity exchange for evolution of active trading, where both demand and supply together can get the best prices for any commodity.

II. OBJECTIVES OF THE STUDY:

1. To seek the knowledge about the major exchanges of trading commodities in the Indian market.

2. To study how the commodities are traded through the trading desk.

3. To study the major impact of spot prices on future prices of commodities.

III. HYPOTHESIS:

H0: There is no impact of spot prices on future prices of commodities.

H1: There is an impact of spot prices on future prices of commodities.

IV. RESEARCH METHODOLOGY:

The present study is conducted to know the detailed information about commodity markets and to know the impact of prices on commodities.

(a) Primary data

Primary data is collected from observation, interviews and survey method.

(b) Secondary data

Secondary data is collected from magazines, reference books, journals various websites and annual reports of company.

V.TOOLS FOR ANALYSIS

1. Mean
2. Standard deviation
3. Beta
4. Variance
5.t- test

VI. REVIEW OF LITERATURE

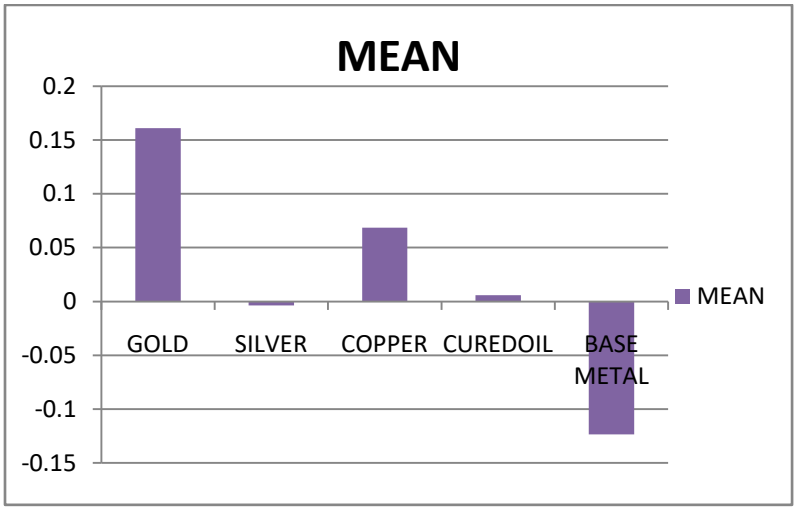
(a) Rahul .k.kapale & karthik b.uttawar (Apr-2016):

In the top producers of variety of commodities, India has become one of them. The supervision of commodity market is needed to make sure that market efficiency. And performs the both economic function of prices discovery and price risk management to a proper mingle the spot and future prices to supply protection against risk of fluctuations in prices. The promotion of free trade in the world will be done by the management of price risk.

(b) Jim Roger (Feb-2012) :The most important investment opportunities will be provided by the commodity markets and have the advantages over the other financial markets while making the note of risk management. The inter connection between spot and future prices and differences in seasonality are the major issues.

TABLE I: CALCULATION OF MEAN:

COMMODITY	MEAN
GOLD	0.161039593
SILVER	-0.003606586
COPPER	0.068594446
CRUDE OIL	0.005964733
BASE METAL	-0.12367745



GRAPHICAL REPRESENTATION OF MEAN

INTERPRETATION:

From the above table we can know the mean values of various commodities. The mean of gold is highest when compared to other commodities i.e. 0.161039596 and the commodity base metal has lowest mean i.e. -0.12367745 in the month of January.

TABLE 2: CALCULATION OF STANDARD DEVIATION:

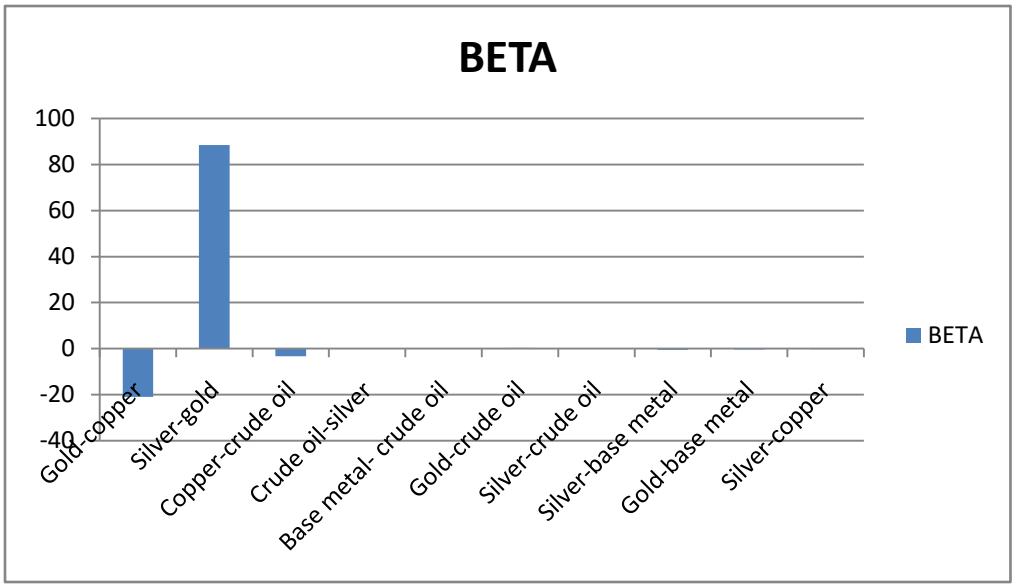
COMMODITY	STANDARD DEVIATION
GOLD	0.707138978
SILVER	1.24659171
COPPER	1.431510091
CRUDE OIL	1.856879584
BASIC METALS	0.658943234

GRAPHICAL REPRESENTATION OF STANDARD DEVIATION

From the above table we can know the standard deviation values of different commodities in the month of January. Crude oil is highest standard deviation when compared to other commodities i.e. 1.856879584 and base metal is having lowest standard deviation i.e. 0.6589432.

TABLR 3: CALCULATION OF BETA

COMMODITIES	BETA
Gold-copper	-20.88388164
Silver-gold	88.43715779
Copper-crude oil	-3.306307571
Crude oil-silver	0.0879862
Base metal- crude oil	0.06128313751
Gold-crude oil	0.266680433
Silver-crude oil	-0.0129630
Silver-base metal	-0.4616239
Gold-base metal	-0.3195032
Silver-copper	-0.269791

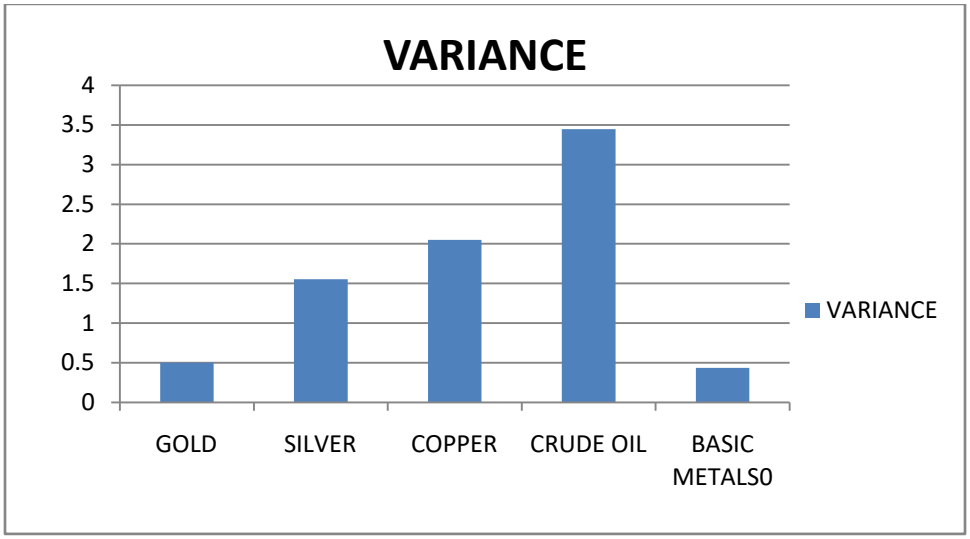


GRAPHICAL REPRESENTATION OF BETA

From the above table we can interpret that silver –gold is higher than other commodities in month of January i.e., 88.43715779. The beta value of gold-copper is negative i.e., -20.88388164.

TABLE4: CALCULATION OF VARIANCE

COMMODITY	VARIANCE
GOLD	0.500045547
SILVER	1.553990892
COPPER	2.049221141
CRUDE OIL	3.448001789
BASIC METALS	0.434206189



GRAPHICAL REPRESENTATION OF VARIANCE

From the above table we can know interpret that the variance of crude oil is higher than all other commodities in the month of January i.e. 3.448001789 and base metal is having the lowest variance i.e. 0.434206186.

TABLE 5: T-TEST WITH GOLD WITH SILVER

t-Test: Paired Two Sample for Means		
	0.418246	*1.008127*
Mean	0.303895	-0.05104
Variance	1.068974	1.576033
Observations	23	23
Pearson Correlation	0.476359	
Hypothesized Mean Difference	0	
df	22	
t Stat	1.434348	
P(T<=t) one-tail	0.082768	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.165536	
t Critical two-tail	2.073873	

Here the calculated value is 1.434348, and the table value is 1.717144

TABLE 6: T-TEST GOLD WITH COPPER

t-Test: Paired Two Sample for Means		
	0.418246	*-0.15197*
Mean	0.303895	0.143796
Variance	1.068974	2.237758
Observations	23	23
Pearson Correlation	-0.07197	
Hypothesized Mean Difference	0	
df	22	
t Stat	0.4087	
P(T<=t) one-tail	0.343356	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.686711	
t Critical two-tail	2.073873	

Here the calculated value is 0.4087, and the table value is 1.717144

TABLE 7:T-TEST GOLD WITH CRUDE OIL

t-Test: Paired Two Sample for Means		
	0.418246	*-1.49033*
Mean	0.303895	-0.65655
Variance	1.068974	3.138849
Observations	23	23
Pearson Correlation	0.36567	
Hypothesized Mean Difference	0	
df	22	
t Stat	2.719777	
P(T<=t) one-tail	0.006255	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.01251	
t Critical two-tail	2.073873	

Here the calculated value is 2.719777, and the table value is 1.717144

TABLE 8: T-TEST WITH BASE METALS

t-Test: Paired Two Sample for Means		
	0.418246	*-0.14682*
Mean	0.303895	-0.24097
Variance	1.068974	0.77605
Observations	23	23
Pearson Correlation	-0.58939	
Hypothesized Mean Difference	0	
Df	22	
t Stat	1.529541	
P(T<=t) one-tail	0.070191	
t Critical one-tail	1.717144	
P(T<=t) two-tail	0.140383	
t Critical two-tail	2.073873	

Here the calculated value is1.529541, and the table value is 1.71714

TESTING OF HYPOTHESIS

- There is the impact of spot prices on future prices.
- So, H0 space is accepted.

FINDINGS

- The commodity gold is having higher mean in the month of January. The mean value of gold is considered as risk type of commodity.
- The variance of crude oil is higher in January when compared to other commodities. Therefore risk and return of crude oil is comparatively higher.

- In the month of January standard deviation of crude oil is higher, so it is treated as risky commodity. As risk is increasing return will also increase.
- The Beta of commodities gold and silver is more than 1 in January. It shows that both commodities are having more risk and return and it is also comparatively and simultaneously high.

SUGGESTIONS

1. For trading unit more commodities can be introduced.
2. Every investor before entering in to commodities has to carefully examine the market conditions and risk involved in it.
3. Investors need to know the better contract of the commodities in future and their negotiation before making decision to enter into the contract.
4. While the process of trading is going on there should not be any interference investors because of risk factors.

CONCLUSION

Capital market reached its maturity level. There is a long history of commodity trading, and there are many developments in Indian commodity markets they are: commodity markets are protected by the government policies and implementing of the sector and fetching the necessary protection from the instruments which are based on markets like a commodity futures contract. The strong potential of markets is shown by the increase in the trend of commodity markets and the market is an essential part of the economy.

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A STUDY ON PERFORMANCE OF MUTUAL FUNDS

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ABSTRACT

The research article titled as performance of mutual funds at kotakmahindra bank. The open-end fund Industry may be a one among the rapidly growing industries within the stock market market where it attracts investors with the diversified nature. the most purpose of study is evaluate the performance of mutual funds and facilitate by the retail investors in deciding . Data collected by the NSE, Money control, Kotak mahindra and value research on online data sources. the most tools employed by this project is beta, variance , correlation and variance. the info was collected from feb 1,20202 to March 1 2020 Day wise net asset values of selected mutual funds schemes are collected to calculate the return and return of these schemes and to match with same benchmark index. during this study, NSE sensex is taken into account because the benchmark return. The research revealed the all schemes are outperformed the benchmark index when the scheme returns are compared with the sensex returns. It indicates that the performance of fund schemes is way better than the market risk.

KEYWORDS: *Net Asset Values, Mutual Funds, Market Returns, Market Risk, Fund Performance, Risk Investment.*

1.INTRODUCTION

A open-end fund may be a security that pools the saving of variety of investors who share a standard financial goal. the cash thus collected is then invested during a capital market instrument like shares, debentures and therefore the other securities.

A open-end fund may be a clean intermediary which performs a basic purpose of shopping for and selling securities on behalf of its unit-holders, which latter can also perform but not easily, conveniently, economically, and profitably. The investors within the open-end fund are given the share in its total funds which is proportionate to their investments, and which is evidenced by the unit certificates. one among the main features of the operations of this type of organization of quite organization to holds. Unlike other financial institutions, whose liabilities and assets differ sharply in their nature, unit investment trust issues claims (units)which have, like its assets (equity stock), claim on a proportionate a part of the portfolio.

Thus open-end fund is that the best suited investment for the overall man because it offers a chance to take a position during a diversified, professionally managed basket of securities at a comparatively low cost.

Investments in securities are spread across a good cross-section of industries and sectors and thus is that the reduced. Diversification decreases the danger because all stock might not move within the same direction within the same proportion at an equivalent time. open-end fund issue units to the investors in accordance with quantum of cash invested by them.

Mutual funds are one among the investment alternatives playing a big role in investment techniques due to its diversification nature and minimum earnings. There are many investment alternatives like bank deposits, insurance, shares, debentures, bonds, commodities, land and far more but mutual funds are one among the sources of investment, gaining rapid increase when matched to the opposite sources of investment alternatives.

This study evaluates the performance of the mutual funds by risk and returns and associating an equivalent with NSE-SENSEX. This study examines the 4 open-ended, growth-oriented equity fund schemes in India. Open-ended funds are that funds don't have any fixed maturity period. they provide the new unit of funds purchasable and prepared to shop for at any period.

2.REVIEW OF LITERATURE

Dr. K. Veeraiah and Dr. A. KishoreKumar (Jan 2014), conducted an enquiry on Comparative Performance Analysis of Select Indian mutual fund Schemes. This study analyzes of the performance of Indian owned mutual funds and compares their performance.

B. Raja behavior and Dr. B. Ramachandra Reddy (Oct 2012), assessment and act of first-class Mutual means Operated By concealed Sector Banks.

Dr.S. Vasantha, Uma Maheswari and K.Subashini, (Sep 2013), Evaluating the execution of a little chosen initiate ruined fair play diversified open-end sponsor in Indian open-end savings account Industry

Dr. B. Saritha, (Feb 2012) has studied open-end fund Investment Decisions by Using Fama Decomposition Models**.**

Dr.S.M.Tariq Zafar, Dr.D.S.Chaubey and Syed Imran Nawab Ali, (Feb 2012), have done An Empirical Study on Indian Mutual Funds Equity Diversified Growth Schemes and Their Performance Evaluation.

3.OBJECTIVES OF THE STUDY

To analyses the danger and return of the chosen fund schemes and compare the same with NSE-SENSEX.

To Examine the scheme on the by performance compared with the market index whether or not they're outperforming or underperforming the benchmark.

To evaluate the performance of selected fund schemes by using several performance evaluation techniques.

4.RESEARCH METHODOLOGY

Any research methodology is consists of primary information and secondary data. Primary data is that the info collected directly by knowing the facts. Primary data wasn't taken within the research. Whereas secondary information is that the choice source from the third parties. This study is taken on the secondary information where it includes the analysis of 10 growth-oriented mutual fund schemes.

Primary Data

The information which we collects directly from the company and moulds it in useful information isknown as primary data.

Secondary Data

which is collected from journals, books, and websites is known as secondary data.

5.HYPOTHESIS

H0 - there's no relationship between the performance of the mutual funds and market index.

H1 - there's relationship between the performance of the mutual funds and market index.

6.SAMPLE DATA

This study is mainly focused on the following samples.

Kotak Gold Fund – Growth

SBI Magnum Midcap Fund

Sundaram Select Focus Fund

Mirae Asset Emerging Bluechip Fund

Axis Small Cap Fund Direct Plan

LIC Mf Equity Hybrid Fund

Nippon India Income Fund Direct Plan

Invesco India Treasury Advantage Fund

BOI AXA Liquid Fund

ICICI Prudential Bluechip Fund

7.STAISTICAL TOOLS USED

Return,Correlation,Risk and Beta

8.RESULTS AND ANALYSIS

Returns, beta, risk and correlation of selected schemes:

Below tables represents the results of the return, risk and beta of determination of selected schemes. The same is compared with the benchmark index (NSE-Index) .

TABLE-1 SUMMARY OF RETURN, RISK, AND BETA OF SELECTEDSCHEMES

SCHEMES	SCHEME RETURN	SCHEME RISK	BETA
Kotak Gold Fund	0.002715555	0.013236651	-0.047872023
LIC Mf Equity Hybrid Fund	-0.001425436	0.007583843	0.202079519
SBI Magnum Midcap Fund	-0.002012608	0.008181959	0.124388458
Sundaram Select Focus Fund	-0.002000473	0.34392317	0.34392317
Mirae Asset Emerging Bluechip Fund	-0.005522446	0.010584001	0.021910875
Axis Small Cap Fund Direct Plan (G)	0.000173958	0.000879344	0.136427279
Nippon India Income Fund Direct Plan (G)	0.016055605	0.001705252	0.022992223
Invesco India Treasury Advantage Fund (G)	0.000247439	0.000362166	-0.15752
BOI Axa Liquid Fund	0.000183036	0.000125883	0.003022
ICICI Prudential Bluechip Fund	-0.002359672	0.011684632	0.351957443
Average	0.000605496	0.03982669	0.100130894
NSE SENSEX INDEX(Benchmark)	0.03968797	0.06982669	1

INTERPRETATION:

SCHEME RETURNS

From table 1, it is clear that 10 schemes performed the market returns. In this analysis, the average market returns are 0.039. The minimum returns are from Mirae asset Emerging Bluechip Fund and highest returns are from Nippon India Income Fund with 0.016055605. All the schemes are performing well when they are compared with the market returns with an average return of 0.000605496.

RISK

From table 1, it is clear that 10 schemes performed the market returns. Sundaram Select Focus Fund is having more risk with 0.34392317 and BOI Axa Liquid Fund ishaving less risk 0.000183036. The average market risk with selected schemes is ICICI Prudential Bluechip Fund with 0.011684632.

BETA

When it comes to beta it is noticed that 10 schemes having beta value is 0. Hence, these funds having less risk category. Kotak Gold Fund having -0.047872023 and Invesco India Treasury Advantage Fund (G) having -0.15752. Thus 10 projects having beta values less than 1 it means these 10 schemes are performing better in managing the systematic risk.

TABLE -2 SUMMARY OF CORRELATION

SCHEMES	CORRELATION
Kotak Gold Fund	-0.03723303
LIC Mf Equity Hybrid Fund	0.274320115
SBI Magnum Midcap Fund	0.156511941
Sundaram Select Focus Fund	0.096703728
Mirae Asset Emerging Bluechip Fund	0.021312508
Axis Small Cap Fund Direct Plan (G)	0.162938417
Nippon India Income Fund Direct Plan (G)	0.138358
Invesco India Treasury Advantage Fund (G)	-0.370652
BOI Axa Liquid Fund	0.247182
ICICI Prudential Bluechip Fund	0.310098602
Average	0.058488431

INTERPRETATION

From table 2, it is clear that total 10 schemes are outperformed that market correlation kotak Gold Fund is having more related with the market index -0.03723303 and Nippon India Income Fund Direct Plan (G) having -0.370652.

9.FINDINGS:

From this analysis, it's clear that total 10 schemes are performed the benchmark returns. It shows the success of mutual funds. The very best returns from Nippon India Income Fund Direct plan scheme and therefore the less returns are Mirae Asset Emerging Blue chip fund Direct plan.

When it involves risk, ICICI Prudential Blue chip fund scheme has high risk and Invesco India Treasury Advantage Fund has less risk.

In the beta calculation, it's observed that 10 funds having beta value is a smaller amount which suggests these 10 schemes are performing well in managing the systematic risk. Later these funds are having less risk.

10.SUGGESTIONS

Beta value for all the ten schemes are but one. So, they have to continue the beta value. Correlation values for 8 schemes are zero and a couple of schemes are but zero. So, invest within the schemes which are having zero. they need less risk.

11.CONCLUSION

From this study, we will assume that some evaluation may have higher returns and a few with higher risk. regardless of the combination, investors always search for the mixture of maximum revenues and minimum risk. Alongside this, it's to look at the correlation of these schemes. Based abreastof the correlation H1 is accepted.From my study I even have concluded that the danger related to the chosen open-endfund schemes is lesser with minimum returns. Hence the beta value is additionally minimum and therefore the levels of systematic risk is minimum to all or any the chosen open-end fund schemes.

Hence I conclude that investors can invest in any of the chosen mutual funds to urge returns and obtain benefited.

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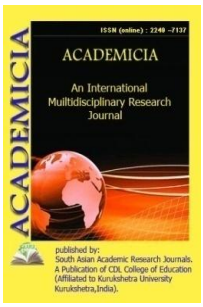

A STUDY ON RISK AND RETURN ANALYSIS OF PHARMACEUTICAL INDUSTRY

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ABSTRACT

A stock exchange is the place where the buying and selling of shares occur in a market. The main objective of risk and return analysis is to maximize returns and to keep a balance of risk. Every investor desire to avoid risk and elevate the returns. Risk and return are basically correlated and are dependent on each other. Pharmaceutical sector is one among of the major industries in India. Most of the investors consider it as a finest business for making profitable investments. This study is all about analysing the risk and return between the top 5 pharma sectors trading on NIFTY-50. It is performed using few tools such as mean, range, standard deviation and t-test.

KEYWORDS: *Risk, Return, Pharma Sector, Mean And T-Test.*

INTRODUCTION

RISK AND RETURN ANALYSIS

Risk and return are high level factors of financial management that must be considered in making new investments. Substantial the amount of risk an investor is willing to take, the greater the potential return.

The term risk and return refer to the potential loss or gain experienced in investments in securities. Risk and return concept are basic to the understanding of the valuation of the assets or securities. The concept of risk and return analysis is essential in the process of investing and finance.

Risk in investment is termed as the unevenness that is likely to occur in future cash flows from an investment. Return expresses the amount which an investor actually earned on an investment during a certain period such as interest, dividend and capital gains etc.

REVIEW OF LITERATURE

A literature review may be a search and evaluation of the available literature in your given subject or chosen topic area. It documents the state of the art with reference to the topic or topic you're writing about.

MacGregor, Slovic, Berry and Evensky (1999):

The study is cantered on how the financial decision-making process is linked to numerous aspects of investments/asset classes, specifically expert's approach of returns, risk, and risk/return associations. A survey was mailed to financial advisors in which, the 265 participants that responded were asked to provide their assessment of a series of 19 asset classes with 14 specific variables. The main findings revealed with the application of multiple regression analysis with perceived risk as the dependent variable revealed that 3 significant factors such as worry, volatility, and knowledge which explained 98% r-square of the experts' risk perception.

Finucane (2002):

He commented that the risk is of high level as a judgement was made by most of the individuals. It was concluded as substantial to the degree that the advisor would bother about the investments, that the investments had greater variance in market value over time, and how knowledgeable the advisor was regarding the investment alternative."

OBJECTIVES OF THE STUDY

1. To analyse the pharmaceutical companies, which are currently trading in NIFTY-50.
2. To determine the return of the selected pharma company's stocks.
3. To determine the risk of the selected pharma company's stocks.
4. To compare the selected firm's risk and return, and to analyse which is the best firm among these selected firms.

RESEARCH METHODOLOGY

The present study has been conducted to find out the solution for the problem "A study on risk and return on pharmaceutical companies in NIFTY-50".
Data is classified into primary and secondary data.

- Primary data:

Primary data refers to the information collected by a researcher from original sources, using methods like surveys, interviews, or experiments. the information is gathered from the main sources keeping research study in mind.

- Secondary data:

Secondary data refers to data that is collected by someone other than the researcher. Common sources of secondary data for the study include, organizational records and data that was collected for other research purposes. secondary data for this study is taken from previous journals, money control and NSE.

HYPOTHESIS FORMULATION

H0: Null hypothesis

In this hypothesis, it has no important relationship between the risk and return of the selected companies.

H1: Alternative hypothesis

In this hypothesis, it has important relationship between the risk and return of the selected companies.

STATISTICAL TOOLS

The tools used for analysis are

1. Mean
2. Standard Deviation
3. Range
4. Skewness
5. T-Test

SAMPLE DESIGN

The five companies selected for the study are from the pharmaceutical industry trading on NIFTY-50.

They are as follows:

1. Cadila Healthcare
2. Lupin
3. Cipla
4. Dr. Reddy's Laboratories
5. Sun Pharmaceutical Industries

MEAN

TABLE: 1 MEAN OF THE PHARMACEUTICALS COMPANIES

S.no	Name of the company	Mean
1	Cadila Healthcare	-2.38479
2	Lupin	-0.75668
3	Cipla	-0.24244
4	Dr. Reddy's Laboratories	0.804983
5	Sun Pharmaceutical Industries	0.251074

Mean = $\frac{\Sigma x}{n}$

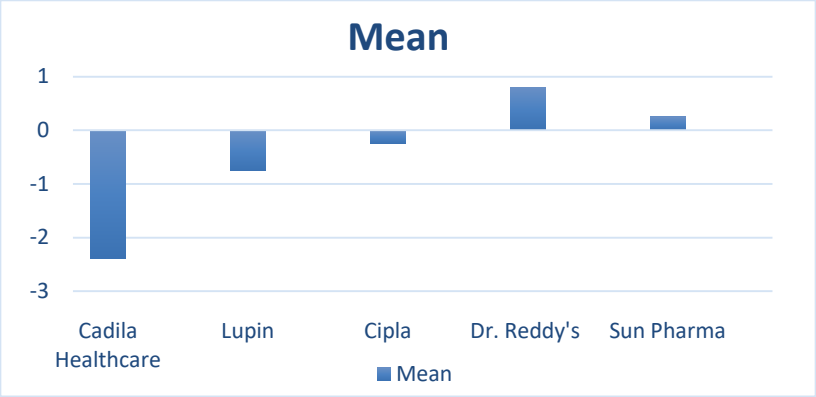

FIGURE:1 GRAPHICAL REPRESENTATION OF MEAN

In the above analysis, five selected pharma companies are compared. From the comparison we can analyse that the mean value of Dr. reddy's is highest i.e. 0.804983 and Cadila Healthcare has the least mean value i.e. -2.38479

STANDARD DEVIATION

TABLE:2 STANDARD DEVIATION OF THE PHARMACEUTICALS COMPANIES

S.no	Name of the company	Standard deviation
1	Cadila Healthcare	7.950398
2	Lupin	8.230788
3	Cipla	6.078377
4	Dr. Reddy's Laboratories	4.400525
5	Sun Pharmaceutical Industries	7.268328

Standard deviation = $\frac{1}{n}(R - \bar{R})^2$

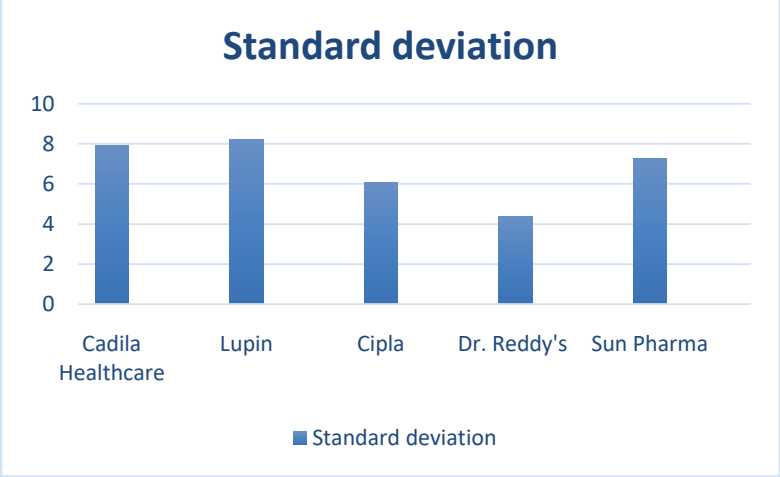

FIGURE:2 GRAPHICAL REPRESENTATION OF STANDARD DEVIATION

INTERPRETATION: In the above analysis, five selected pharma companies are compared. From the comparison we can analyse that the standard deviation value of lupin is highest i.e. 8.230788and Dr. reddy's has the least mean value i.e. 4.400525.

RANGE

TABLE: 3 RANGE OF THE PHARMACEUTICALS COMPANIES

S.no	Name of the company	Range
1	Cadila Healthcare	31.6546
2	Lupin	32.14919
3	Cipla	18.31901
4	Dr. Reddy's Laboratories	14.0572
5	Sun Pharmaceutical Industries	25.01287

RANGE = Maximum value- Minimum value

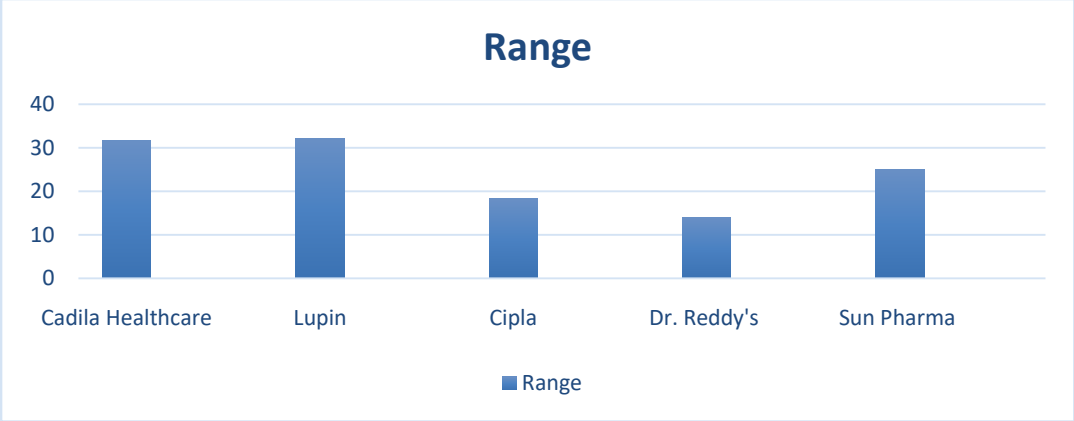

FIGURE: 3 GRAPHICAL REPRESENTATION OF RANGE

In the above analysis, five selected pharma companies are compared. From the comparison we can analyse that the range value of lupin industries is highest i.e. 32.14919 and Dr. reddy's has the least range value i.e. 14.0572.

SKEWNESS

TABLE: 4 SKEWNESS OF THE PHARMACEUTICALS COMPANIES

S.no	Name of the company	Skewness
1	Cadila Healthcare	0.204118
2	Lupin	-0.59392
3	Cipla	1.66187
4	Dr. Reddy's Laboratories	2.09452
5	Sun Pharmaceutical Industries	-0.66232

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$$\text{Skewness} = \frac{\text{Mean} - \text{Mode}}{\text{standard deviation}}$$

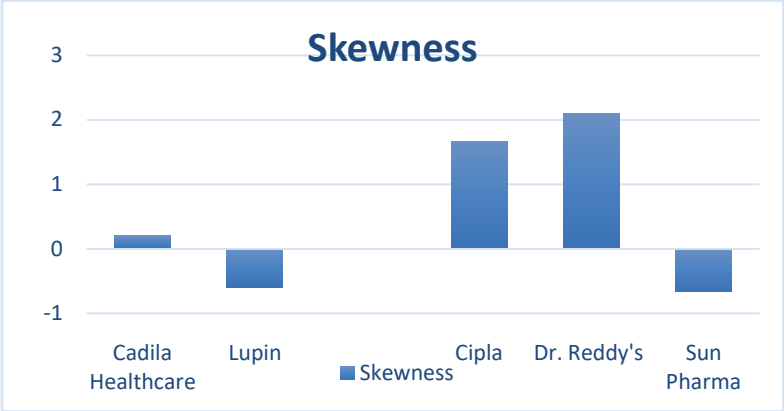

FIGURE: 4 GRAPHICAL REPRESENTATION OF SKEWNESS

In the above analysis, five selected pharma companies are compared. From the comparison we can analyse that the skewness of Dr. reddy'sis highest i.e. 2.09452and Sun Pharma has the leastvalue i.e. -0.66232.

TABLE NO: 5 T-TESTS RESULTS OF DR. REDDY WITH CADILA HEALTH

T-Test: Two-Sample test result for Dr. reddy with cadila health		
TABLE COLUMN SUB HEAD	**DR. REDDY**	**CADILA HEALTH**
Mean	0.8049825	-2.384790833
Variance	21.12504201	68.95508364
Observations	12	12
Pooled Variance	45.04006283	
Hypothesized Mean Difference	0	
df	22	
t Stat	1.164222409	
P(T<=t) one-tail	0.128402207	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.256804414	
t Critical two-tail	2.073873068	

From the above table, calculated value is (1.16422<1.71714). Hence the hypothesis H0 is accepted.

TABLE NO: 6 T-TESTS RESULTS OF DR. REDDY WITH LUPIN

T-Test: Two-Sample test result for Dr. reddy with Lupin		
TABLE COLUMN SUB HEAD	**DR. REDDY**	**LUPIN**
Mean	0.8049825	-0.756675
Variance	21.12504201	73.90459158
Observations	12	12
Pooled Variance	47.5148168	
Hypothesized Mean Difference	0	

df	22	
t Stat	0.554941095	
P(T<=t) one-tail	0.292266846	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.584533692	
t Critical two-tail	2.073873068	

From the above table, calculated value is (0.55494<1.71714). Hence the hypothesis H0 is accepted.

TABLE NO: 7 T-TESTS RESULTS OF DR. REDDY WITH CIPLA

T-Test: Two-Sample test result for Dr. reddy with Cipla		
TABLE COLUMN SUB HEAD	**DR. REDDY**	**CIPLA**
Mean	0.8049825	-0.24244425
Variance	21.12504201	40.30545098
Observations	12	12
Pooled Variance	30.7152465	
Hypothesized Mean Difference	0	
df	22	
t Stat	0.462937417	
P(T<=t) one-tail	0.323977933	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.647955866	
t Critical two-tail	2.073873068	

From the above table, calculated value is (0.46293<1.71714). Hence the hypothesis H0 is accepted.

TABLE NO: 8 T-TESTS RESULTS OF DR. REDDY WITH CIPLA

T-Test: Two-Sample test result for Dr. reddy with Sun pharma		
TABLE COLUMN SUB HEAD	**DR. REDDY**	**SUN PHARMA**
Mean	0.8049825	0.251074
Variance	21.12504201	57.63118336
Observations	12	12
Pooled Variance	39.37811268	
Hypothesized Mean Difference	0	
df	22	
t Stat	0.216215192	
P(T<=t) one-tail	0.415406123	
t Critical one-tail	1.717144374	
P(T<=t) two-tail	0.830812247	
t Critical two-tail	2.073873068	

From the above table, calculated value is (0.21621<1.71714). Hence the hypothesis H0 is accepted.

FINDINGS

1. During the period of study, the mean returns for the selected five pharmaceuticals companies shares are both positive and negative. values.
2. The standard deviation of the five pharmaceutical companies are adequate.
3. The range of the five pharmaceutical companies have all positive values.
4. Based on the returns calculated for the five pharmaceutical companies, Dr. reddy's returns are highest and Cadila health returns are lowest among the five companies.

SUGGESTIONS

1. When there is more risk, based on it the returns will also be high but might not be in all the situations such as economic crisis.
2. When the market price is sliding down steeply and has no protection against the risk on investment done. it is very important for an investor to analyse the market conditions and the fluctuations before investing in any sector or company.
3. Pharmaceutical companies are one of the best sectors for making investments for higher return and low risks.

CONCLUSION

Investors are mainly concerned about risk and return factors before investing their valuable money in any company. Through this study on selected pharmaceutical companies trading on NSE, we can analyse that the pharmaceuticals have moderate returns in the year 2019. From the study it is concluded that Dr. reddy's has the highest returns among the five selected pharma companies.

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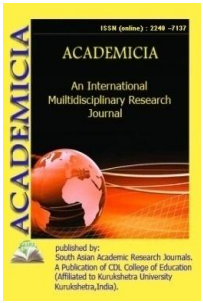

AN EMPIRICAL ANALYSIS ON NON-PERFORMING ASSETS OF PUBLIC AND PRIVATE SECTOR BANKS

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ABSTRACT

The banking sector plays a crucial role in the growth of every nation in the world. Nowadays Indian banking industry is in a very bad position,due to the continuous decrease in the profitability and liquidity of the banks. It became very important to analyzing the banking sector (Public sector and Private sector banks) whether it can be in statistical analysis or comparative analysis. This paper is an attempt to analyze how efficiently the banks are working in India. Nowadays Non- Performing Asset is a serious problem faced by the Indian banking in both Public sector banks and Private sector banks. NPA is also reflectedin the efficiency of the banks where the increase in the NPA will lead to decreases the profitability and liquidity of banks. Net worth and value of assets of banks also depend on the Non- Performing Assets. In this study, we will compare the Advances, Gross Advances, Gross NPAs, Gross NPA Percentage, Net NPAs, Net NPA Percentage, YoY growth of all aspects. The data is about all Public sector banks and Private sector banks are compared in terms of Column charts, Pie charts, Line charts.

KEYWORDS: *Banking Sector, Public Sector, Private Sector, Non Performing Assets*

INTRODUCTION

India is considered as the independent largest democracy and also emerging power in the economy due to that it needs huge support from the government and systematic banking structure which brings huge changes in different sectors of India. In the olden days, the main functions of the banking industry are accepting deposits from the public and lending whenever they need it. Even banks lend money to the person or organizationthat needs them which are deposits by the public. Now a day'sbasic functions of banks are accepting deposits and lending loans for priority sectors and non-priority sectors (agriculture, industry, personal loans, housing loans, etc.,). Due to the development of the nation,the Indian banking sector is lending the loans mostly due that

there is gradually increasing in the Non-Performing Assets in the banking sector. This NPA concept is restricted to Investments, Loans and advances. As long as the asset which does not show any unusual which only showsthe commercial risk is called a performing asset and when it fails to generate the expected income it becomes a "Non-Performing Asset".

KEYWORDS: NPA- Non-Performing Assets, GNPA- Gross Non-Performing Assets, NNPA- Non-Performing Assets.

Concept

Bank:- A bank is a financial institution licensed to receive deposits and make loans. Banks may also provide financial services such as wealth management, currency exchange, and safe deposit boxes, credit card, online banking.

Public sector bank:

Public sector banks are the financial institution where the highshares are owned by Government. There are 18 Public sector banks until the end of February 2020.

Private sector bank:

The private sector banks in India are the most percentage of equity and shares are owned byprivate shareholders. Private sector banks are divided into two categories: i) Old Private banks (Nationalized before 1969) ii) New Private banks (Got license since 1990). There are 22 private sector banks until the end of February 2020.

Non-Performing Asset:

Mainly Non-Performing Assets are considered when the given Loans and Advances not repaid within the 90days of maturity period. Assets that do not generate income are called Non-Performing Assets.

Classification of Non-Performing Assets are:

Banks should classify their NPA into these categories, viz-

i. Standard Assets
ii. Sub-standard Assets
iii. Doubtful Assets
iv. Loss Assets

Types of Non-Performing Assets:

i. Gross NPA
ii. Net NPA

Objective of the study:

- To study the trends of Non-Performing Assets of Private sector banks and Public sector banks.
- To compare the Non-Performing Assets of private and public sector banks.
- To compare theGross NPA & Net NPA, Ratios of Gross NPA and Net NPA.
- To highlight the trend of Gross NPA and Net NPA in both the Banks.

Need for study:

- The comparative analysis of NPA based on secondary data taken from Annual report of the public and private sector banks.
- This study will help to take control on NPAs.
- This study can be used for comparing the performance of the bank with another banks.
- This study improves the economical conditions and to increase the liquidity and profitability of banks.

Limitations

- This present data is not considered complete Indian banking sector. It only considered study on Public sector and Private sector banks.
- This figures that we are analyzing is not accurate. It is nearest value which is considered the nearest decimal value.
- This study is done on the present value of the statistics so it cannot consider in future development.
- This study is only done until the year 2019 and on secondary data only.

RESEARCH METHODOLOGY

Tools for data collection

The data considered is secondary data which is taken from the bank annual reports from its official websites, money control and RBI.

Tools for data analysis

Comparative analysis with the tool of Pie chart and Column chart.

Sample size

The study covered only one year of data of complete Public and Private banking industry.

REVIEW OF LITERATURE

Dr. Raj Kumar Mittal and Ms. Deeksha Suneja (2017) examined **"The Problem of Rising Non-performing Assets in Banking Sector in India"** and also made a **"comparative analysis of public and private sector banks"** using the secondary data collected from RBI publications journals, reports and websites of public and private sector banks in India which was analyzed using graphs and figures. The study revealed that the extent of NPA was more in public sector compared to private sector which can be recovered by government policies. The suggestions given was to consider ROI before lending loans and credit worthiness is to be considered.

Dr. Ujjwal M. Mishra and Jayant R Pawaskar (2017) made a **"A Study of Non-Performing Assets and its Impact on Banking Sector"** that analyzed sector-wise NPA, recovery channel and impact of NPA on Indian Banking Sector using secondary data which mainly constitute information from annual reports of banks. The data analysis tools used were ratio analysis, tables

and pie diagrams which revealed that banks need to maintain a proper credit appraisal system to reduce NPA.

Vivek Rajbahadur Singh(2016)titled **"A Study of Non-Performing Assets of Commercial Banks and it's recovery in India"** in his research study he stated that NPA has been always been a huge problem not only to the banks but also to the economy.The capital or money which is locked up in NPAs will have a direct impact on the profitability and liquidity position of the banks as the Indian banks are highly dependent on the income that is generated through interest earned through funds lent to the customers. His study also indicated that the extent of NPA is comparatively very high in public sector banks.

N. Rajput, A. P. Arora and B. Kaur (2012) in their research study titled **—"Management of Non-Performing Assets a Study of Indian Public Sector Banks"** provided an empirical approach to the analysis of profitability indicators on NPA. In their research study, they also emphasized the importance of inclusion of various methods to control the trend of NPA which proves to be an effective and efficient solution to the existing problem about the concept of NPA in the banking sector.

Hypothesis

H0: Comparatively Non-Performing Assets are more in the Public sector banks Compare to Private Sector Banks.

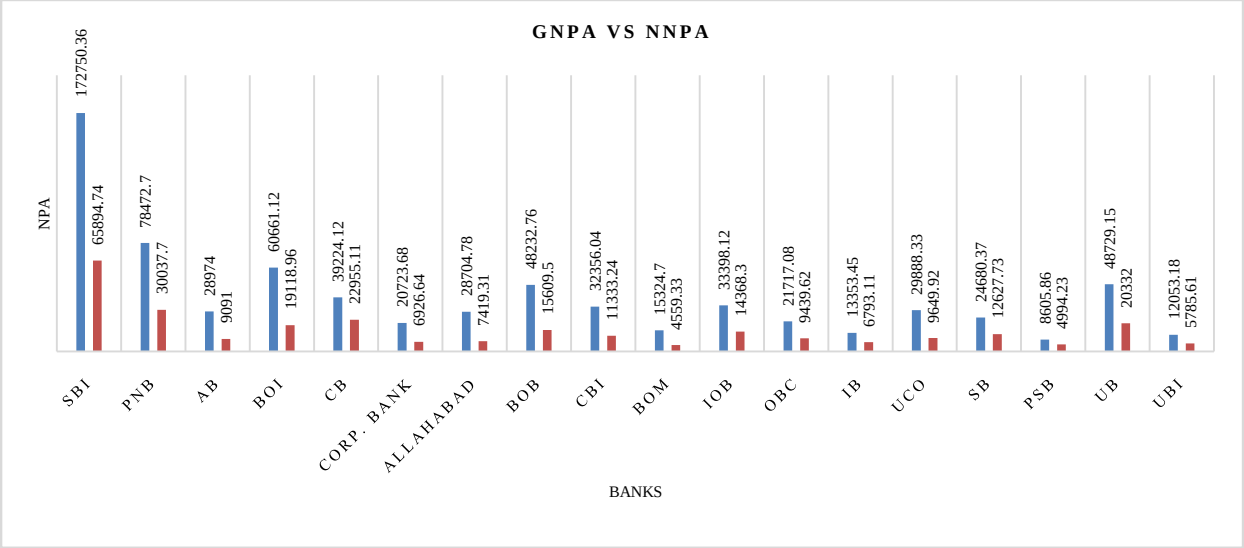
H1: Comparatively Non-Performing Assets are more in the Private sector banks Compare to Public Sector Banks.

Data Analysis and Interpretation

PUBLIC SECTOR BANKS	Advances	Gross Advance	GNPA	GNPA %	NNPA	NNPA %
State Bank of India	2185877	2293454	172750.4	7.53	65894.74	3.01
Punjab National Bank	458249	506194.3	78472.7	15.5	30037.7	6.56
Andhra Bank	158822.7	178690	28974	16.21	9091	5.73
Bank of India	341005.9	409154.2	60661.12	15.78	19118.96	5.59
Canara Bank	428114.8	444216	39224.12	8.83	22955.11	5.37
Corporation Bank	121251.2	155782.9	20723.68	15.35	6926.64	5.71
Allahabad Bank	142212.2	163552.3	28704.78	17.55	7419.31	5.22
Bank of Baroda	468818.7	501706.2	48232.76	9.61	15609.5	3.33
Central Bank of India	146525.4	167728.9	32356.04	19.29	11333.24	7.73
Bank of Maharashtra	82666.21	93466.7	15324.7	16.4	4559.33	5.52
Indian Overseas Bank	132597.6	151996.4	33398.12	21.97	14368.3	10.81
Oriental Bank of Commerce	159284.8	171549.5	21717.08	12.66	9439.62	5.93
Indian Bank	181261.9	187896.1	13353.45	7.11	6793.11	3.75
UCO Bank	99313.01	119573	29888.33	25	9649.92	9.72
Syndicate Bank	205044.4	217148.9	24680.37	11.37	12627.73	6.16
Punjab and Sind Bank	69175.53	72747.47	8605.86	11.83	4994.23	7.22

Union Bank of India	296932.2	325391.8	48729.15	14.98	20332	6.85
United Bank of India	66955.1	73123.41	12053.18	16.48	5785.61	8.67

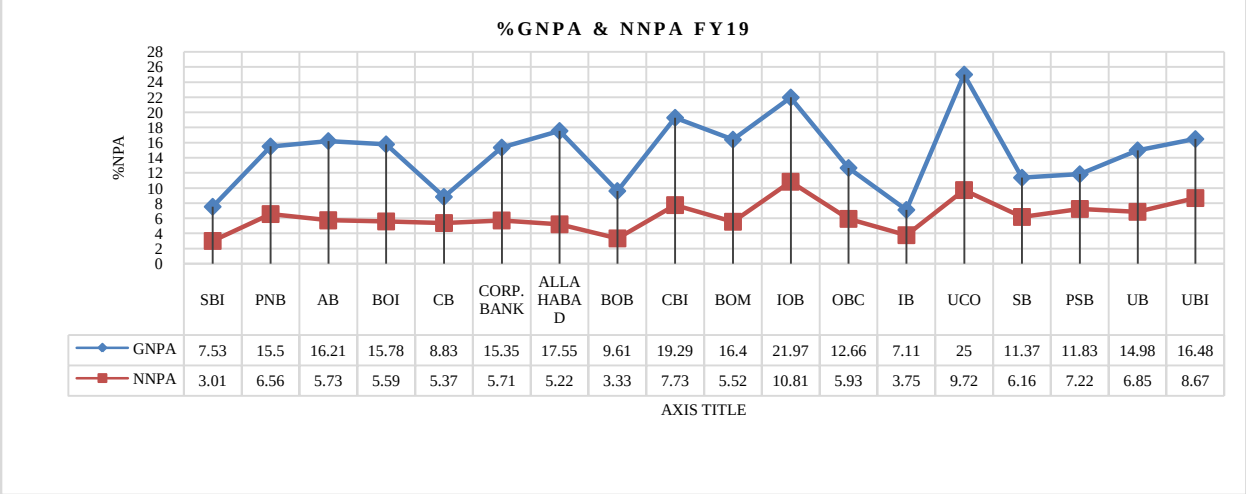
Chart: Public sector Banks GNPA Vs NNPA



Interpretation:

From above figure, we analyzed that the Banks are using the provisions to avoid increasing Gross NPA there is huge difference between the GNPA and NNPA.

Chart: GNPA and NNPA Ratio FY-19



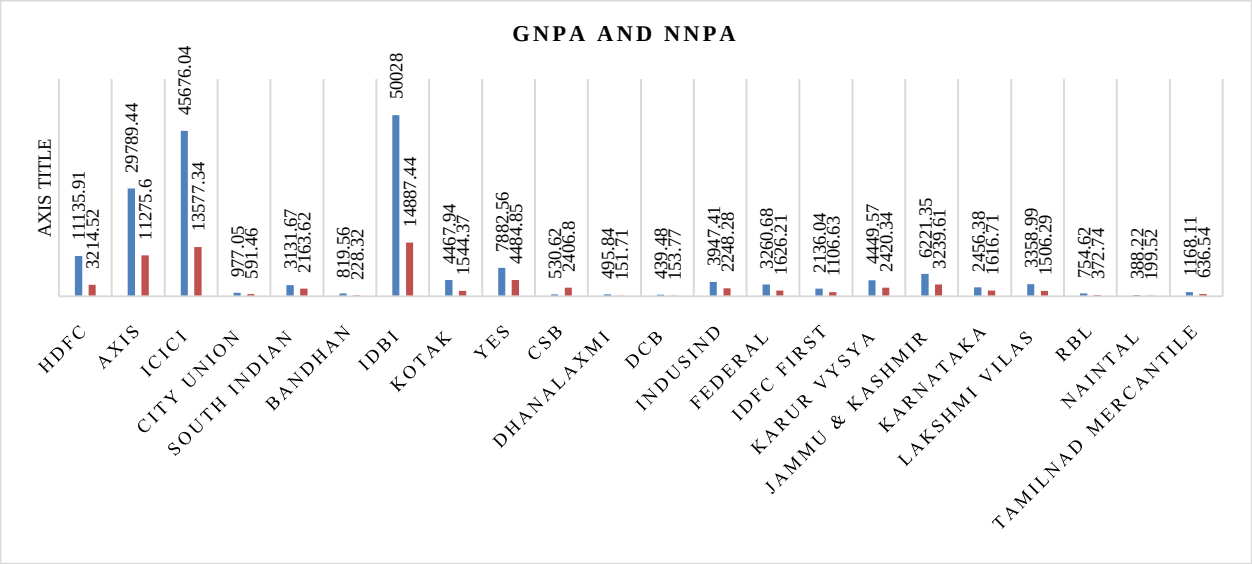
Interpretation:

From above chart we can analyze the Asset quality of the Banks with the help of both Gross and Net Non-Performing Assets ratios. We know that less the Gross and Net NPA ration greater the performance level of the Banks. So, govt. always introduces to decrease the NPA.

ii. Private Sector Banks

PRIVATE SECTOR BANK	Advances	Gross Advances	GNPA	GNPA %	NNPA	NNPA %
HDFC Bank	819401.2	827334.9	11135.91	1.36	3214.52	0.39
Axis Bank	494798	511096.4	29789.44	5.26	11275.6	2.06
ICICI Bank	586646.6	618985.2	45676.04	7.38	13577.34	2.06
City Union Bank	32673.34	33065.25	977.05	2.95	591.46	1.81
South Indian Bank	62693.74	63635.92	3131.67	4.92	2163.62	3.45
Bandhan Bank	39643.39	40234.63	819.56	2.04	228.32	0.58
IDBI Bank	146790.4	182097	50028	27.47	14887.44	10.11
Kotak Mahindra Bank	205694.8	208632.2	4467.94	2.14	1544.37	0.75
Yes Bank	241499.6	244897.3	7882.56	3.22	4484.85	1.86
CSB Bank	10615.24	10905.48	530.62	4.87	2406.8	2.27
Dhana Laxmi Bank	6289.28	6636	495.84	7.47	151.71	2.41
DCB Bank	23568	23858.69	439.48	1.84	153.77	0.65
IndusInd Bank	186393.5	188092.6	3947.41	2.1	2248.28	1.21
Federal Bank	110223	11829.27	3260.68	2.92	1626.21	1.48
IDFC first Bank	86302	88055.17	2136.04	2.43	1106.63	1.27
Karur Vysya Bank	48580.21	50615.66	4449.57	8.79	2420.34	4.98
Jammu & Kashmir Bank	66271.5	69372.2	6221.35	8.97	3239.61	4.89
Karnataka Bank	54828.2	55692.75	2456.38	4.41	1616.71	2.95
Lakshmi Vilas Bank	20103.26	21955.96	3358.99	15.3	1506.29	7.49

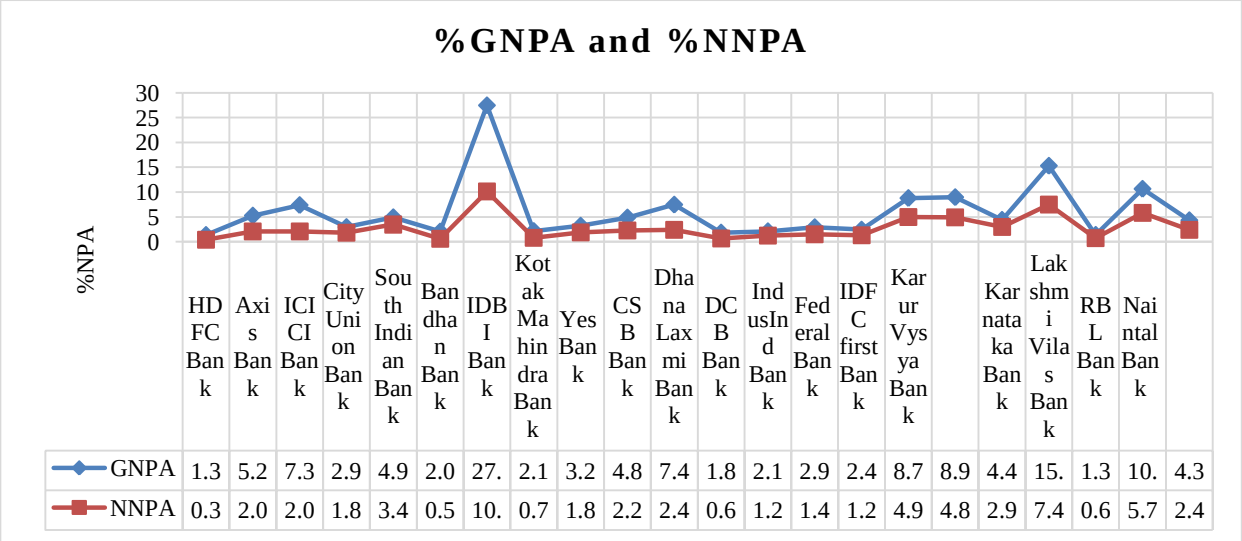
Chart: Comparing GNPA and NNPA



Interpretation:

In above graph we are comparing the GNPA and NNPA values to know the performance of the banks. Some of the banks are issuing a greater number of loans which not repaid within maturity are IDBI Bank, ICICI Bank, Axis Bank, HDFC Bank these banks need to reduce their Non-performing assets to increase the liquidity.

Chart: Comparing of GNPA and NNPA Ratios



	HDFC Bank	Axis Bank	ICICI Bank	City Union Bank	South Indian Bank	Bandhan Bank	IDBI Bank	Kotak Mahindra Bank	Yes Bank	CSB Bank	Dhana Laxmi Bank	DCB Bank	IndusInd Bank	Federal Bank	IDFC first Bank	Karur Vysya Bank		Karnataka Bank	Lakshmi Vilas Bank	RBL Bank	Nainital Bank	
GNPA	1.3	5.2	7.3	2.9	4.9	2.0	27.	2.1	3.2	4.8	7.4	1.8	2.1	2.9	2.4	8.7	8.9	4.4	15.	1.3	10.	4.3
NNPA	0.3	2.0	2.0	1.8	3.4	0.5	10.	0.7	1.8	2.2	2.4	0.6	1.2	1.4	1.2	4.9	4.8	2.9	7.4	0.6	5.7	2.4

Interpretation:

As we know that Non-Performance Asset should be always less. But some banks are facing issues of high NPA it effects the banks and economy of India. Here IDBI bank and Lakshmi Vilas bank facing the problem of high NPA.

Findings

- Public sector banks record the highest AverageGross NPA than the Private sector banks and the average varies by 20.91 percent.
- Public sector banks are recorded the highest sum of Gross NPA than the Private sector banks in the year 2019 and the sum is varied by 25.6%
- Some banks are facing the NPA problem. Some of them are functioning efficiently in both Public and Private sector banks.
- In Public sector banks State bank of India is facing the serious problem of NPA.
- Some of the Public sector banks are performing really well like State Bank of India, Indian Bank with less NPA ratios. Some of banks are in very bad situation like Indian Overseas Bank, UCO Bank.
- From Analysis we found that Gross NPA Ratio is very high for Indian Overseas bank with 21.97 and less for Indian Bank with 7.11. Net NPA Ratio is high for Indian Overseas Bank with 10.81 and less for State Bank of India with 3.01 in Public sector banks.
- From Analysis we found that Gross NPA Ratio is very high for IDBI bank with 27.47 and less for HDFC Bank with 1.36. Net NPA Ratio is high for IDBI Bank with 10.11 and less for HDFC Bank with 0.39 in Private sector banks.

Suggestions

- Properly analyzing the security attached for borrowing the loans.
- A systematic procedure of Analyzing, controlling, and reporting and recovering of NPAs must be followed.
- Bankers should provide insurance for the crop and provide income security for farmers rather giving loans to them.
- Bankers should analyze the Balance sheet and Profit and loss of the company which shows true picture of the organization by that we can decide whether to provide loan or not.

CONCLUSION

As we analyzed the condition of Non-Performing Assets in Both Public sector banks and Private sector banks. Some banks are performing really well in terms of recovering the loan amount from the loanees. Some banks are trying to reduce their Non-Performing Assets that are seen by comparing this year with the previous year. Some banks are not maintaining their liquidity due that banks are looking for merging with the banks which are performing good in the country. Government helping the manipulations that are done by the banks bye grouping or merging with the other banks.

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COMPARATIVE ANALYSIS OF SECTORAL INDICES WITH NSE INDEX

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ABSTRACT

The Indian capital Market has witnessed a tremendous growth. There was an explosion of investor interest during the nineties and an Equity Guilt emerged in statutory legislations has helped the capital market. Foreign Exchange regulation act is one such legislation in this direction. An important recent development has been the Entry of Foreign Institutional investors are participants to the primary and secondary markets for the securities. In the past several years, investments in developing countries have increased remarkably. Among the developing countries India has received considerable capital inflows in recent years. The liberalization policy of the government of India has now started fielding results and the country is poised for a big leap in the industrial and economic growth. The Economy of the country is mainly based on the development of the corporate sectors. A better understanding of the stock market trend will facilitate allocation of financial sources to the most profitable investment opportunity. The behavior of stock returns will enable the investors to make appropriate investment decisions. The fluctuations of stock returns are due to several economic and non-economic factors. The study is aimed at ascertaining the behavior of share returns. This project analyses the equity share fluctuations in India Selected Industry. It also measures the strength of the trend and the money involved in investing in the stocks. Simple moving average model is applied for selected companies which would give the investor a sell signal or buy signal.

KEYWORDS: *Nse Indices, Nifty 50, Comparative Analysis, Returns, Risk, Correlation.*

I. INTRODUCTION

The Indian capital Market has witnessed a tremendous growth. There was an explosion of investor interest during the nineties and an Equity Guilt emerged in statutory legislations has helped the capital market. Foreign Exchange regulation act is one such legislation in this direction. An important recent development has been the Entry of Foreign Institutional investors are participants to the primary and secondary markets for the securities. In the past several years, investments in developing countries have increased remarkably. Among the developing countries India has received considerable capital inflows in recent years. The liberalization policy of the government of India has now started fielding results and the country is poised for a big leap in the industrial and economic growth. The Economy of the country is mainly based on the development of the corporate sectors.

II. OBJECTIVES OF THE STUDY

- To study the analysis of price movement of shares and company performance with respect to Information Technology
- To study the various factors affecting the price movement of shares and company performance.
- To analyze the performance of select companies in IT industry
- The research report can be used by the organization to assist the investors in making investment decisions.

In order to accomplish the primary objectives the following secondary objectives are to be accomplished:

- To understand fundamental and technical analysis.

III. RESEARCH METHODOLOGY

Type of Study

The project will be exploratory in the initial stage and the knowledge thus gained will be used for further descriptive research.

Sample Size:

2 IT companies listed in the N Stock Exchange. HCL and INFOSYS

Sampling Design:

The companies for the project shall be selected using Convenience Random Sampling.

IV. LIMITATIONS:

The analysis is fully based on secondary data and hence the accuracy of data is a major concern.

Analysis helps the investor in making investment decisions but not every investment is entirely dependent on the analysis alone.

V. ANALYSIS OF STUDY

MEAN, SD,VARIEANCE INFOSYS

DISCRPTIVE ANALYSIS	
Mean	0.31
Standard Deviation	3.15
Sample Variance	9.95

MEAN, SD, VARIEANCE

DISCRPTIVE ANALYSIS	
Mean	0.31
Standard Deviation	3.15
Sample Variance	9.95

MEAN, SD, VARIEANCE

DISCRPTIVE ANALYSIS	
Mean	0.68
Standard Deviation	2.72
Sample Variance	7.39

MEAN, SD, VARIEANCE

DISCRPTIVE ANALYSIS	
Mean	-1.31
Standard Deviation	3.60
Sample Variance	12.96

MEAN, SD, VARIEANCE HCL

DESCRIPTIVE STUDY	
Mean	1.08
Standard Deviation	2.17
Sample Variance	4.70

MEAN, SD, VARIEANCE HCL

DESCRIPTIVE STUDY	
Mean	-2.11
Standard Deviation	5.89
Sample Variance	34.67

MEAN, SD, VARIEANCE HCL

DESCRIPTIVE STUDY	
Mean	-0.96
Standard Deviation	3.33
Sample Variance	11.11

MEAN, SD, VARIEANCE HCL

DESCRIPTIVE STUDY	
Mean	1.08
Standard Deviation	2.17
Sample Variance	4.70

FUNDAMENTAL ANALYSIS FOR HCL

Balance Sheet of HCL Technologies					
---------- in Rs. Cr. ----------					
	Mar '19	Jun '18	Jun '17	Jun '16	Jun '15
Sources Of Funds					
Total Share Capital	282.08	281.2	140	139.37	138.66
Equity Share Capital	282.08	281.2	140	139.37	138.66
Share Application Money	0.05	0.02	7.65	5.01	2.77
Reserves	21,226.78	19,124.53	15,605.61	10,093.36	6,465.15
Net worth	21,508.91	19,405.75	15,753.26	10,237.74	6,606.58
Secured Loans	28.16	27.22	27.45	532.66	698.87
Unsecured Loans	0.03	0	29.25	82.48	0
Total Debt	28.19	27.22	56.7	615.14	698.87
Total Liabilities	21,537.10	19,432.97	15,809.96	10,852.88	7,305.45
Application of Funds					
Gross Block	5,446.61	5,297.03	4,489.56	3,764.05	3,153.74
Less: Accum. Depreciation	2,372.86	2,232.80	2,040.99	1,809.87	1,540.03
Net Block	3,073.75	3,064.23	2,448.57	1,954.18	1,613.71
Capital Work in Progress	582.12	543.95	518.5	488.19	549.55
Investments	3,973.44	4,124.96	4,116.01	4,055.70	3,297.95
Inventories	128.56	83.65	15.54	81.84	99.99
Sundry Debtors	4,084.53	3,578.28	3,224.19	2,709.21	1,992.42
Cash and Bank Balance	8,662.96	8,829.41	7,911.08	2,808.83	1,041.20
Total Current Assets	12,876.05	12,491.34	11,150.81	5,599.88	3,133.61
Loans and Advances	6,095.02	4,690.58	3,580.61	3,861.38	2,282.21
Total CA, Loans & Advances	18,971.07	17,181.92	14,731.42	9,461.26	5,415.82
Current Liabilities	3,886.96	4,395.19	4,914.06	3,748.66	2,613.79
Provisions	1,176.32	1,086.90	1,090.48	1,357.79	957.79
Total CL & Provisions	5,063.28	5,482.09	6,004.54	5,106.45	3,571.58
Net Current Assets	13,907.79	11,699.83	8,726.88	4,354.81	1,844.24
Total Assets	21,537.10	19,432.97	15,809.96	10,852.88	7,305.45
Contingent Liabilities	975.34	1,222.24	3,519.61	4,186.27	3,644.36
Book Value (Rs)	152.5	138.02	224.94	146.84	95.25

Profit & Loss account of HCL Technologies					
	19-Mar	18-Jun	17-Jun	16-Jun	15-Jun
INCOME					
Revenue from Operations [Gross]	13,433.35	17,153.44	16,497.37	12,517.82	8,907.22
Revenue from Operations [Net]	13,433.35	17,153.44	16,497.37	12,517.82	8,907.22
Total Operating Revenues	13,433.35	17,153.44	16,497.37	12,517.82	8,907.22
Other Income	968.76	1,199.50	659.12	378.84	300.86
Total Revenue	14,402.11	18,352.94	17,156.49	12,896.66	9,208.08
EXPENSES					
Purchase of Stock-In Trade	162.66	363.76	345.37	251.66	180.51
Changes In Inventories Of FG, WIP And Stock-In Trade	-46.79	-66.23	64.75	7.83	25.85
Employee Benefit Expenses	4,854.22	5,924.62	5,123.95	4,628.61	3,923.06
Depreciation andAmortization Expenses	279.15	299.92	490.7	441.91	353.07
Other Expenses	3,339.44	4,071.69	3,652.41	3,038.99	2,267.58
Total Expenses	8,634.50	10,654.40	9,758.83	8,445.46	6,847.34
Profit/Loss Before Exceptional, Extra Ordinary Items and Tax	5,767.61	7,698.54	7,397.66	4,451.20	2,360.74
Exceptional Items	0	0	0	93.54	0
Profit/Loss Before Tax	5,767.61	7,698.54	7,397.66	4,544.74	2,360.74
Tax Expenses-Continued Operations					
Current Tax	1,240.33	1,610.45	1,555.74	924.55	416.2
Less: MAT Credit Entitlement	181.86	310.43	115.91	14.43	0
Deferred Tax	-24.54	52.57	-26.79	-70.1	-5.88
Total Tax Expenses	1,033.93	1,352.59	1,413.04	840.02	410.32
Profit/Loss After Tax and Before Extraordinary Items	4,733.68	6,345.95	5,984.62	3,704.72	1,950.42
Profit/Loss from Continuing Operations	4,733.68	6,345.95	5,984.62	3,704.72	1,950.42

Profit/Loss For The Period	4,733.68	6,345.95	5,984.62	3,704.72	1,950.42

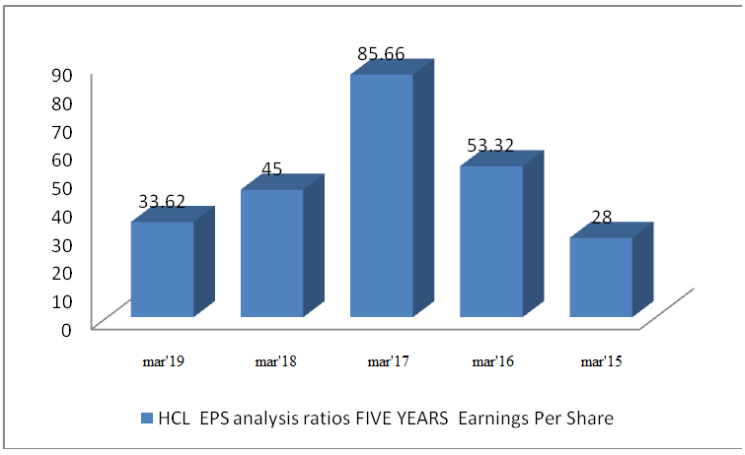
CURRENT RATIO: CA/CL

YEARS	CURRENT ASSETS	Current Liabilities	RATIO
Mar '19	12,876.05	3,886.96	3.31
Mar '18	12,491.34	4,395.19	2.84
Mar '17	11,150.81	4,914.06	2.27
Mar '16	5,599.88	3,748.66	1.49
Mar '15	3,133.61	2,613.79	1.20

INTERPRETATION:

The current ratio is used extensively in financial reporting. However, while easy to understand, itcan be misleading in both a positive and negative sense - i.e., a high current ratio is not necessarily good, and a low current ratio is not necessarily bad. Here the current ratio is satisfactory in the years 2019 & 2018,

HCL EPS analysis ratios FIVE YEARS	
YEARS	Earnings Per Share
Mar '19	33.62
Mar '18	45
Mar '17	85.66
Mar '16	53.32
Mar '15	28



INTERPRETATION:

- EPS Is Very Important For Estimating Yearly Income Positions For Any Company Performance.
- It reveals every year growth of the company.

- 20147was highest % of income generated by HCL (85.66)

FUNDAMENTAL ANALYSIS FOR INFOSYS

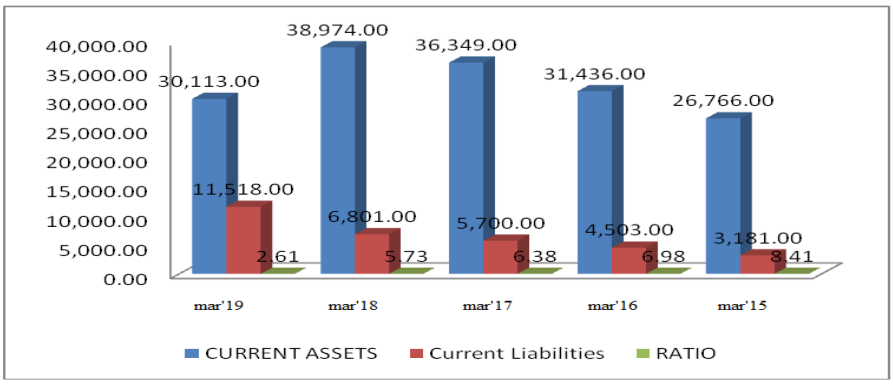
---------- in Rs. Cr. ----------BALANCE SHEET ----------					
	Mar '19	Mar '18	Mar '17	Mar '16	Mar '15
Sources Of Funds					
Total Share Capital	1,148.00	1,148.00	574	286	287
Equity Share Capital	1,148.00	1,148.00	574	286	287
Reserves	66,869.00	56,009.00	47,494.00	41,806.00	35,772.00
Net worth	68,017.00	57,157.00	48,068.00	42,092.00	36,059.00
Total Liabilities	68,017.00	57,157.00	48,068.00	42,092.00	36,059.00
Application Of Funds					
Gross Block	16,210.00	14,709.00	12,827.00	10,374.00	8,029.00
Less: Accum. Depreciation	7,605.00	6,461.00	5,480.00	4,642.00	3,576.00
Net Block	8,605.00	8,248.00	7,347.00	5,732.00	4,453.00
Capital Work in Progress	1,247.00	934	769	954	1,135.00
Investments	24,977.00	11,113.00	6,857.00	6,717.00	4,344.00
Sundry Debtors	10,960.00	9,798.00	8,627.00	7,336.00	6,365.00
Cash and Bank Balance	19,153.00	29,176.00	27,722.00	24,100.00	20,401.00
Total Current Assets	30,113.00	38,974.00	36,349.00	31,436.00	26,766.00
Loans and Advances	14,943.00	13,498.00	10,491.00	7,873.00	6,330.00
Total CA, Loans & Advances	45,056.00	52,472.00	46,840.00	39,309.00	33,096.00
Current Liabilities	11,518.00	6,801.00	5,700.00	4,503.00	3,181.00
Provisions	350	8,809.00	8,045.00	6,117.00	3,788.00
Total CL & Provisions	11,868.00	15,610.00	13,745.00	10,620.00	6,969.00
Net Current Assets	33,188.00	36,862.00	33,095.00	28,689.00	26,127.00
Total Assets	68,017.00	57,157.00	48,068.00	42,092.00	36,059.00
Contingent Liabilities	3,033.00	1,512.00	1,461.00	1,020.00	1,693.00
Book Value (Rs)	296.12	248.84	418.54	736.64	627.95

PROFIT & LOSS ACCOUNT OF INFOSYS					
---------- in Rs. Cr. ----------					
	19-Mar	18-Mar	17-Mar	16-Mar	15-Mar
INCOME					
Revenue From Operations [Gross]	59,289.00	53,983.00	47,300.00	44,341.00	36,765.00
Revenue From Operations [Net]	59,289.00	53,983.00	47,300.00	44,341.00	36,765.00

Total Operating Revenues	59,289.00	53,983.00	47,300.00	44,341.00	36,765.00
Other Income	3,062.00	3,009.00	3,337.00	2,576.00	2,215.00
Total Revenue	62,351.00	56,992.00	50,637.00	46,917.00	38,980.00
EXPENSES					
Operating and Direct Expenses	6,044.00	6,029.00	4,284.00	3,990.00	2,969.00
Employee Benefit Expenses	30,944.00	28,206.00	25,115.00	24,350.00	19,932.00
Depreciation andAmortization Expenses	1,331.00	1,115.00	913	1,101.00	956
Other Expenses	5,094.00	3,985.00	3,939.00	3,474.00	2,849.00
Total Expenses	43,413.00	39,335.00	34,251.00	32,915.00	26,706.00
Profit/Loss Before Exceptional, Extraordinary Items and Tax	18,938.00	17,657.00	16,386.00	14,002.00	12,274.00
Exceptional Items	0	3,036.00	412	0	83
Profit/Loss Before Tax	18,938.00	20,693.00	16,798.00	14,002.00	12,357.00
Tax Expenses-Continued Operations					
Current Tax	5,068.00	4,898.00	4,537.00	4,063.00	3,361.00
Deferred Tax	52	9	97	-255	-120
Total Tax Expenses	5,120.00	4,907.00	4,634.00	3,808.00	3,241.00
Profit/Loss After Tax and Before Extraordinary Items	13,818.00	15,786.00	12,164.00	10,194.00	9,116.00
Profit/Loss from Continuing Operations	13,818.00	15,786.00	12,164.00	10,194.00	9,116.00
Profit/Loss for The Period	13,818.00	15,786.00	12,164.00	10,194.00	9,116.00

CURRENT RATIO: CA/CL

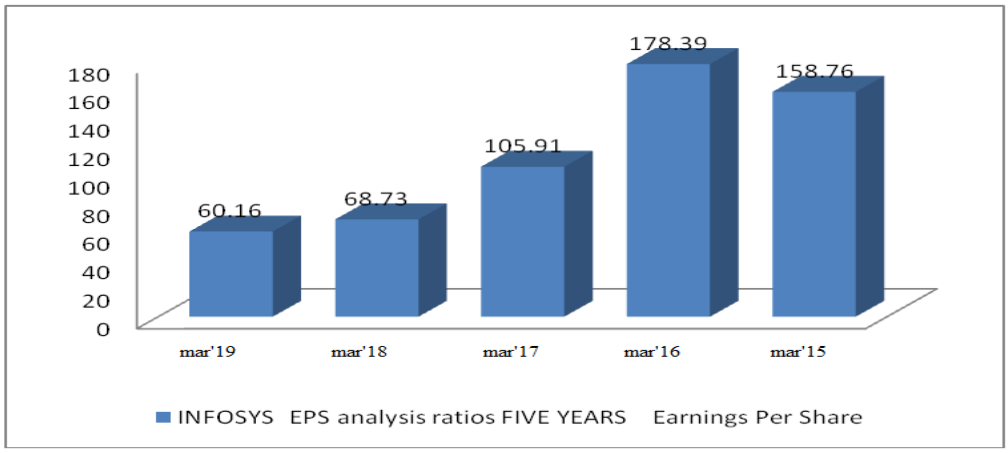
YEARS	CURRENT ASSETS	Current Liabilities	RATIO
Mar '19	30,113.00	11,518.00	2.61
Mar '18	38,974.00	6,801.00	5.73
Mar '17	36,349.00	5,700.00	6.38
Mar '16	31,436.00	4,503.00	6.98
Mar '15	26,766.00	3,181.00	8.41



INTERPRETATION:

The current ratio is used extensively in financial reporting. However, while easy to understand, it can be misleading in both a positive and negative sense - i.e., a high current ratio is not necessarily good, and a low current ratio is not necessarily bad. Here the current ratio is satisfactory in the years 2017 & 2016

INFOSYS EPS analysis ratios FIVE YEARS	
YEARS	Earnings Per Share
Mar '19	60.16
Mar '18	68.73
Mar '17	105.91
Mar '16	178.39
Mar '15	158.76



INTERPRETATION:

- EPS Is Very Important For Estimating Yearly Income Positions For Any Company Performance.
- It reveals every year growth of the company.
- 2013 was highest % of income generated by INFOSYS (178.39)

VI. CONCLUSION:

INDIAN IT INDUSTRY: The industry has recovered from the global slowdown and started to make good returns and the industry is expected to grow in the future years. So investment in the IT companies is good for long term.

- From the fundamental analysis we can conclude that the company is strong in its fundamentals and has a good future value.
- From the technical analysis we can conclude that the prices are in uptrend even though the MACD shows a bearish signal line crossover because the MACD is above zero. So the prices are expected to rise in the near future.
- From the fundamental analysis we can conclude that the company is strong in its fundamentals and has a good future value.
- From the technical analysis we can conclude that the prices are in uptrend and since EMAs are moving closer and the stock is highly volatile. The ROC is negative which shows a bearish signal. But we can see that the MACD is above its signal line. So there is strong upward momentum, but the prices may fall very soon but will rise again.
- From the fundamental analysis we can conclude that the company is strong in fundamentals and prices are expected to rise in the future.
- From the technical analysis we can see that the EMAs are rising. We can also notice that the MACD, ROC and RSI also show bullish momentum. So, we can conclude that the prices will rise in the short term.

VII. FINDINGS

High current ratio is not necessarily good, and a low current ratio is not necessarily bad. Here the current ratio is satisfactory in the years 2017 & 2018,

- 2019 was highest % of income generated by HCL (85.66)
- EPS Is Very Important For Estimating Yearly Income Positions For Any Company Performance.
- It reveals every year growth of the company.
- It reveals every year growth of the company.
- 2018 was highest % of income generated by INFOSYS (179.39)

I found that **Infosys** The current ratio is used extensively in financial reporting. However, while easy to understand, it can be misleading in both a positive and negative sense - i.e., a high current ratio is not necessarily good, and a low current ratio is not necessarily bad. Here the current ratio is satisfactory in the years 2018 & 201

VIII. SUGGESTIONS

→ Fundamental analysis is one of the most often overlooked techniques of stock picking.

→ Many investors eschew fundamental analysis in favor of the flashier technical analysis made so famous by chartists over the years. Stock market charts are now animated wonders, so who doesn't love looking at them, especially since it's a lot easier than actually pouring through SEC statements adding up the numbers.

- → But fundamental analysis never really completely goes out of style, because many of history's greatest investors, such as the greatest of all, Warren Buffett have practiced fundamental analysis as strictly as a devout person practices religion.
- → The reason great investors believe in fundamental analysis is because it's a great model of how things work.
- → Companies report on financial operations that are best explained by numbers. Analyzing the numbers rigorously, and placing personalities aside, gives a stock analyst the chance to really get a feel for how the company is doing. Why listen to hyped up PR statements when you can clearly see what a company really did, as reported by them in their statement of operations.
- → Apart from the analysis done, stocks can be analyzed on the basis of various other indicators of technical analysis or on the basis of the fundamental analysis.
- → The index considered here is not alone the best investment avenue available. Even other stock of other indexes may yield good returns.
- → The technical indicators can be utilized even for the study of Derivatives market and even for the commodities market etc.
- → The opportunity cost of capital and the returns from investing elsewhere can be calculated and compared with the investment made in stocks.
- → Apart from the factors explained in the project which would affect the stock market, many other factors also may exist.

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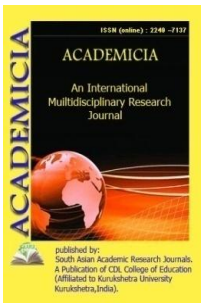

PORTFOLIO MANAGEMENT OF DIFFERENT SECTORS

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ABSTRACT

Portfolio management may be a process encompassing many activities of investment is assets and securities. It is a dynamic and versatile concept and involves regular and systematic analysis, judgment, and action. It is a combination of securities held together will provide a beneficial result if they grouped during a manner to secure higher returns after taking into consideration the danger elements. Portfolio management is an art of choosing right investment policy for the individuals in terms of minimum risk with maximum returns. The main objective is to study the investment decision process. The need of portfolio management is presents the best investment plan to the individuals as per their incomes, budget, age and ability to undertake risks. The Sample size is calculated by taking 5 years of data from 5 different companies. Statistical tools used in this are mean, standard deviation, covariance and correlation coefficient.

KEYWORDS: *Portfolio Management, Expected Return On Portfolio, Portfolio Weights, Analysis Of Risk And Return.*

INTRODUCTION

PORTFOLIO MANAGEMENT

A portfolio is a collection of assets. The assets could also be physical or financial like Shares, Bonds, Debentures, preferred stock etc. The individual investor or a fund manager wouldn't wish to put all his money within the shares of one company that might amount to great risk. He would therefore, follow the age-old maxim that one shouldn't put all the eggs into one basket. By doing so, we are able to do objective to maximize portfolio return and at an equivalent time minimizing the portfolio risk by diversification Portfolio management is that the management of varied financial assets which comprise the portfolio.

1. Portfolio management is a decision support system that is designed with a view to meet the multi-faced needs of investors.

2. According to Exchange Board of India and Securities of Portfolio Manager is defined as "Portfolio means total holdings of securities belonging to any person"

NEED OF THESTUDY

Portfolio management has emerged as a not equally academic discipline in India. Portfolio theory that deals with the rational investment decision-making process has now become an integral a part of financial literature. Investing in securities such as shares, debentures & bonds s profitable well as exciting. It is indeed rewarding but active participate in a great deal of risk & need artistic skill. Investing in financial securities is now considered to be one of the most risky avenues of investment. It is rare to seek out investors investing their entire savings during a single security. Instead they have a tendency to take a position during a group of securities. Such group of securities s called as PORTFOLIO. Creation of portfolio helps to scale back risk without sacrificing returns. Portfolio management deals with the analysis of individual securities also like the idea & practice of optimally combining securities into portfolios.

OBJECTVESOFTHESTUDY

- To Study the investment pattern and its related risk & returns.
- To see whether the portfolio risk is less than individual risk on whose basis the portfolios are constituted.
- To understand, analyse and select the best portfolio.

HYPOTHESIS FORMULATION

H0: There is no significant relation between portfolio risk and portfolio return

H1: There is a significant relation between portfolio risk and portfolio return

Sample size:

We aredealingandstudyingthe securitiesof

- TataMotors(Auto mobiles)
- Ultratechcement(Cement company)
- SunPharma(pharmaceutical)
- Wipro(IT company)
- ICICI bank.(Bank)

Research methodology is the procedure which we used to collect the information and data from making decisions. It may include past and present information**.**

DATA COLLECTION

Primary source

- Information gathered from interacting with employees in the organization.

Secondary source

- Daily prices of scripts from newspapers.

- And the data from the BSE and other magazines

TOOLS&TECHNIQUES:

- Statistical tools which are used for the study are return, average return, standard deviation, covariance, portfolio risk &portfolio return, T-Test.

PORTFOLIO ANALYSIS

- Standard Deviation =$\sqrt{\text{variance}}$
- Variance = $\frac{1}{n}$ (R-$\bar{R}$)^2
- Co-variance (COV ab) =$\frac{1}{n}$ (RA-$\overline{RA}$) (RB-$\overline{RB}$)
- Correlation Coefficient =$\frac{\text{COV ab}}{\sigma a * \sigma b}$
- weights of portfolio:
- Wa=$\frac{\sigma b[\sigma b-(\text{nab} * \sigma a)]}{\sigma a^2+\sigma b^2-2\text{nab} * \sigma a * \sigma b}$
- Wb=1-Wa

Portfolio risk:

- $R_p = \sqrt{(\sigma a * \text{Wa})2 + (\sigma b * \text{Wb})2 + 2 * \sigma a * \sigma b * \text{Wa} * \text{Wb} * \text{nab}}$
- Portfolio return: Rp=(RA*WA) +(RB*WB)

REVIEW OF LITERATURE

Catherine P. Killen, Robert A. Hunt, Elko J. Kleinschmidt 2008 project portfolio management for product innovation Journal of quality of reliable management , Vol.35, No.3 pp.327-342.The purpose of this paper is to form a benchmark and determine best practices for Project Portfolio Management (PPM) for each tangible product-based and repair product-based development project portfolios.

– A questionnaire was developed to collect data to copy the PPM methods used PPM performance, PPM challenges, and resulting new product success measures in 60 Australian organizations during a diverse range of service and manufacturing industries.

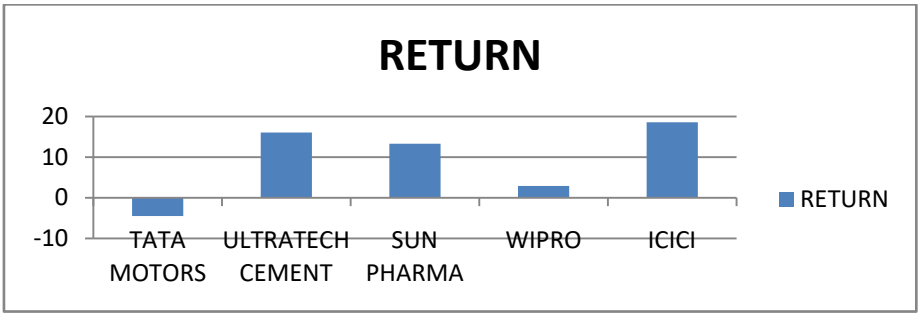
LourenceWormald and Elmarievandermerwe (2014) It deals with the connection between conventional shrinkage approaches to the development of the covariance matrix for portfolio optimization. Here, we use Quadratic constraints on each part of the total risk (variance) measure, such as the systematic or specific risk associated with risk factor. For examine the practical value of this approach, using a well documented set of alphas, we set out the result of 13-year simulation exercise over the Russell 3000 Growth U.S. equity universe. The results shows the effect of constraints on decline on covariance matrix related with span a part of alpha will end in different portfolio allocations.

DATA ANALYSIS

TABLE 1: CALCULATION OF AVERAGE RETURNS:

COMPANY	RETURN
TATA MOTORS	-4.4589
ULTRATECH CEMENT	16.077
SUN PHARMA	13.3256

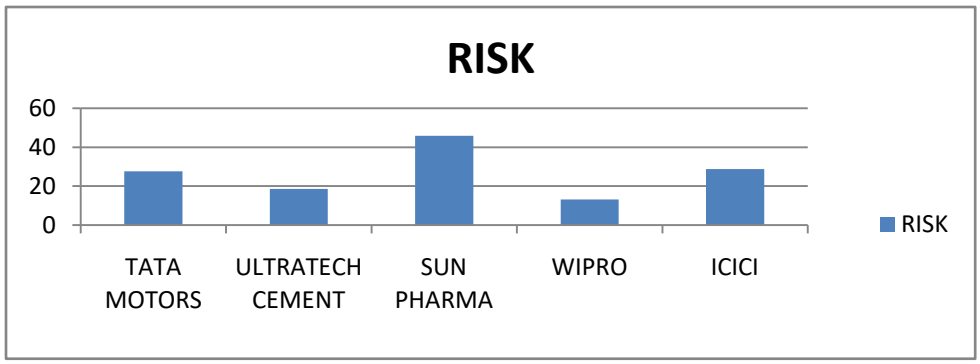
WIPRO	2.9058
ICICI	18.5509



INTERPRETATION: From the above graph, the returns of ICICI Bank are having higher i.e., (18.55) than all the selected companies and the returns Of TATA Motors are having lesser i.e., (-4.45) than all the selected companies

TABLE 2: CALCULATION OF STANDARD DEVIATION:

COMPANY	RISK
TATA MOTORS	27.64
ULTRATECH CEMENT	18.58
SUN PHARMA	45.89
WIPRO	13.23
ICICI	28.70

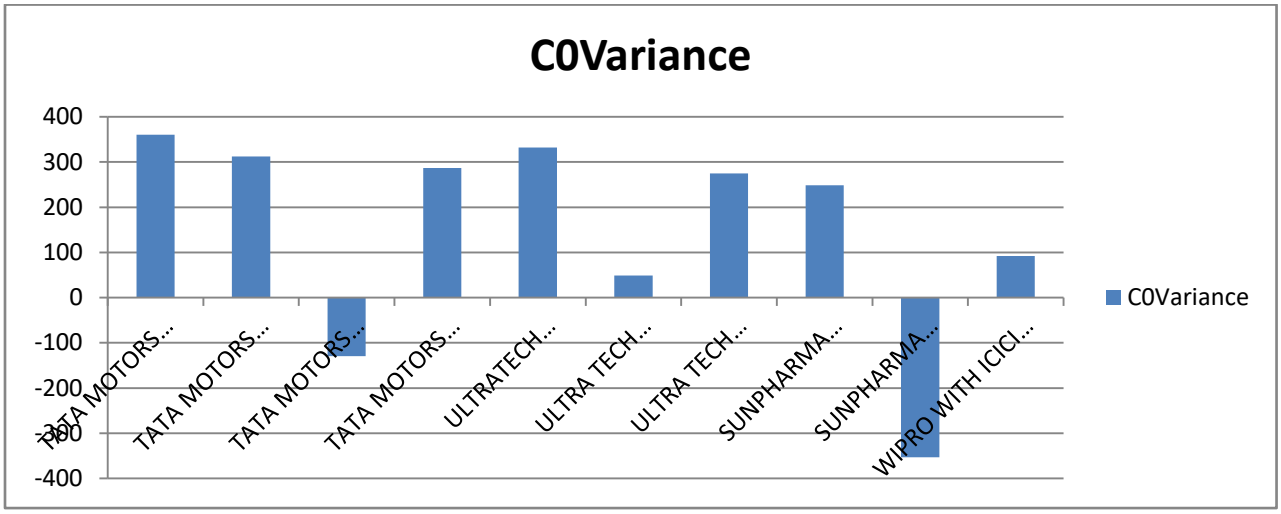


INTERPRETATION: From the above graph, the risk of SUN PHARMA are having high i.e., (45.89) when compared to other selected companies and WIPRO is having low i.e., (13.23) when compared with the other selected companies.

Covariance

COMPANIES	C0Variance
TATA MOTORS COMPANY WITH ULTRA TECH CEMENT	360.3
TATA MOTORS COMPANY WITH SUNPHARMA	312.37
TATA MOTORS COMPANY WITH WIPRO	-129.62
TATA MOTORS WITH ICICI BANK	286.9

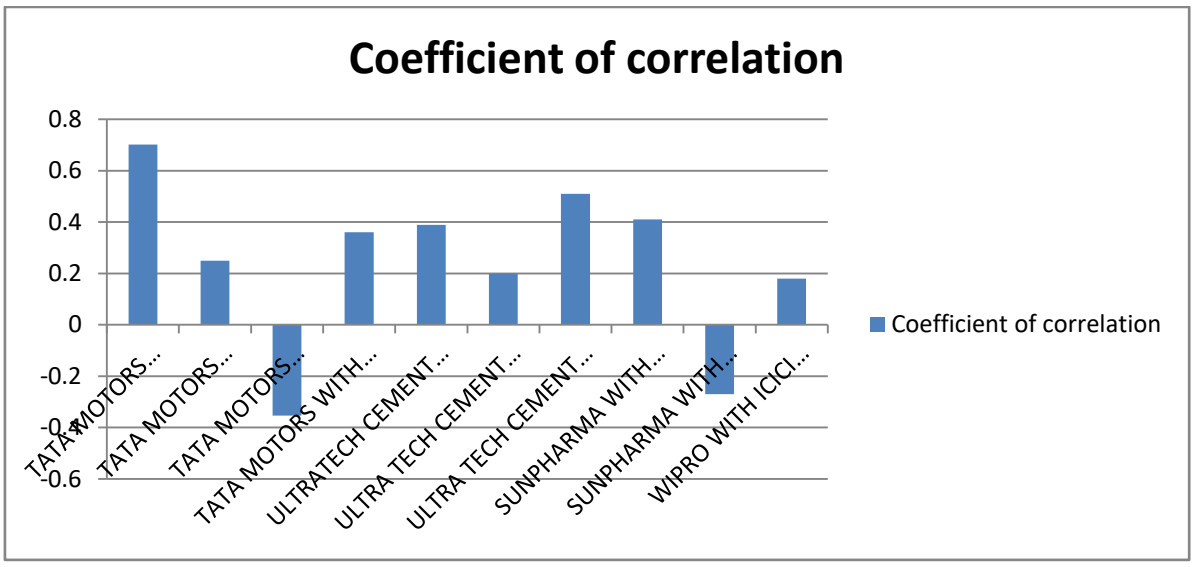
ULTRATECH CEMENT WITH SUN PHARMA	332.27
ULTRA TECH CEMENT WTH WIPRO	48.55
ULTRA TECH CEMENT WITH ICICI BANK	274.48
SUNPHARMA WITH WIPRO	248.24
SUNPHARMA WITH ICICI BANK	-353
WIPRO WITH ICICI BANK	92.13



INTERPRETATION: From the above graphs it is shown that covariance is greater for TATA MOTORS COMPANY WITH ULTRA TECH CEMENT i.e., (360.3) and lesser for SUNPHARMA WITH ICICI BANKI.e., (-353) when compare to other selected companies.

COEFFICIENT OF CORRELATION:

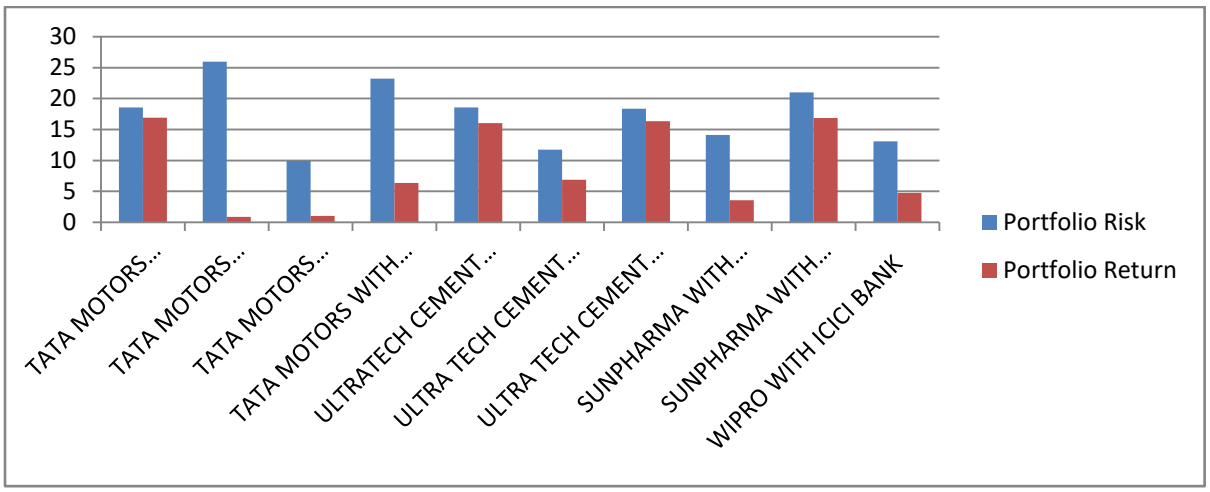
COMPANIES	Coefficient of correlation
TATA MOTORS COMPANY WITH ULTRA TECH CEMENT	0.701
TATA MOTORS COMPANY WITH SUNPHARMA	0.25
TATA MOTORS COMPANY WITH WIPRO	-0.353
TATA MOTORS WITH ICICI BANK	0.36
ULTRATECH CEMENT WITH SUN PHARMA	0.389
ULTRA TECH CEMENT WTH WIPRO	0.2
ULTRA TECH CEMENT WITH ICICI BANK	0.51
SUNPHARMA WITH WIPRO	0.41
SUNPHARMA WITH ICICI BANK	-0.27
WIPRO WITH ICICI BANK	0.18



INTERPRETATION: From the above graph it is shown that correlation of coefficient is greater forTATA MOTORS COMPANY WITH ULTRA TECH CEMENTi.e., (0.701) and lesser forTATA MOTORS COMPANY WITH WIPROi.e., (-0.353) when compare to other selected companies.

PORTFOLIO RISK AND PORTFOLIO RETURN:

COMPANIES	Portfolio Risk	Portfolio Return
TATA MOTORS COMPANY WITH ULTRA TECH CEMENT	18.56	16.89
TATA MOTORS COMPANY WITH SUNPHARMA	25.97	0.902
TATA MOTORS COMPANY WITH WIPRO	9.91	1.06
TATA MOTORS WITH ICICI BANK	23.21	6.35
ULTRATECH CEMENT WITH SUN PHARMA	18.57	16.05
ULTRA TECH CEMENT WTH WIPRO	11.72	6.86
ULTRA TECH CEMENT WITH ICICI BANK	18.35	16.37
SUNPHARMA WITH WIPRO	14.1	3.55
SUNPHARMA WITH ICICI BANK	21.02	16.88
WIPRO WITH ICICI BANK	13.1	4.78



INTERPRETATION:

From the above graph it is shown that the portfolio risk of TATA MOTORS COMPANY WITH SUNPHARMA has high portfolio risk i.e., (25.97) and their portfolio return 0.902. TATA MOTORS COMPANY WITH WIPRO has the lowest portfolio risk i.e., (9.91) and their portfolio return is 1.06 when compared to other selected companies.

10. Hypothesis test:

t-Test: Paired Two Sample for Means		
	portfolio risk	portfolio return
Mean	17.451	8.9692
Variance	26.84877	46.23229
Observations	10	10
Pearson Correlation	0.23938	
Hypothesized Mean Difference	0	
Df	9	
t Stat	3.577403	
P(T<=t) one-tail	0.002977	
t Critical one-tail	1.833113	
P(T<=t) two-tail	0.005955	
t Critical two-tail	2.262157	

Here the calculated value is more than the table value, so we reject H_0 and accept H_1. Which means there is a significance relation between portfolio risk and portfolio return.

FINDINGS

1. Individual returns on the selected stocks including TATA MOTORS, ULTRATECH CEMENT, SUN PHARMA, WIPRO, ICICI BANK are -4.46%, 16.08%, 13.32%, 2.90%, 18.55% respectively.
2. Individual risks on the selected stocks including are TATA MOTORS, ULTRATECH CEMENT, SUN PHARMA, WIPRO, ICICI BANK27.64, 18.58, 45.89, 13.39, 28.70 respectively.

3. Covariance of TATA MOTORS WITH ULTRATECH CEMENT i.e., (360.30) are very high while SUN PHARMA WITH WIPROi.e., (-353.03) are very low when compared to other companies.
4. Coefficient of correlation of TATA MOTORS WITH ULTRATECH CEMENTi.e., (0.701) are very high while coefficient of correlation of TATA MOTORS WITH SUN PHARMA i.e., (-0.353) are very low when compared to other companies.
5. Portfolios Returns ofTATA MOTORS WITH ULTRATECH CEMENT (16.89) are very high while TATA MOTORS WITH SUN PHARMA(-3.15) are very low compared to other companies.
6. Portfolios Risk of TATA MOTORS WITH ULTRATECH CEMENT(25.97) are very high while Portfolio Risks of TATA OTORS WITH SUN PHARMA (9.91) are very low compared to other companies.

SUGGESTIONS

1. TATA MOTORS is having negative returns it should increase its value in the market to get positive returns.

2. It is suggested that the investors who require minimum return with low risk can invest in TATA MOTORS AND SUN PHARMA.

3. It is suggested that the investors who require high risk with high return should invest in SUN PHARMA.

CONCLUSION

Before we invest in shares you should look at the type of shares you want to buy and the way in which you want to deal on the stock market. The different ways for investing in shares are; An investor should invest in a company giving him the highest average return. Investment should be in a company for which standard deviation is high as the return on investment will also be high. Even the risk involved is high.Wipro standard deviation is less when compared to other companies indicating the risk and return involved will also be low.Risk & Return goes hand in hand and they are directly proportional to each other. Invest your capital in a different number of companies (a portfolio of shares). Invest indirectly and spread your risk through collectively investments

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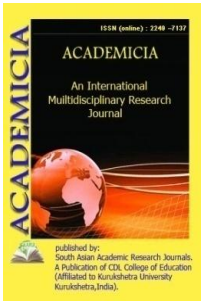

PORTFOLIO MANAGEMET WITH REFERENCE TO AUTOMOBILE INDUSTRY

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ABSTRACT

Portfolio management is often defined and used in other ways. The basic meaning of portfolio management is "combination of various things that remain intact". The purpose of selecting this problem is to understand how to effectively eliminate the management of the incoming portfolio and at the same time know the investors to liquidate the securities that they must insert in their portfolio. This topic deals with how a particular portfolio should be chosen with respect to the individual profitability of all the securities and, therefore, arrive at the overall profitability of the portfolio. This together provides an adequate entry position in the portfolio based on totally different values rather than a single value. Therefore, this article has been prepared to provide tips for effective portfolio management through the use of returns, standard deviation, portfolio returns and portfolio weights.

KEYWORDS: *Portfolio Management, Portfolio Weights, Analysis Of Risk And Return.*

1. INTRODUCTION:

A portfolio can be a variety of investments controlled by an establishment or a non-public entity. In the associate in the nursing investment portfolio, a financial organization can generally perform its own investment analysis, while a non-public individual can take advantage of the services of a monetary adviser or financial organization that offers portfolio management services. By owning many companies, the associated types of risk will be reduced (at specific risk). Assets within the portfolio can incorporate stocks, bonds, options, warrants, gold

certificates, properties, futures contracts, production facilities or the opposite element that is expected to maintain its price. According to the Securities and Exchange Board of India, the Portfolio Manager is defined as: "The portfolio indicates the overall availability of securities belonging to any person".

2. NEED OF THE STUDY: -

- The main aspect of this study i.e. "portfolio management with reference to automobile sector "is to analyse the portfolio performance of the selected companies.
- To Analyse the changes and it's causes in the company portfolio's
- To Compare the results of each company with the other selected companies for effective decision making.
- To have a practical experience of the portfolio management.

3. REVIEW OF LITERATURE:

- **Edward Qian (2012) –** His study supports analytical results on portfolio rebalancing and associated diversification returns for various types of portfolios. It analysed the diversification yields of the risk parity portfolios. Their numerical examples show that diversification performance is, in general, tremendous for leveraged danger parity portfolios when the leverage rate is not too high, furthermore, it shows that low correlations between the various activities are crucial for get a return. of positive diversification and reduction of the turnover of the portfolio for portfolios of equal risk.
- **Richard Grinold (2014):**This study Provides a general framework to describe various aspects of a portfolio that uses a set of things. The work is a cousin to the exposition of the spent argument of attribution of analysis 7, and in this sense it is fairly represented as old wine in new bottles, however the scope is much more general. The first provides a theoretical framework with a model that describes various aspects of the portfolio as an allocation of portfolio variation or as a covariance of two portfolios.

4. OBJECTIVES:

- To analyse the effective portfolio which offers maximum return with minimum risk.
- To frame an optimal portfolio from the selected industries.
- To determine the amount of portfolio risk and portfolio returns involved in the securities of selected industries.

5. HYPOTHESIS:

H0: There is no significant relationship between portfolio risk & portfolio return.

H1: There is a significant relationship between the portfolio risk & portfolio return.

5. Sample size:

5 companies from automobile industry are:

1. HERO MOTOCORP.

2. BAJAJ AUTO LIMITED.

3. MAHINDRA & MAHINDRA LIMITED.

4. TVS MOTORS COMPANY LIMITED

5. MAHARASHTRA SCOOTERS LIMITED.

7. RESEARCH METHODOLOGY:

Research methodology is the procedure which we used to collect the information and data from making decisions. It may include past and present information.

- **Primary Source:**Information gathered from interacting with employees within the organization.
- **Secondary Source:**Daily prices of scripts from newspapers,websites.

8. TOOLS AND TECHNIQUES:

Statistical tools which are used for the study are return, average return, variance, standard deviation, covariance, coefficient of correlation, portfolio risk &portfolio return, T-test.

9. PORTFOLIO ANALYSIS:

Standard Deviation $=\sqrt{\text{variance}}$

Variance $= \frac{1}{n}(R-\bar{R})^2$

Co-variance (COV ab) $=\frac{1}{n}(RA-\overline{RA})(RB-\overline{RB})$

Correlation Coefficient $=\frac{COV\ ab}{\sigma a * \sigma b}$

weights of portfolio:

$Wa=\frac{\sigma b[\sigma b-(nab*\sigma a)]}{\sigma a^2+\sigma b^2-2nab*\sigma a*\sigma b}$

Wb=1-Wa

Portfolio risk:

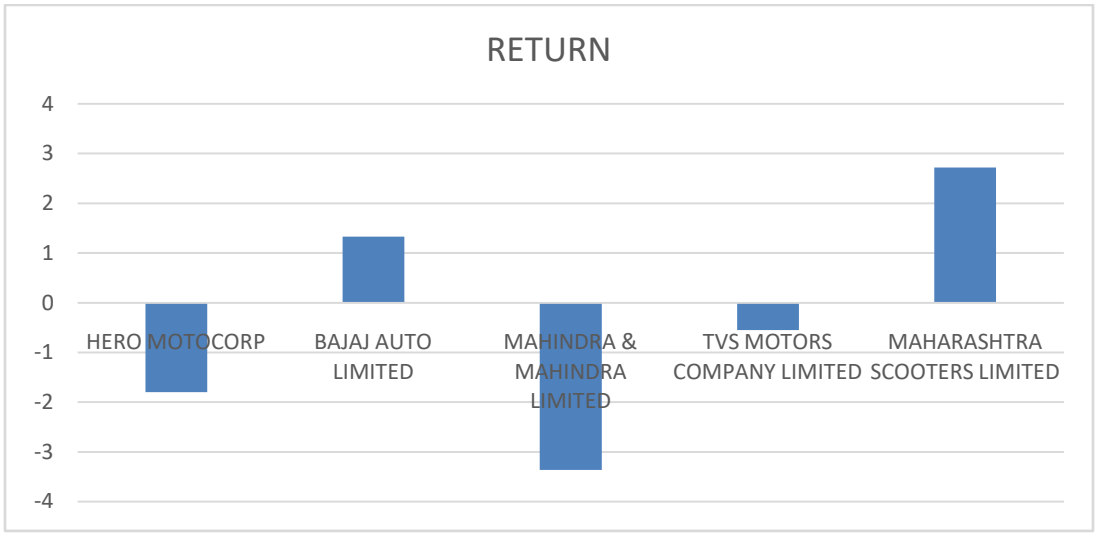
$\sigma_p=\sqrt{(\sigma a * Wa)2+(\sigma b * Wb)2+2*\sigma a*\sigma b*Wa*Wb*nab}$

Portfolio return: Rp=(RA*WA) +(RB*WB)

10. DATA ANALYSIS:

TABLE 1: CALCULATION OF AVERAGE RETURNS:

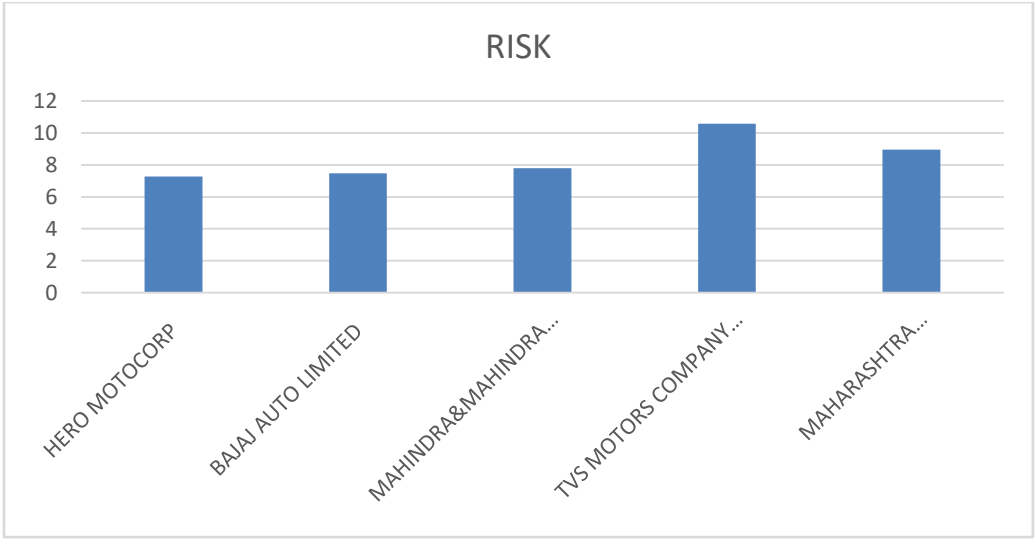
COMPANIES	RETURN
HERO MOTOCORP	-1.80
BAJAJ AUTO LIMITED	1.33
MAHINDRA & MAHINDRA LIMITED	-3.36
TVS MOTORS COMPANY LIMITED	-0.55
MAHARASHTRA SCOOTERS LIMITED	2.72



INTERPRETATION: From the above graph, the returns of Maharashtra Scooters Limited are having higher i.e., (2.72) than all the selected companies and the returns of Mahindra & Mahindra Limited are having lesser i.e., (-3.36) than all the selected companies.

TABLE 2: CALCULATION OF STANDARD DEVIATION:

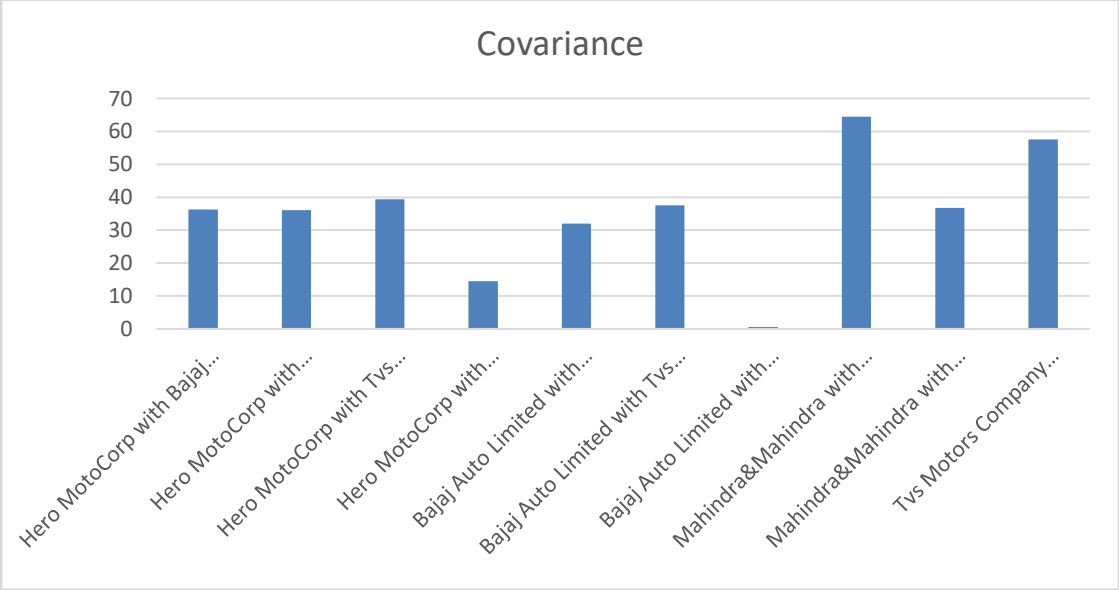
COMPANIES	RISK
HERO MOTOCORP	7.28
BAJAJ AUTO LIMITED	7.48
MAHINDRA&MAHINDRA LIMITED	7.80
TVS MOTORS COMPANY LIMITED	10.57
MAHARASHTRA SCOOTERS LIMITED	8.96



INTERPRETATION: From the above graph, the risk of TVS MOTORS COMPANY LIMITED is having high i.e., (10.57) when compared to other selected companies and HERO MOTOCORP is having low i.e., (7.28) when compared with the other selected companies.

Covariance

Companies	Covariance
Hero MotoCorp with Bajaj Auto Limited	36.31
Hero MotoCorp with Mahindra & Mahindra Limited	36.04
Hero MotoCorp with TVS Motors Company Limited	39.39
Hero MotoCorp with Maharashtra Scooters Limited	14.52
Bajaj Auto Limited with Mahindra&Mahindra Limited	32.02
Bajaj Auto Limited with TVS Motors Company Limited	37.48
Bajaj Auto Limited with Maharashtra Scooters Limited	0.61
Mahindra&Mahindra with TVS Motors Company Limited	64.43
Mahindra&Mahindra with Maharashtra Scooters	36.75
TVS Motors Company Limited with Maharashtra Scooters Limited	57.54

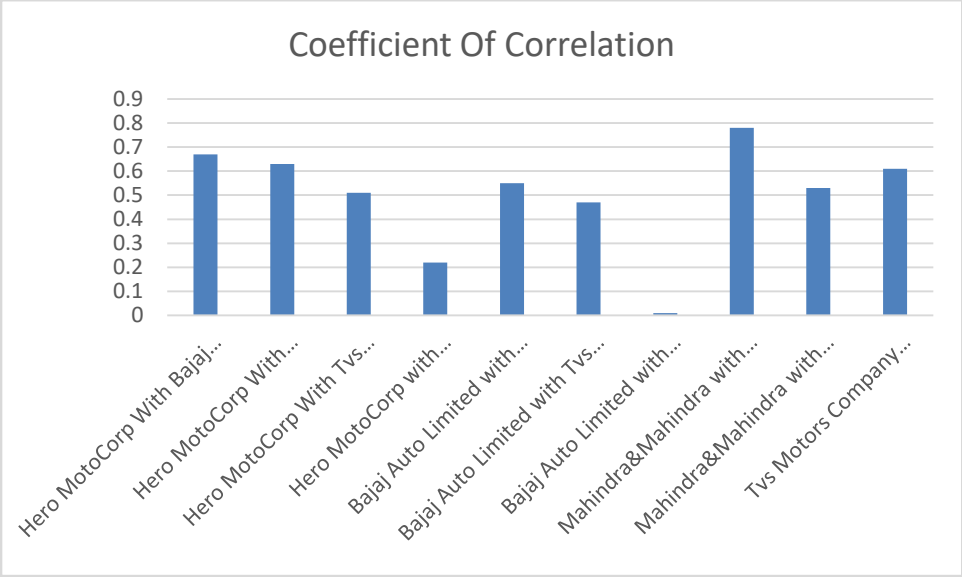


INTERPRETATION: From the above graphs it is shown that covariance is greater for Mahindra&Mahindra with TVS Motors Company Limited i.e., (64.43) and lesser for Bajaj Auto Limited with Maharashtra Scooters Limited I.e., (0.61) when compare to other selected companies.

COEFFICIENT OF CORRELATION:

Companies	Coefficient Of Correlation
Hero MotoCorp With Bajaj Auto Limited	0.67
Hero MotoCorp With Mahindra&Mahindra Limited	0.63
Hero MotoCorp With TVS Motors Company Limited	0.51
Hero MotoCorp with Maharashtra Scooters Limited	0.22
Bajaj Auto Limited with Mahindra&Mahindra Limited	0.55

Bajaj Auto Limited with TVS Motors Company Limited	0.47
Bajaj Auto Limited with Maharashtra Scooters Limited	0.009
Mahindra&Mahindra with TVS Motors Company Limited	0.78
Mahindra&Mahindra with Maharashtra Scooters	0.53
TVS Motors Company Limited with Maharashtra Scooters Limited	0.61

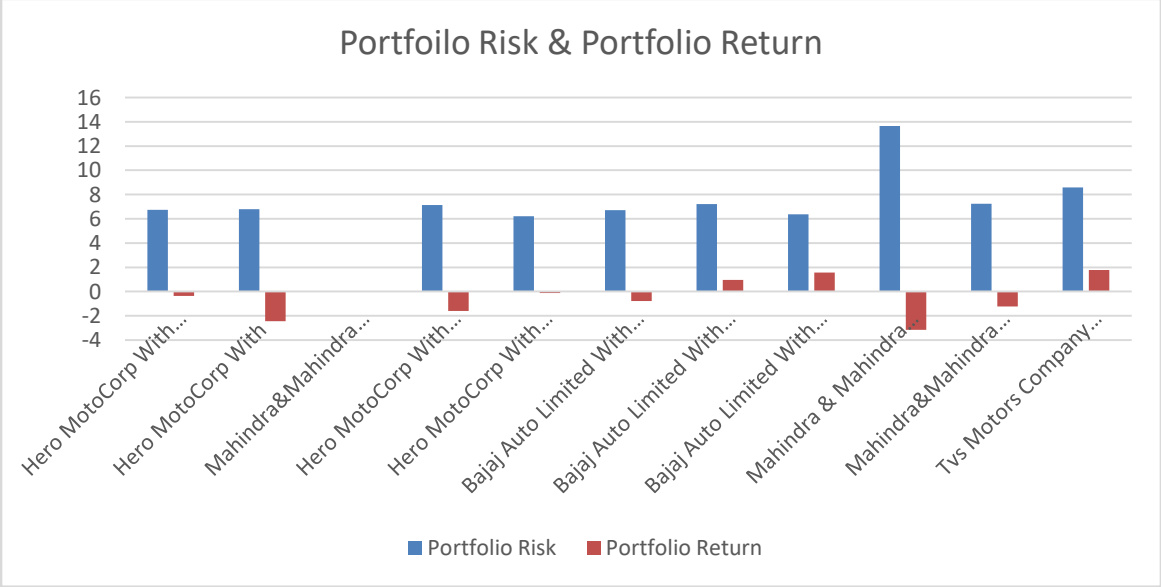


INTERPRETATION:From the above graphs it is shown that correlation of coefficient is greater for Mahindra&Mahindra with TVS Motors Company Limited i.e., (0.78) and lesser for Bajaj Auto Limited with Maharashtra Scooters Limited i.e., (0.009) when compare to other selected companies.

PORTFOLIO RISK AND PORTFOLIO RETURN:

Companies	**Portfolio Risk**	**Portfolio Return**
Hero MotoCorp With Bajaj Auto Limited	6.74	-0.36
Hero MotoCorp With Mahindra&Mahindra Limited	6.78	-2.44
Hero MotoCorp With TVS Motors Company Limited	7.13	-1.6
Hero MotoCorp WithMaharashtra Scooters Limited	6.22	-0.13
Bajaj Auto Limited With Mahindra&Mahindra Limited	6.72	-0.78
Bajaj Auto Limited With TVS Motors Company Limited	7.22	0.95
Bajaj Auto Limited With Maharashtra Scooters Limited	6.36	1.58
Mahindra&Mahindra With TVS Motors Company Limited	13.66	-3.15

Mahindra&Mahindra With Maharashtra Scooters	7.24	-1.23
TVS Motors Company Limited With Maharashtra Scooters Limited	8.58	1.77



INTERPRETATION: From the above graph it is shown that the portfolio risk of Mahindra&Mahindra Limited with TVS Motors Company Limited has high portfolio risk i.e., (13.66) and their portfolio return is -3.15. Hero MotoCorp with Maharashtra Scooters Limited has the lowest portfolio risk i.e., (6.22) and their portfolio return is -0.13 when compared to other selected companies.

11. HYPOTHESIS TEST:

t-Test: Paired Two Sample for Means		
	portfolio risk	**portfolio return**
Mean	7.665	-0.539
Variance	4.862783	2.703388
Observations	10	10
Pearson Correlation	-0.45824	
Hypothesized Mean Difference	0	
Df	9	
t Stat	7.861933	
P(T<=t) one-tail	1.27E-05	
t Critical one-tail	1.833113	
P(T<=t) two-tail	2.54E-05	
t Critical two-tail	2.262157	

Here the calculated value is more than the table value, so we reject $H_0$and accept H_1. Which means there is a significance relation between portfolio risk and portfolio return.

12. FINDINGS:

- Individual returns on the selected stocks including HERO MotoCorp, Bajaj Auto Limited, Mahindra&Mahindra Limited, TVS Motors Company Limited, Maharashtra Scooters Limited are -1.80%,1.33%, -3.36%, -0.55%,2.72% respectively.
- Individual risks on the selected stocks includingHero MotoCorp, Bajaj Auto Limited, Mahindra&Mahindra Limited, TVS Motors Company Limited, Maharashtra Scooters Limited are 7.28, 7.48, 7.80, 10.57, 8.96 respectively.
- Covariance of Mahindra&Mahindra with TVS Motors Company Limited i.e., (64.43) are very high while Bajaj Auto Limited withMaharashtra Scooters Limited i.e., (0.61) are very low when compared to other companies.
- Coefficient of correlation of Mahindra & Mahindra with TVS Motors Company Limitedi.e., (0.78) are very highwhile coefficient of correlation of Bajaj Auto Limited withMaharashtra Scooters Limited i.e., (0.009) are very low when compared to other companies.
- Portfolios Returns of TVS Motors Company Limited with Maharashtra Scooters Limited (1.77) are very high while Mahindra&Mahindra with TVS Motors Company Limited (-3.15) are very low compared to other companies.
- Portfolios Risk of Mahindra & Mahindra with TVS Motors Company Limited (13.66) are very high while Portfolio Risks of Hero MotoCorp with Maharashtra Scooters Limited (6.22) are very low compared to other companies.

13. SUGGESTIONS:

- As Hero Moto Corp, Mahindra & Mahindra Limited, TVS Motors Company Limited are having negative average return so it is better not to invest.
- Comparing the individual risks, TVS Motors Company Limited are risky securities compared to the other securities like Hero MotoCorp, Bajaj Auto Limited, Mahindra &Mahindra Limited, Maharashtra Scooters Limitedand it is suggested that the investors should be careful while investing in these securities.
- Bajaj Auto Limited with Maharashtra Scooters Limited is having low co-variance. So investors better to invest in other selected companies.
- The investors who require minimum return with low risk can invest inMahindra&Mahindra with TVS Motors Company Limited.
- Investors who want high return on their investments so better they can invest in TVA Motors Company Limited with Maharashtra Scooters Limited, because these are having the highest portfolio risk.

13.CONCLUSION:

In case of perfectly correlated securities or stocks, the danger is often reduced to a minimum point. In case of negatively correlative securities the danger is often reduced to a zero. (which is company's risk) but the market risk prevails the same for security or stock in the portfolio. In case of perfect positive co-relation securities or stock, the risk can be reduced to a minimum level, were as within the case of negative correlated securities the danger is often reduced to zero, which is corporate risk but the market risk prevails an equivalent for the safety or stock in portfolio. Positive correlation means both the securities are occupation an equivalent direction

i.e., either upward or downward. Whereas indirect correlation means, the securities are occupation other way, which is more portfolio.

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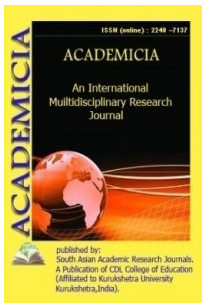

PORTFOLIO MANAGEMET WITH REFERENCE TO BANKING SECTOR

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ABSTRACT

A portfolio refers to the collection of investments in which an investor can invest to maximize his returns. Whereas, a portfolio management is described as an art of selecting the best portfolio which gives the maximum return with less risk. Now a day, most of the peoples are showing interest to make an investment on various portfolios such as Shares, Debenture, Bonds. But, they are unable to manage them effectively. so this article is prepared with an intention of providing suggestions to manage the portfolio in an effective way by suing some statistical tools like returns, standard deviation, portfolio returns and portfolio weights. So the study concentrates on empirical approach towards measuring portfolio performance of the companies operating under one of the most dynamic sector i.e banking sector in Indian economy.

KEYWORDS: *Portfolio Management, Analysis Of Portfolio Risks And Portfolio Return.*

INTRODUCTION:-

Portfolio refers to combination of securities like shares, debentures, commodities etc. Portfolio Management refers to diversification of investment with a view to minimizing chances of risk and maximizing the returns. It is platform for the investors to diversify their portfolio among various investment sources. Portfolio manager is the individual who control, monitor and provide suggestions to the individual investor.

NEED OF THE STUDY:-

1. This study helps to learn the best investment plan which is available to the individuals as per their income, budget, age and ability to undertake risks.
2. It helps to analyze the chances of profits from investments.
3. It helps in comparing the portfolio performance of the selected companies.
4. To helps to learn the relationship between risk and return from the securities.

OBJECTIVES OF THE STUDY:-

1. To study the investment patterns of the selected companies.
2. To determine the risk and return of the selected banking portfolio.
3. To analyze the portfolio which offers the maximum return and minimum risk
4. To compare the risk and returns involved in each firm so that best portfolio is selected.

RESEARCH METHODOLOGY: -

Research is a process of careful consideration of study regarding a particular concern or a problem using scientific methods. "It is an art or technique of work undertaken to increase the knowledge in respective field." Research methodology is the set of procedures or techniques used to identify, select, process, and analyze information about a topic.

DATA COLLECTION:-

1. **Primary Source:-**

No primary data is used in my project of portfolio management in banking sector.

2. **Secondary data: -**

The secondary data is collected from websites, journals, past year annual reports, etc.

SAMPLE SIZE:-

Total 5 companies are selected from both public and private sectors banks. (SBI, Punjab National Bank, Andhra Bank, HDFC, ICICI).

TOOLS AND TECHNIQUES:-

The statistical tools which are used for this study are Variance, Covariance, Correlation, Standard Deviation, t-test.

Statistcial Tools:-

Standard Deviation (SD) $=\sqrt{\text{variance}}$

Variance (Var) $=\frac{1}{n}(R-\bar{R})^2$

Co-variance (COV ab) $=\frac{1}{n}(RA-\overline{RA})(RB-\overline{RB})$

Correlation Coefficient (co-coef) $=\frac{COV\ ab}{\sigma a*\sigma b}$

weights of portfolio:

$Wa=\frac{\sigma b[\sigma b-(nab*\sigma a)]}{\sigma a^2+\sigma b^2-2nab*\sigma a*\sigma b}$

Wb=1-Wa

Portfolio risk: $\sigma_{p} = \sqrt{(\sigma a * Wa)2 + (\sigma b * Wb)2 + 2 * \sigma a * \sigma b * Wa * Wb * nab}$

Portfolio return: Rp=(RA*WA) +(RB*WB)

HYPOTHESIS OF THE STUDY:-

H0: There is no significant relationship between the portfolio risk and portfolio return.

H1: There is a significant relationship between the portfolio risk and portfolio return.

REVIEW OF LITERATURE:-

S.M.Tariq Zafar, D.S.Chaubey, and Shruti Nagar (2013) in their study stated that every investor has different thinking to invest in stock which may give them maximum return with minimum or no risk. So, they want a portfolio which provides maximum return with less risk. The main purpose of this paper is to identify the relationship between risks, return, and diversification effect on portfolio risk with composite of market and non-market risk.

Ravi kiran(2012) in his study highlighted the volatility which are influencing the various portfolio's and stock market movements. His article revealed that mutual funds, and stocks are most preferred financial avenue but needs some innovation and added quality dimensions in existing services.

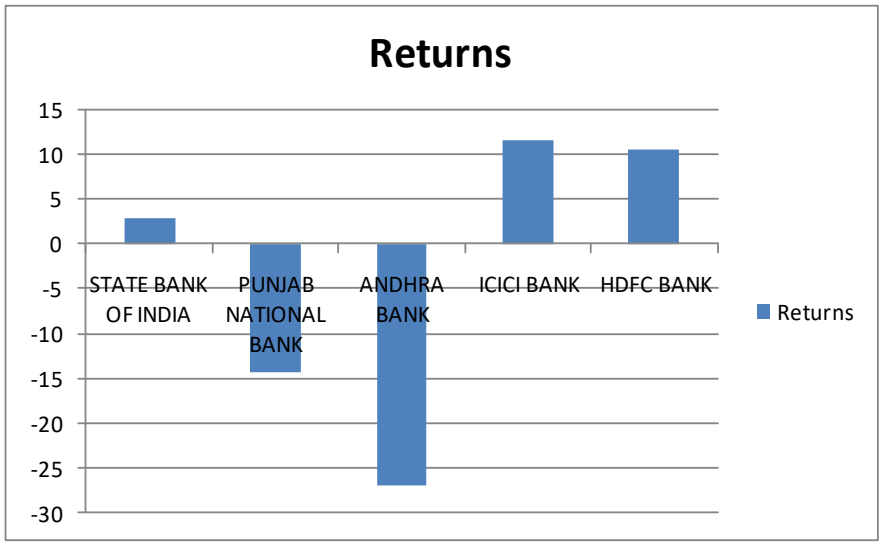
Singh(2012) conducted an empirical study of Indian investors and noticed that the maximum of his respondents don't have much awareness about the varied function of mutual funds, bonds, and debentures etc., . And they are bit confused regarding investment in various investment alternatives. His study found that some demographic factors like gender, income and level of education have their significant impact over the attitude towards various portfolio alternatives. On the contrary age and occupation haven't been found influencing the investor's attitude. He in his study noticed that portfolio return and liquidity are seemed to be most profitable benefits of investment in mutual funds,bonds etc.

Devasena S (2006) made an attempt to identify the "Risk perception and portfolio management of equity investors". She in her study says that the investors are not aware of portfolio which would minimize risk and maximize the return. And also it is clear that the investors have low level of understanding about risk and the importance of portfolio management as they are not aware of the portfolio management proper steps to be taken so as to enhance the notice level within the minds of the investors.

DATA ANALYSIS:-

Calculated values of average Returns: -

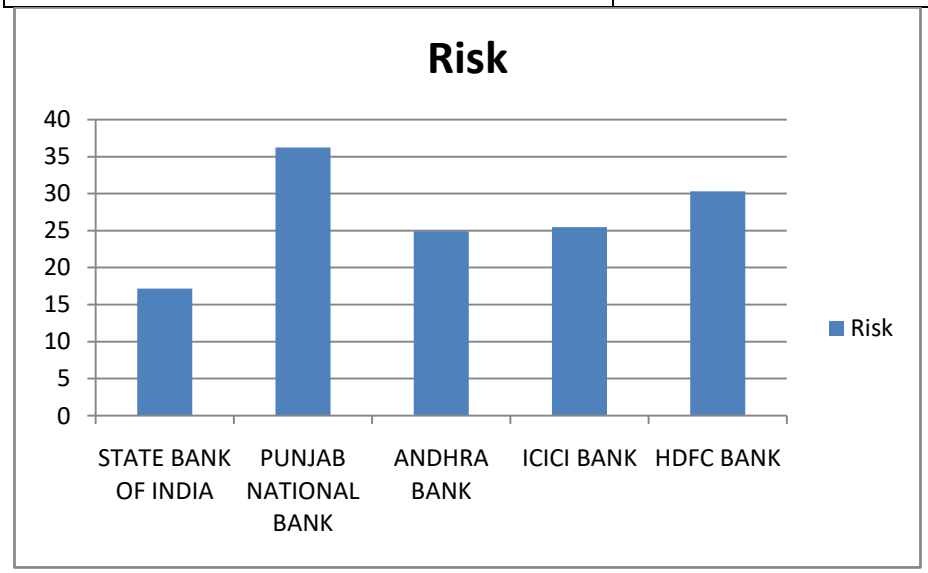
BANK	**Returns**
STATE BANK OF INDIA	2.89
PUNJAB NATIONAL BANK	-14.23
ANDHRA BANK	-26.86
ICICI BANK	11.47
HDFC BANK	10.50



Interpretation: From the above graph, ICICI BANK is having higher returns i.e., (11.47) than all the other selected companies and the ANDHRA BANK is having lesser returns i.e., (-26.86) than all the selected companies.

Calculated values of Standard Deviation: -

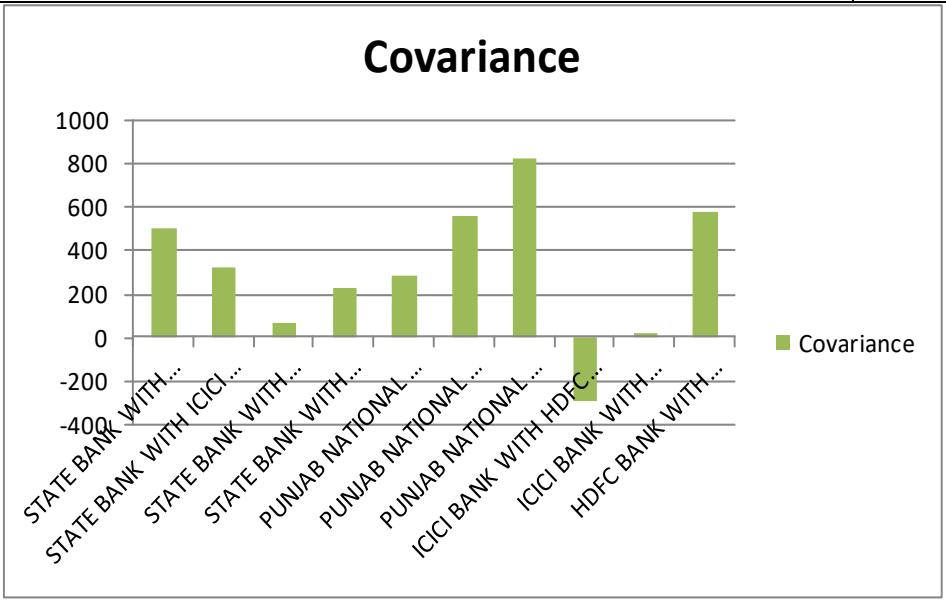
BANK	Risk
STATE BANK OF INDIA	17.15
PUNJAB NATIONAL BANK	36.25
ANDHRA BANK	24.91
ICICI BANK	25.46
HDFC BANK	30.32



Interpretation: From the above graph, we can see that the PUNJAB NATIONAL BANK is having the high risk i.e., (36.25) whereas STATE BANK OF INDIA is having the low risk i.e., (17.15) when compared with the other selected companies.

Calculated values of covariance: -

BANKS	Covariance
STATE BANK WITH PUNJAB NATIONAL BANK	499.24
STATE BANK WITH ICICI BANK	317.6
STATE BANK WITH HDFC BANK	63.03
STATE BANK WITH ANDHRA BANK	222.79
PUNJAB NATIONAL BANK WITH ICICI BANK	282.76
PUNJAB NATIONAL BANKWITH HDFC BANK	554.81
PUNJAB NATIONAL BANK WITH ANDHRA BANK	820.09
ICICI BANK WITH HDFC BANK	-293.28
ICICI BANK WITH ANDHRA BANK	14.9
HDFC BANK WITH ANDHRA BANK	571.158

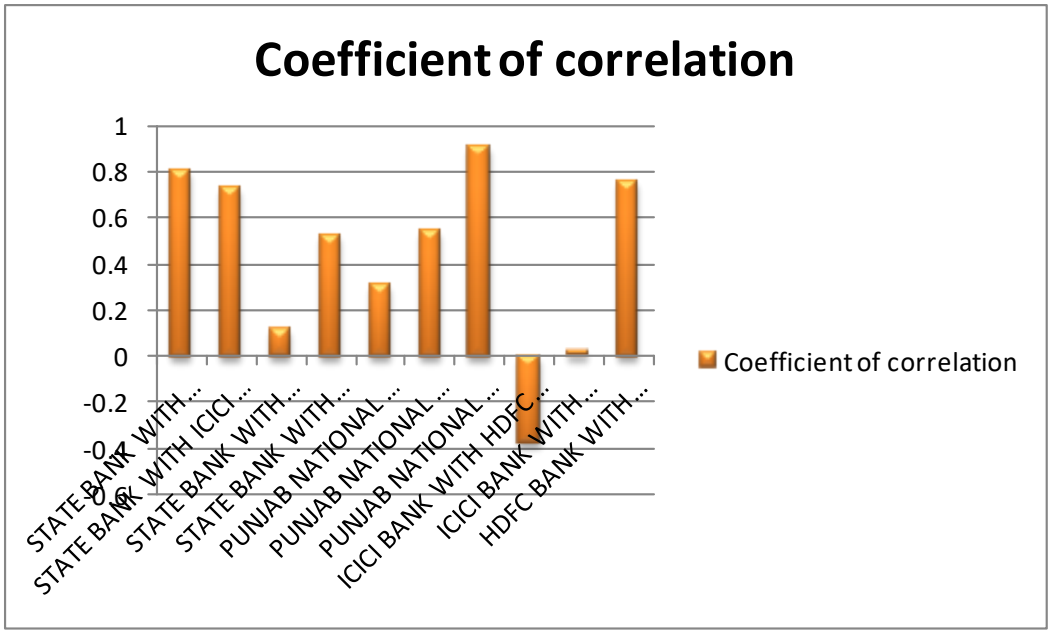


Interpretation: From the above graphs it is shown that covariance is greater for PUNJAB NATIONAL BANK with ANDHRA BANK i.e., (820.09) and lesser for. ICICI BANK with HDFC BANK i.e., (-293.28) when compare to other selected companies.

Calculated values of coefficient of correlation: -

BANKSZ	Coefficient of Correlation
STATE BANK WITH PUNJAB NATIONAL BANK	0.8
STATE BANK WITH ICICI BANK	0.73
STATE BANK WITH HDFC BANK	0.12
STATE BANK WITH ANDHRA BANK	0.52
PUNJAB NATIONAL BANK WITH ICICI BANK	0.31
PUNJAB NATIONAL BANK WITH HDFC BANK	0.54
PUNJAB NATIONAL BANK WITH ANDHRA BANK	0.91

ICICI BANK WITH HDFC BANK	-0.38
ICICI BANK WITH ANDHRA BANK	0.02
HDFC BANK WITH ANDHRA BANK	0.76



Interpretation:- From the above graphs it is shown that correlation of coefficient is greater for PUNJAB NATIONAL BANK with ANDHRA BANK i.e., (0.91) and lesser for ICICI BANK WITH HDFC BANK i.e., (-0.38) whencompare to other selected companies.

Calculated values of portfolio risk and portfolio return:

BANKS	Portfolio Risk	Portfolio Return
STATE BANK WITH PUNJAB NATIONAL BANK	15.06	8.54
STATE BANK WITH ICICI BANK	17.09	2.2
STATE BANK WITH HDFC BANK	15.65	4.49
STATE BANK WITH ANDHRA BANK	16.83	-1.57
PUNJAB NATIONAL BANK WITH ICICI BANK	23.53	4.79
PUNJAB NATIONAL BANK WITH HDFC BANK	28.6	2.83
PUNJAB NATIONAL BANK WITH ANDHRA BANK	21.94	-35.58
ICICI BANK WITH HDFC BANK	15.39	11.04
ICICI BANK WITH ANDHRA BANK	17.98	-8.08
HDFC BANK WITH ANDHRA BANK	24.8	-22.38

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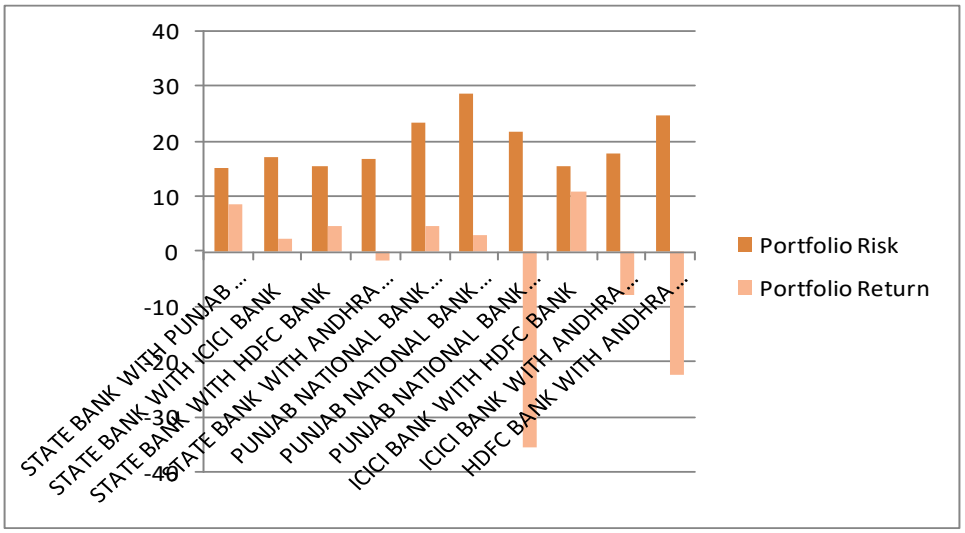

Interpretation:- From the above graph it is shown that the portfolio risk of PUNJAB NATIONAL BANK with HDFC BANK has high portfolio risk i.e., (28.6) and their portfolio return is 2.83. STATE BANK OF INDIA with PUNJAB NATIONAL BANK has the lowest portfolio risk i.e., (15.06) and their portfolio return is 8.54 when compared to other selected companies.

HYPOTHESIS TEST: -

t-Test: Paired Two Sample for Means		
	Portfolio Risk	**Portfolio Return**
Mean	19.687	-3.372
Variance	22.15782333	219.0682844
Observations	10	10
Pearson Correlation	-0.38829029	
Hypothesized Mean Difference	0	
Df	9	
t Stat	4.243123279	
P(T<=t) one-tail	0.001082149	
t Critical one-tail	1.833112923	
P(T<=t) two-tail	0.002164299	
t Critical two-tail	2.262157158	

Since the calculated value is more than the table value we accept the h_1. Which means there is a direct relationship between the portfolio risk and portfolio return.

FINDINGS: -

- The average returns of SBI portfolio is 2.89 and this is very low when compared to other banks. This is due to the recent announcement of the government of India regarding the recapitalization of Public sector banks.
- The scam in the Punjab National Bank in the year 2018 had showed its impact on the shares of this bank which resulted in the down fall of its shares.
- Andhra bank merging with the union bank resulted in the downfall of its shares.

- Risk factors is more with the HDFC shares.
- SBI is highly correlated with the Punjab National Bank.

SUGGESTIONS: -

- The investors who are willing to earn maximum returns with minimum risk in necessary to have a clear understanding of their investment objectives, tax status and risk tolerances.
- Even though the amount of returns from SBI is low it the best investment source for the invidual to invest as it is the India's largest bank.
- The investor who are seeking for high returns with less risk can invest in the ICICI portfolios.
- The investment should be carefully done based up on the previous performance of the portfolios and present prevailing market conditions.
- Investors who are prefering for less risk and and low retuns can invest in Andhra Bank.

CONCLUSION:-

This study concentrated on the risk and return relationship of various company portfolios. From this study we can say that portfolio functioning is depended on the market situations so it is better for the investor to take the guidance and help of the portfolio manager in order to reduce the risk on investment sources. It can be concluded that the investors should be updated with latest information on the market trends and on the respective company profile in which they are invested.

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ACADEMICIA
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A STUDY ON ASSET LIABILITY MANAGEMENT

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ABSTRACT

Assets and Liabilities Management (ALM) is a dynamic process of planning, organizing, coordinating and controlling the assets and liabilities – their mixes, volumes, maturities, yields and costs in order to achieve a specified Net Interest Income. As all transactions of the banks revolve around raising and deploying the funds, Asset-Liability Management (ALM) gains more significance as an initiative towards the risk management practices by the Indian banks. Measuring and managing liquidity risk is an important dimension of ALM. Mismatch in the maturity profile of assets and liabilities exposes the balance sheet to liquidity risk. This paper is aimed at measuring the liquidity Risk, by using Gap Analysis Technique (maturity profiling).

KEYWORDS: *Asset, Liability, Banking Sector, Nationalization, Balance Sheet, Liquidity, Net Interest, Margin.*

I. INTRODUCTION :

Asset Liability Management (ALM) is a strategic approach of managing the balance sheet dynamics in such a way that the net earnings are maximized. This approach is concerned with management of net interest margin to ensure that its level and riskiness are compatible with the risk return objectives.

If one has to define Asset and Liability management without going into detail about its need and utility, it can be defined as simply “management of money” which carries value and can change its shape very quickly and has an ability to come back to its original shape with or without an additional growth. The art of proper management of healthy money is ASSET AND LIABILITY MANAGEMENT (ALM).

II. OBJECTIVES OF THE STUDY

- To study the concept of Asset and Liablity Management **in The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**
- To study process of CASH INFLOWS and OUTFLOWS in **The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**
- To study RISK MANAGEMENT under **The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**

III. RESEARCH METHODOLOGY

The study of **ALM Management** is based on two factors.

1. Primary data collection.
2. Secondary data collection

PRIMARY DATA COLLECTION:

The sources of primary data were

- The chief manager – ALM cell
- Department Sr. manager financing & Accounting
- System manager- ALM cell

SECONDARY DATA COLLECTION:

Collected from books , journal, and management containing relevant information about ALM and Other main sources were

- Annual report of **The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**
- Published report of **The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)**
- **RBI** guidelines for **ALM.**

IV. LIMITATION OF THE STUDY:

(i) This subject is based on past data of The Housing Development Finance Corporation Limited (STATE STREET INDIA PRIVATE LIMITED)

(ii) The analysis is based on structural liquidity statement and gap analysis.

(iii) The study is mainly based on secondary data.

(iv) Approximate results: The results are approximated, as no accurate data is Available.

(v) The study is based on the issues that are listed on NSE only.

V. REVIEW OF LITERATURE

Asset-Liability Management (ALM) can be termed as a risk management technique designed to earn an adequate return while maintaining a comfortable surplus of assets beyond liabilities. It

takes into consideration interest rates, earning power, and degree of willingness to take on debt and hence is also known as Surplus Management. But in the last decade the meaning of ALM has evolved. It is now used in many different ways under different contexts. ALM, which was actually pioneered by financial institutions and banks, are now widely being used in industries too. The Society of Actuaries Task Force on ALM Principles, Canada, offers the following definition for ALM: "Asset Liability Management is the on-going process of formulating, implementing, monitoring, and revising strategies related to assets and liabilities in an attempt to achieve financial objectives for a given set of risk tolerances and constraints."

ANALYSIS OF STUDY

VI. Risk management system:

Assuming and managing risk is the essence of business decision-making. Investing in a new technology, hiring a new employee, or launching a marketing campaign is all decisions with uncertain outcomes. As a result all the major management decisions of how much risk to take and how to manage the risk. The implementation of risk management varies from business to business, from one management style to another and from one time to another. Risk management in the financial services industry is different from others. Circumstances, Institutions and Managements are different. On the other hand, an investment decision is no recent history of legal and political stability

Data Interpretation

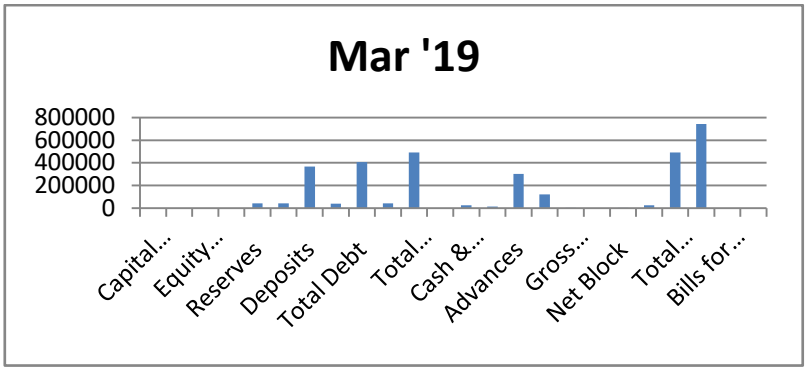
GENERAL:

The classification of various components of assets and liabilities into different time buckets for preparation of Gap reports (Liquidity and interest rate sensitivity) may be done as indicated in Appendices I & II as a sort of **bench mark,** which are better equipped to reasonably estimate the behavioral pattern, embedded options, rolls-in and rolls-out etc. of various components of assets and liabilities on the basis of past date. Empirical studies could classify them in the appropriate time buckets, subject to approval from the STATE STREET INDIA PRIVATE LIMITED / Board. A copy of the note approved by the ALOC / Board may be sent to the Department of Supervision.

COMPARATIVE ASSET LIABILITY SHEET AS ON 31ST MARCH 2018-19

	Mar '19	Mar '18	**Increase (+) / Decrease (-) (in Rs)**	**Percentage (%)**
Capital and Liabilities:				
Total Share Capital	479.81	475.88	3.93	0.82583845
Equity Share Capital	479.81	475.88	3.93	0.82583845
Share Application Money	0.00	0.00		
Reserves	42,998.82	35,738.26	7260.56	20.3159303
Net Worth	**43,478.63**	36,214.14	7264.49	20.0598164
Deposits	367,337.48	296,246.98	71090.5	23.9970379
Borrowings	39,438.99	33,006.60	6432.39	19.4881933
Total Debt	**406,776.47**	329,253.58	77522.89	23.5450409

Other Liabilities & Provisions	41,344.40	34,864.17	6480.23	18.5870766
Total Liabilities	**491,599.50**	400,331.89	91267.61	22.7979864
Assets				
Cash & Balances with RBI	25,345.63	14,627.40	10718.23	73.2750181
Balance with Banks, Money at Call	14,238.01	12,652.77	1585.24	12.528798
Advances	**303,000.27**	239,720.64	63279.63	26.3972389
Investments	**120,951.07**	111,613.60	9337.47	8.3658891
Gross Block	2,939.92	2,703.08	236.84	8.76185684
Accumulated Depreciation	0.00	0.00		
Net Block	**2,939.92**	2,703.08	236.84	8.76185684
Other Assets	25,124.60	19,014.41	6110.19	32.1345232
Total Assets	**491,599.50**	400,331.90	91267.6	22.7979834
Contingent Liabilities	744,097.98	746,226.39	-2128.41	-0.28522309
Bills for collection	0.00	0.00		
Book Value (Rs)	181.23	152.20	29.03	19.0735874



Interpretation:

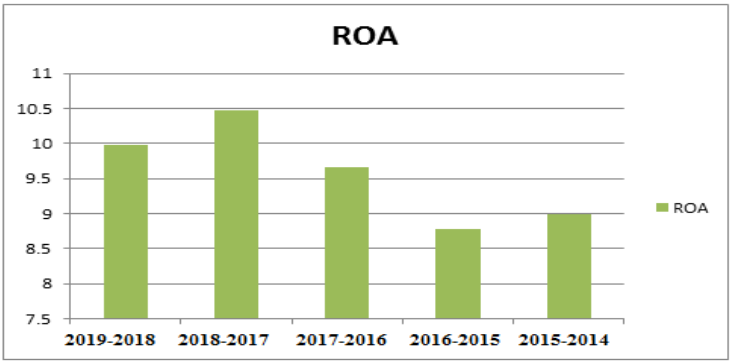
The total current liabilities for the year are Rs.491599.50 in the year 2019 is less than the total current assets for the year. Therefore the assets are more than the liabilities. So there is a positive gap of Rs.236.84 i.e 8.76 % .

Ratio Analysis

- Return on Assets (ROA)

$$\text{Return on Assets (ROA)} = \frac{\text{Net Income}}{\text{Average Total Assets}}$$

Year	Net income	Average Total Assets	ROA
2018-2019	49055.17	491599.50	9.97868
2017-2018	41917.49	400331.90	10.47068
2016-2017	32619.76	337909.49	9.653402
2015-2016	24361.72	277352.61	8.783664
2014-2015	19983.52	222458.56	8.98303



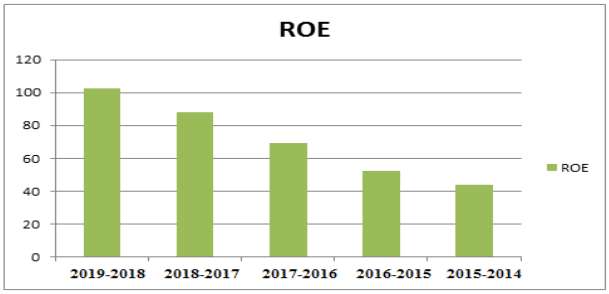
Interpretation:

In the ROA the total Average Assets was increasing year by year and the net income was also in the decreasing position

- Return on Equity (ROE)

$$\text{Return on Equity (ROE)} = \frac{\text{Net Income}}{\text{Average Stockholders' Equity}}$$

Year	Net income	Average Equity	ROE
2018-2019	49055.17	479.81	102.233874
2017-2018	41917.49	475.88	88.0841598
2016-2017	32619.76	469.34	69.5013423
2015-2016	24361.72	465.23	52.3648948
2014-2015	19983.52	457.74	43.6569231



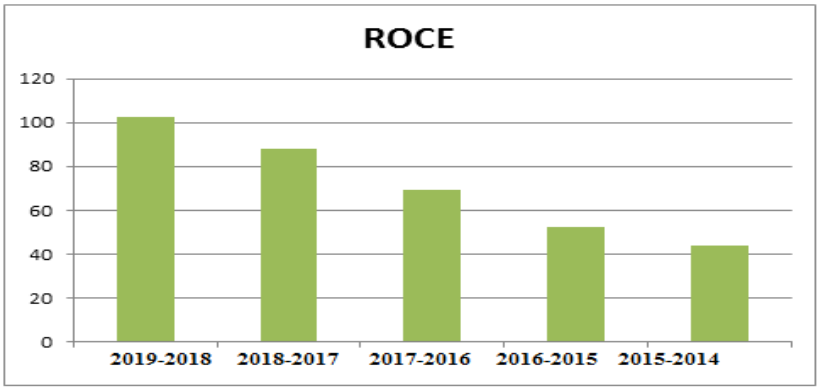
Interpretation:

The net income of the organization was in the increasing position and also the equity value for the investors is also in the increasing stage.

- Return on Common Equity (ROCE)

$$\text{Return on Common Equity} = \frac{\text{Net Income}}{\text{Average Common Stockholders' Equity}}$$

Year	Net income	Average Common Stockholders' Equity	ROCE
2018-2019	49055.17	479.81	102.233874
2017-2018	41917.49	475.88	88.0841598
2016-2017	32619.76	469.34	69.5013423
2015-2016	24361.72	465.23	52.3648948
2014-2015	19983.52	457.74	43.6569231



Interpretation:

The net income of the organization was in the increasing position and also the equity value for the shareholders is also in the increasing stage.

VII. CONCLUSION:

The purpose of ALM is not necessarily to eliminate or even minimize risk. The level of risk will vary with the return requirement and entity's objectives. Financial objectives and risk tolerances are generally determined by senior management of an entity and are reviewed from time to time. All sources of risk are identified for all assets and liabilities.

FINDINGS:

1. ALM technique is aimed to tackle the market risks. Its objective is to stabilize and improve Net interest Income (**NII)**.

2. ALM presents a disciplined decision making framework for s while at the same time guarding the risk levels.
3. The company also increased considerably which investors in coming period. The company has taken up a plant expansion program during the year to increase the production activity and to meet the increase in the demand

VIII. SUGGESTIONS:

- They should strengthen its management information system (MIS) and computer processing capabilities for accurate measurement of liquidity and interest rate Risks in their Books.
- In the short term the Net interest income or Net interest margins (NIM) creates economic value of the which involves up gradation of existing systems & Application software to attain better & improvised levels.

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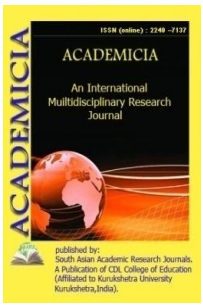

A STUDY ON EQUITY ANALYSIS OF TELECOM SECTOR

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ABSTARCT

The study on equity analysis on Telecom sector proved to be unavoidable to understand the association or relation between returns and risk of investment on telecommunications. The super motive of every investor is to have maximum returns with less risk, The ability of the investor returns can be estimated based on the risk taking caliber. Statistical methods like Correlation, Variance, Beta and Standard Deviation helps in knowing the association of risk and returns in telecom sector. For making good financial and investment decisions the research of stock market is compulsory.

KEYWORDS: *Unavoidable, Association, Caliber.*

INTRODUCTION

LITERATURE REVIEW

R. Naraayanaswamy And R. Thirugnansoundari (2016): By the research they have done, they explained that the relation between the security market return and average rate of return is in a positive way during the period of the study. They gave a suggestion to the investors to take appropriate decisions before investing in the shares. According to the study they have done the IT companies like Oracle and Infosys which are having high and good growth rate and also the investors those who are interested in the short investment can prefer the Wipro Company because it gives profits in short term investment. The Indian market exhibiting a positive relationship among risk and return is their final conclusion.

Dr. Shyam Vashistha And Rajesh Kumar (2011): This research explains that the equity volatility analysis is said to be an effective analysis for the measurement of risk factor. The volatility analyzes the securities based on the fluctuations in price so this study helps in investment decision to the investors by forecasting the volatility in the share price. There are different factors like internal information which influence the actual price of shares so the

concluded it as the investment decisions cannot be done only on the equity volatility analysis basis.

OBJECTIVES

1. To understand and analyze the equity analysis concept and also to gain a practical knowledge.
2. To know the selective 5 Telecom sector companies present scenario.
3. To suggest the investors for gaining the appropriate profits in the telecom industry.
4. To analyze the risk and return which is involved in the selected 5 telecom sector companies.

RESEARCH METHODOLOGY

Primary Data: Primary data is defined as the information which is directly collected from the company and processed in a required manner. The information is gathered from the first hand sources like interview, direct mail or the telephonic conversations with the company management.

Secondary Data: Secondary data is defined as the information related to the organization collected from various sources like Books, Journals, BSE and NSE Official websites and Portals of telecommunications. This study is totally based on secondary data.

PERIOD OF STUDY

This study includes the period of previous 5 years, 2015-2019 and its data which is used for the analysis of equity share price volatility of selected 5 telecommunications companies.

METHOD OF SAMPLING

This study includes the random sampling of 5 companies in the telecom sector. The selection is totally based on the trading platforms of BSE and the information which is available in other reliant sources.

Bharati Airtel: Bharati Airtel limited is also called as airtel. It is one of the most important global telecommunications services company which is headquartered New Delhi. Airtel provides various mobile services like 3G, 4G LTE, 4G+, GSM. It operates in 18 different countries across South Asia and Africa, and in the channel Islands with 411.42 million subscribers. Airtel is recognized as the 3nd largest mobile network operator in the India.

Tata Teleservices: Tata Teleservices Limited (TTSL) is an Indian telecommunications and broadband service provider. The headquarters of Tata Teleservices is located in Mumbai, Maharashtra. Tata Teleservices is a subsidiary of the Tata Group which is an Indian conglomerate company. It has 1.78 million subscribers and 8.51% market share. It is one of the important wireline operators in telecom sector.

Reliance Communications: Reliance Communications Limited is popularly known as R.Comm which provides voice, 2G, 3G and 4G data services. Reliance communications has 0.55 million subscribers and 2.64 market share. It is the fixedline operator which is headquartered in Navi Mumbai.

Vodafone Idea: Vodafone Idea Limited is said to be the Indian telecom operator which is headquartered in Mumbai, Maharashtra and Gandhinagar, Gujarat. Vodafone Idea is known as a

pan-India integrated GSM operator which is offering 2G, 3G and 4G Volte mobile services under two brands called Vodafone and Idea. Vodafone Idea Limited is India's 2nd largest telecommunications network and world's 5th largest mobile telecommunications network. It has 332.65 million subscribers as of December 31st 2019.

MTNL: Mahanagar Telephone Nigam Limited (MTNL) is a subsidiary of Bharat Sanchar Nigam Limited (BSNL) which is headquartered in New Delhi, India. MTNL is known as a state owned telecommunications service provider. 57% of stock in the company is owned by the Government of India. MTNL has subscribers of 6.71 million.

TOOLS OF ANALYSIS

MEAN: Mean is defined as the average of the numbers. It is calculated by adding all the values taken and dividing it by the number of values. Mean is used most commonly and it is the general purpose for the calculation of the midpoint of a set of values. The following is the formula of Mean.

$\bar{X} = \sum x/N$

Where, $\bar{X}$ = Mean

$\sum x$ = Summation of the values

N = Number of values.

Standard Deviation: To reveal the historical volatility of an investment standard deviation is applied to the annual rate of returns of that investment. The variance between each price and mean is greater with the greater standard deviation. The following is the formula which is used for the calculation of standard deviation.

$\sigma = sqrt[\Sigma(Xi - \mu)2 / N]$

Where

σ = Standard deviation

Xi = Each value

μ = Mean

N = Number of values

BETA: Beta is known as a statistical method which is used for the measurement of the systematic risk or volatility of an individual security in comparison to the unsystematic risk of the entire market. The calculation of Beta is done with the help of the following formula.

$\beta = (N \Sigma XY - \Sigma X \Sigma Y) / (N \Sigma X2 - (\Sigma X)2)$

HYPOTHESIS

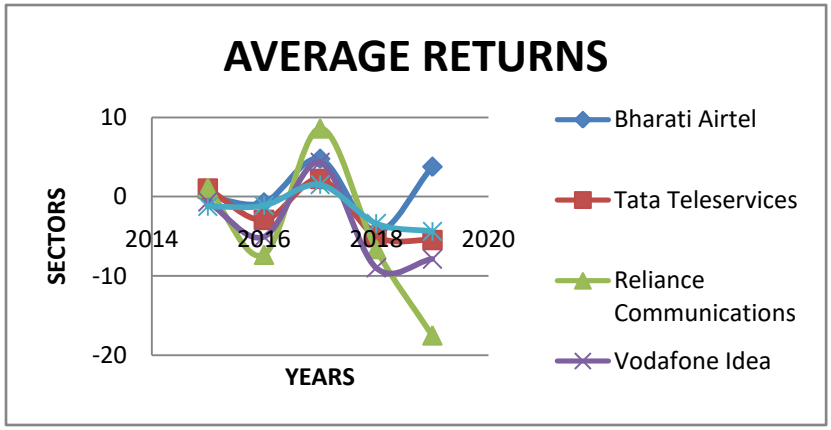
H0: There is no significance association between return and risk in telecom sector.

H1: There is a positive significance association between return and risk in telecom sector.

AVERAGE RETURNS

TABLE 1

YEAR	Bharati Airtel	Tata Teleservices	Reliance Communications	Vodafone Idea	MTNL
2015	0.02554	0.98597	1.11999	-0.646	-1.2303
2016	-0.7489	-2.9218	-7.3329	-5.065	-1.1151
2017	4.75662	2.21285	8.60609	4.34012	1.51529
2018	-4.3816	-4.9799	-6.6228	-8.9719	-3.3746
2019	3.759639	-5.45244	-17.5028	-7.86316	-4.38

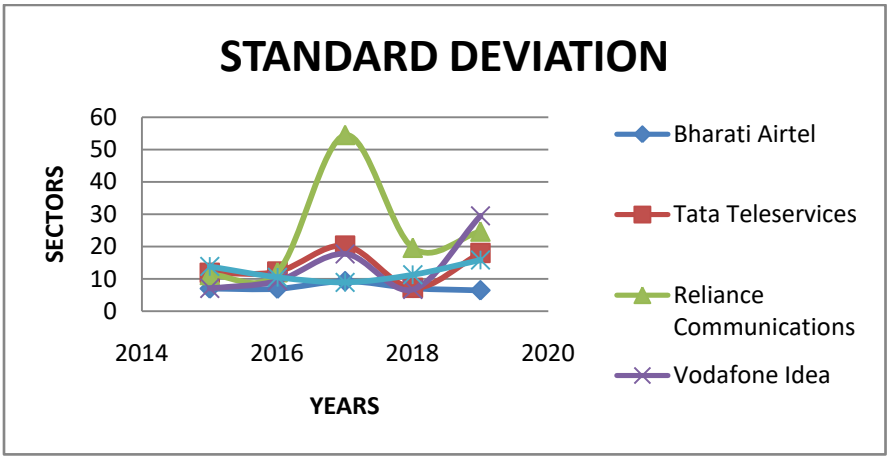


Interpretation: From the above graph we can know the highest and lowest average returns of Bharati Airtel are 4.75662 and -4.3816 in the years 2017 and 2018. For Tata Teleservices they are 2.21285 and -5.45244 in the years 2017 and 2019. For Reliance Communications they are 8.60609 and -17.5028 in the years 2017 and 019. For Vodafone Idea they are 4.34012 and -8.9719 in the years 2017 and 2018. And for MTNL they are 1.51529 and -4.38 in the years 2017 and 2019.

STANDARD DEVIATION

TABLE 2

YEAR	Bharati Airtel	Tata Teleservices	Reliance Communications	Vodafone Idea	MTNL
2015	7.01062	11.878	11.2297	7.068	13.8603
2016	6.94876	12.2687	12.0785	9.39466	10.4975
2017	9.26926	20.2956	54.4752	17.7302	8.92207
2018	7.13021	7.2568	19.6347	6.7577	11.276
2019	6.45765	18.02001	24.65324	29.45214	15.8771

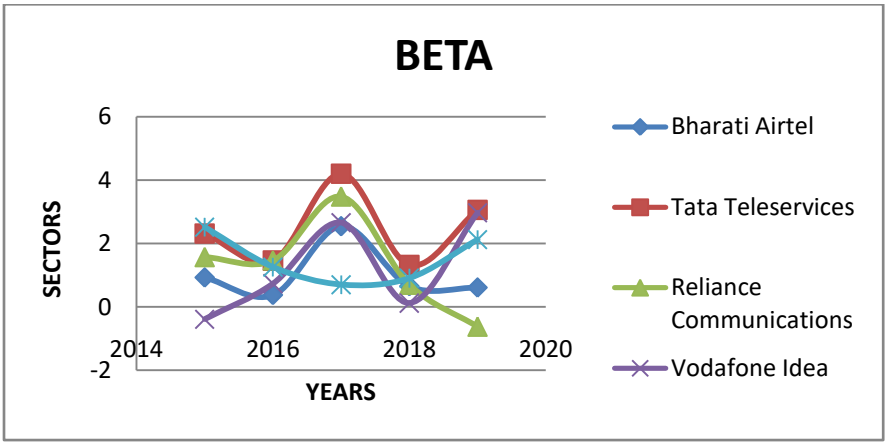


Interpretation: From the above graph we can say the highest and lowest standard deviation values of Bharati Airtel are 9.26926 and 6.45765 in the years 2017 and 2019. For Tata Teleservices they are 20.2956 and 7.2568 in the years 2017 and 2018. For Reliance Communications they are 54.4752 and 11.2297 in the years 2017 and 2015. For Vodafone Idea they are 29.45214 and 6.7577 in the years2019 and 2018. And for MTNL they are 15.8771 and 8.92207 in the years 2019 and 2017.

BETA

TABLE 3

YEAR	Bharati Airtel	Tata Teleservices	Reliance Communications	Vodafone Idea	MTNL
2015	0.928896	2.31157	1.5735	-0.3861	2.51398
2016	0.37617	1.46025	1.46867	0.73336	1.25486
2017	2.547022	4.20041	3.4814	2.6544	0.70343
2018	0.65512	1.32575	0.70241	0.11969	0.9067
2019	0.61085	3.06244	-0.6196	2.96496	2.12319



Interpretation: From the above graph we can say that the highest and lowest Beta values of Bharati Airtel are 2.547022 and 0.37617 in the years 2017 and 2016. For Tata Teleservices they

are 4.20041 and 1.32575 in the years 2017 and 2018. For Reliance Communications they are 3.4814 and -0.6196 in the years 2017 and 2019. For Vodafone Idea they are 2.96496 and -0.3861 in the years 2019 and 2015. And for MTNL they are 2.51398 and 0.70343 in the years 2015 and 2017.

Consolidated Sample Analysis

TABLE 4

Name	Average Returns	Standard Deviation	Beta
Bharati Airtel	0.6822598	7.3633	1.023612
Tata Teleservices	-2.031064	13.943822	2.472084
Reliance Communications	-4.346484	24.414268	1.321276
Vodafone Idea	-3.641188	14.08054	1.217262
MTNL	-1.7169	12.0866	1.500432

Interpretation: From table 4 we can say that the highest and lowest average returns are 0.6822598 and -4.346484 for the companies Bharati Airtel and Reliance Communications. The highest and lowest standard deviation values are 24.414268 and 7.3633 for the companies Reliance Communications and Bharati Airtel. And the highest and lowest Beta values are 2.472084 and 1.023612 for the companies Tata Teleservices and Bharati Airtel.

CORRELATION

TABLE 5

Companies	Market returns	Bharati Airtel	Tata Teleservices	Reliance Communications	Vodafone Idea	MTNL
Market returns	1					
Bharati Airtel	0.694104242	1				
Tata Teleservices	0.151638468	0.410200249	1			
Reliance Communications	0.198907705	0.169633171	0.922983194	1		
Vodafone Idea	0.363697336	0.575495579	0.972594781	0.88850039	1	
MTNL	0.31371493	0.362252956	0.901924077	0.909475072	0.924766591	1

Interpretation: From the above study we can conclude that the average calculated value of telecommunication sector is 0.653 where the critical or tabulated value of correlation degrees of freedom with (v=5) and 5% (0.05) level of significance is r=0.754. As the calculated value is less than that critical value, it is not significant and we failed to reject the hypothesis H0 at 0.05. Hence H0 may be accepted at 0.05 level of significance i.e., there is no impact of returns on telecommunications sector on selected companies.

FINDINGS

- From the above study it has been discovered that the returns of the above selected 5 companies started reducing from the year 2015 and started increasing in the year 2017 but it continued for 2019 due fall in the market price this is because of other telecom companies like Jio which gave a strong competition to these companies.

- From this study we can say that the entry of Jio in the market reduced the returns of these companies by increasing its returns.

CONCLUSION

From the above study we can conclude that the equity analysis is the most appropriate method for measuring the volatility, risk and return, and the relation between market returns and telecom sector returns. The study of equity analysis also helps the investors in ascertaining the risk involved in the selected companies with respect to market returns. This study also helps in analyzing the price fluctuations in order to determine the returns. As the period of study is specified, it has not undertaken the internal policy changes of selected companies so it is necessary to the investors to consider both internal and external factors while taking the investment decisions.

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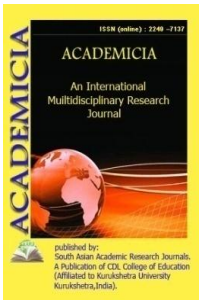

A STUDY ON INDIAN COMMODITY MARKET

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ABSTRACT

The study on the Indian commodity market help's in understanding the remarkable growth in the commodity market which has been witnessed in the past year. When Economic liberalization initiated in 1991 we noticed the tremendous change in the commodity market. The future commodity market plays the major role in the financial market of India. Most of the investor believes that investing in commodity market is safer and less risky than equity market. In the commodity market most of the investment invested form leverage for speculating and hedging. An awareness about the commodity market need to done to increase the trading in the commodity market. The derivatives have been used for hedging, speculation and price discovery for effective trading.

KEYWORDS: *Commodity, Market, Risk Financial Market*

INTRODUCTION

Commodity market is markets where raw materials and primary products are traded in the commodity market. The raw materials are traded generally on MCX (Multi Commodity Exchange) and NCDEX (National Commodity Derivatives Exchange) which are commodity exchange platform or trading platforms for this products. Commodity market is one of the important segment in the financial development of any country. Under this commodity market, wide range of product like agricultural and precious metals are traded to improve the trading ability and reduce the risk management and availability of products for required people and industrialist.

Commodity market sub divided into two types

1. Hard commodity
2. Soft commodity

Hard commodities**:** are those, which are extracted from natural resources such as gold, silver, rubber, oil etc.

Soft commodities**:** are those commodities, which are agriculture product like jute, wheat, Chana and lively stock.

Mostly the hard commodities are traded in MCX (multi commodity exchange) and the other soft commodities are exchanged under NCDEX (national commodity derivatives exchange).

The commodities are sub divided as per the nature and availability of the commodity.

Precious Metals	Oil & Energy	Base Metals
Silver	Natural Gas	Copper
Micro Gold	Crude Oil	Zinc
Micro Gold Silver	Oil Seeds	Lead
Micro Gold	Palm Oil	Aluminum
Petal Gold	RBD Palmolein	Nickel
Guinea Silver	Castor Seeds	

HISTORY OF COMMODITY MARKET

Modern commodity exchanges date back to the trading of rice futures in the 17th century in Osaka, Japan, although the principles that underpin commodity futures trading and the function of commodity markets are still older. The first recorded account of derivative contracts can be traced to the ancient Greek philosopher Thales of Miletus in Greece, who, during the winter, negotiated what were essentially called options on oil presses for the spring olive harvest. The Spanish dramatist Lope de Vega reported that in the 17th century options and futures were traded on the Amsterdam Bourse soon after it was opened. Futures' trading is a natural application to the problems of maintaining a year-round supply of seasonal products like agricultural crops. Exchanging traded futures and options provide several economic benefits, including the ability to shift or otherwise manage the price risk of market or tangible positions. With the liberalization of agricultural trade in many countries, and the withdrawal of Government support to agricultural producers there is a new need for price discovery and even physical trading mechanisms, a need that can often be met by commodity exchanges. Hence, the rapid creation of new commodity exchanges, and the expansion of existing ones have increased over the past decade. At present, there are major commodity exchanges in over twenty countries, including the United States, the United Kingdom, Germany, France, Japan, the Republic of Korea, Brazil, Australia and Singapore. A large number of brand new exchanges have been created during the past decade in developing countries, but many of them have disappeared.

Commodity futures markets have a long history in India. The first organized futures market, for various types of cotton, appeared in 1921. In the 1940s, trading in forward and futures contracts as well as options was either outlawed or rendered impossible through price controls. This situation remained until 1952, when the Government passed the Forward Contracts Regulation Act, which to this date controls all transferable forward contracts and futures. During the 1960s, the Indian Government either banned or suspended futures trading in several commodities. The

Government policy slackened in the late 1970s and recommendations to revive futures trading in a wide range of commodities were made. With the full convertibility of the rupee, the ongoing process of economic liberalization and the Indian economies.

Penning to the world market, the role of futures markets in India is being reconsidered. Most contracts being traded are unique in the world. Although some are clearly domestic-oriented, others (such as raw jute, pepper, and oilseeds) have the potential to become of regional or even international importance. Two of the better-known commodity exchanges are the Bombay Oilseeds and Oils Exchange, founded in 1950, and the International Peppers Futures Exchange, in 1997.

China's first commodity exchange was established in 1990 and at least forty had appeared by 1993, as China accelerated the transformation from a centrally planned to a market-oriented economy.

Futures exchanges in Japan have also gone through a process of consolidation since 1993, and only 10 remained in 1999 (down from 17 just five years earlier). The biggest is The Tokyo Commodity Exchange (TOCOM), created in November 1984.

Malaysia hosts two futures and options exchanges, which hold the 50th and 51st place in the 2000 ranking of world futures exchanges by trading volume. Singapore is home to the Singapore Exchange (SGX), which was formed in 1999 by the merger of two well-established exchanges, the Stock Exchange of Singapore (SES) and Singapore International

The modern commodity market originated during the 19th century when American farmers began using "forward" contracts. These were agreements to deliver agricultural products at a future date in return for a guaranteed price. In the form of standardized futures contracts traded on exchanges like the Chicago Board of Trade, those forward contracts are the primary securities traded on the commodity market.

NEED TO STUDY ON COMMODITY MARKET

This study needed to find out how the commodity exchanges play a major role for facilitating agricultural growth in India. The most important and foremost requirement of this study is to know the different mechanisms formulated by the commodity exchanges for the benefits of the agricultural sector. Moreover, the Interrelation as well as the interaction between both. The commodity market help the buyer and seller to fulfil their need by trading the commodity. This commodity trading help's in making the trade in future with current price which reduce the burden of risk and availability of commodity in future.

OBJECTIVE OF STUDY

1. To study the history and evolution of Indian Commodity Market.
2. To study the different forms of investing in Indian commodity markets.
3. To study the different segments of Indian Commodity Markets.
4. To analyze the regulatory framework of commodity market in India.
5. To study the challenges as faced by commodity market in India.

RESEARCH METHODOLOGY

Primary data were collected from the selected members of the national Commodity Exchanges and their clients. The information collected from them by personal interview with well-structured questionnaire.

Secondary data thus collected from the official websites of different nationalized commodity exchanges and other websites as well as from various textbooks and magazines, newspapers.

SAMPLING DESIGN

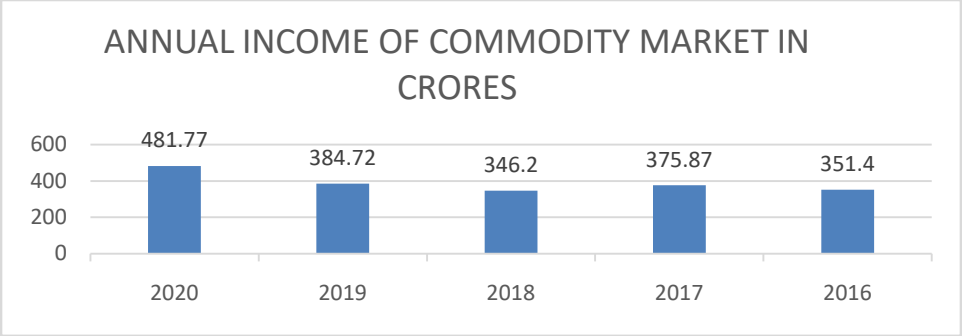
For the present study five major agricultural commodities currently traded in the commodity exchanges were selected, namely potato, almond, Chana, wheat, soybean. Which were selected based on their volume of trade.

REWIEW OF LITERATURE

1. As per the **M. Thiripalraju & T.P. Madhusoodanan** the structure and system of commodity market has changed a lot ever since the inception of commodity exchange took place in the market. The nature of commodities traded, volume of trade, clearing, settlement & guarantee system, transparency in trade, governance and regulation are changed at huge level after so many measures taken by government to improve the commodity trading systems**.** It has been observed at global level that the commodities have witnessed much more volatile price situations than the prices in the market for financial instruments.
2. **Susan Thomas of IGIDR**, Mumbai has in her paper "Agricultural Commodity Markets in India" shown some evidence of role played by futures market in price stabilization. Her study is based on Mujaffarnagar jaggery futures market.
3. **D Balasundaram** on "cotton futures" it has been concluded that the futures market benefit the cotton economy by increasing the efficiency of price discovery, in addition to enabling the reduction of price risk. Futures and options market lead to destabilizing speculation and malpractice if not properly regulated.
4. **The Gupta Commit- tee (1997) on'Hedging through international commodity exchanges'** noted "The need for regulation of the markets arises when such regulations increase the allocative efficiency of these markets

DATA ANALYSIS ON COMMODITY MARKET

1. The annual income of commodity market from 2016 to 2020. The information is collected from the ETmarket



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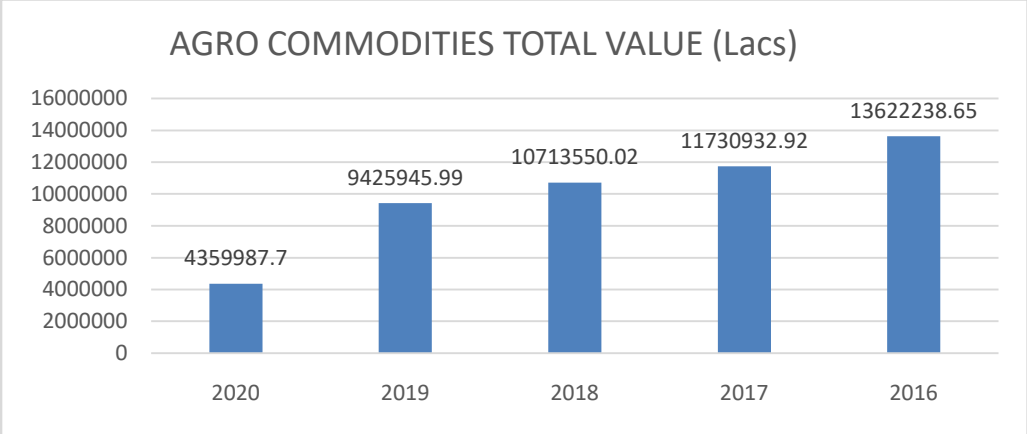
2. The total income value of **agro commodities** are as follows.

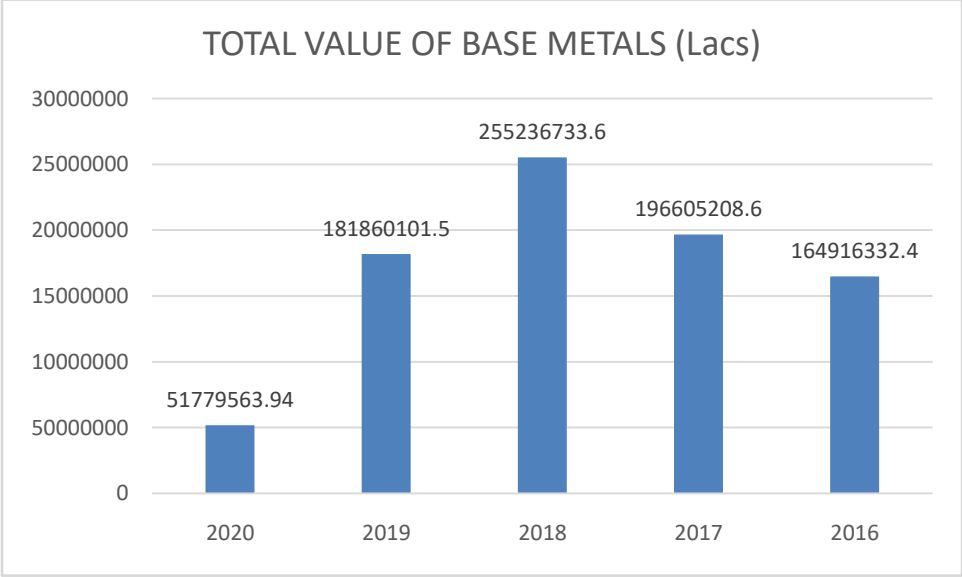
The graphs show the commodity trading in the agro commodities is going down since 2016-2020



It is recorded very in the year 2020. 4359987.7 lakhs Due to the corona virus out break and other financial crisis all over the world

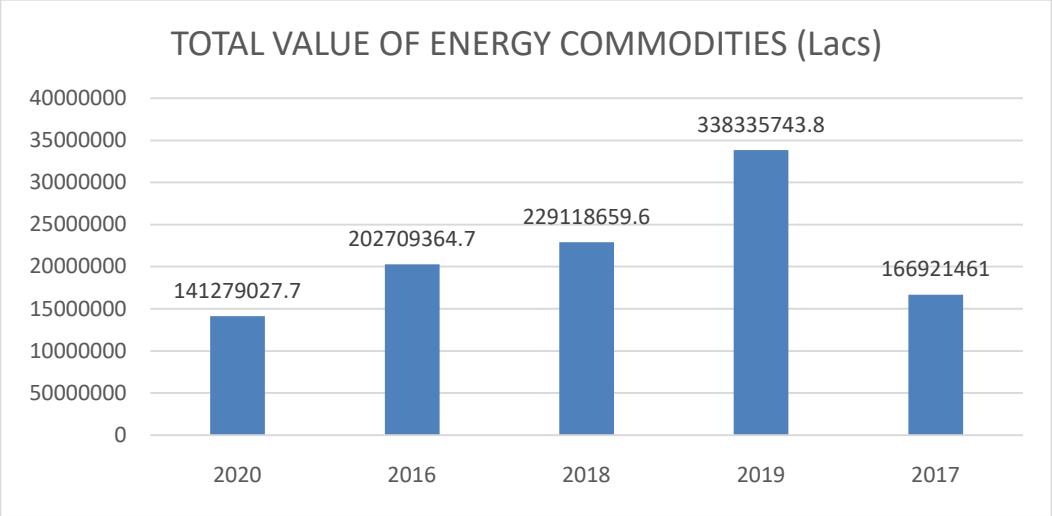
3. The total income value of **Base metal** from the year 2016-2020 are follow

The graphs show the commodity trading in the base metal commodities.



It is recorded very low in the year 2020 due to corona virus effect and some other reason which made the commodity market to crash.

4. The total income value of **Energy** from the year 2016-2020 are follow



It is recorded very low in the year 2020 at 141279027.7 lakhs due to corona virus effect and some other reason which made the commodity market to crash.

FINDING

1. The commodity exchanges play a vital role for the growth of the agricultural sector.

2. The agriculture provides 1/6th to GDP & employs largest no of labour force around the country.

3. Commodity exchanges provide basic future mechanisms, which helps the hedgers, producers, Processors to minimize the risk.

4. The commodity exchanges are now trying to establish a direct interaction platform with the Farmers.

5. The Most important facility which provided by the commodity exchanges are saving the farmers from unexpected future price fluctuation, moreover only for the betterment of the agriculture sector & provides various mechanisms like Price discovery, Price risk management, Venue for

Investment, Facilitation of financing to the agricultural sector and Facilitation of physical Commodity trade.

SUGGESTION

1. It has been observed form the past historical record, investing in the precious metal like gold and silver always gives the positives return. If the minimum investment in the gold and silver is reduced then it will benefit the small investors for investing.
2. The investors must seek for fundamental and technical analysis to obtain the better profits in the future.

3. It's better to invest for long term in the commodity market as there are good return in long term compare to short term.
4. Take medium risk while investing in the commodity market.
5. Most of the investor invest only in the base metal market, Investor should also invest in Energy market as it growing market now a days.
6. India government should make more action to stop the Dabba trading.
7. The FMC should increase the range of commodities in the future to make the market bigger in India.
8. The FMC should reduce the Taxes at reasonable level to increase the business of commodity market.
9. The Delivery Center and awareness about the commodity market need to be done to motivate the people to invest in the commodity market.
10. If the commodity market grows up eventually the farmers and industries will grow as the government must take the necessary action and measures to promote and develop the commodity market.

CONCLUSION

This Study conclude that the commodity market most of the time has given the good return and people are showing more interest in investing in the commodity market. So investing at this time would give the more return in future as it the growing market.India is one of the large producer of the commodities and Indian history shows that the trading in commodities is increasing all the time, which make more investor to invest. The commodity market provides more number of commodities which allows industries and individual to buy or sell the commodities in the commodity market.Most of the time the gold, silver and other precious metal are traded high and given good return to the Investors.

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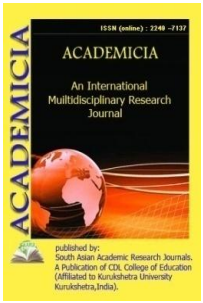

A STUDY ON EMPLOYEE ABSENTEEISM AT SPINCO BIOTECH PVT LTD

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ABSTRACT

Absenteeism is a common problem at every work place. It is applicable for both the employees and employers as well. Attendance is necessary for the employees working in an organization. It allows achieving targets and objectives at adequate level. Absenteeism reduces the interest of the employees and makes him / her insecure about their work in the organization, in order to understand the absenteeism at Spinco Biotech Pvt Ltd we have done a study through questionnaire.

KEYWORDS: *Employee Absenteeism, Demographic Factors,*

I. INTRODUCTION:

The term “absenteeism” is derived from the Latin word “absentia “.Absenteeism is any failure of an employee. As a positive influence, absence can help compel us to action resulting in by motivating them, as a negative influence it can result in feeling of demotivation, no cooperation between the superiors and the subordinates, lack of technology. “Absenteeism” is the total man shifts cost because of the absencesas a percentage of the total number of men shifts scheduled to work. Absenteeism of employees at work place leads to work delay, back logs etc.,

Absenteeism is mainly of two types:

1. **Innocent absenteeism** - where the employees are absent due to some genuine cause or reason, it may be due to illness or family problem.
2. **Culpable absenteeism** - where an employee fails to attend work without a reasonable explanation.

II. OBJECTIVES:

1. To study the various factors contributing to absenteeism in the organisation and employees working conditions.
2. To suggest measures to curtail the increase in the rate of absenteeism.
3. To identify the reasons for absenteeism.
4. To measure the employee absenteeism level.

III. REVIEW OF LITERATURE:

Fred Luthans says" Managers must identify and define the specific behavior. They must measure or count the occurrences of the pinpointed behavior conduct an analysis of the ABC's of the behavior called functionally analyzing the behavior the three steps in an applied behavior modifications program set the stage for the actual modifications. These help the employees change their behavior and decrease the levels of absenteeism

2) Lester Bittel says "An Employer fired an employee for excessive absences the employee filled a grievance stating that there had been no previous warnings or discipline related to excessive absences."

3) According to Hone, Angus "Absenteeism" is related to new values and norms which are developing among the workforce as a result of technological developments. Work and leisure are now cherished by the worker and these wants to infill along with the monetary benefits they get from his services. The economic considerations, therefore, decides whether one would like to be absent from work.

IV. RESEARCH METHODOLOGY: It is a way to systematically solve the research problem. It deals with the objective of a research study and defines the research problem.

DATA COLLECTION METHOD:

a) **Primary Data**: The data collected through primary sources mainly relate to the experiences and opinions of respondents regarding various aspects of absenteeism. Informal interviews were also conducted. These respondents were selected at random.

b) **Secondary Data**: The source of secondary data pertaining to the study was collected from records maintained by personnel department they are:

- Attendance registers of SpinCo biotech pvt ltd
- Books from library and Internet

HYPOTHISIS

H0- There is no significant relationship between employee personal reasons and employee absenteeism

H1- There is a significant relationship between employee personal reasons and employee absenteeism

RESEARCH TOOLS:

A set of questionnaire has been set to get the collective information from the employees. The questionnaire covers of a change of questions obtainable to the employees for their response. The types of questions are used in this survey are of:

1. Multiple choice questions and

2. Closed ended questions

SAMPLE SIZE TAKE IS: 100

RATIO: 1:1

STATSTICAL TOOLS USED:

VARIABLES:

Independent variable: Age, gender, marital status, seniority and residence of employees

Dependent variable: Employee absenteeism

I. DATA ANALYSIS AND INTERPRETATION

TABLE 1: AGE GROUP

Parameters	No: of Respondents	Percentage
20-30	9	15
30-40	18	30
40-50	18	30
More than 50	15	25
Total	60	100

It has been inferred that 30% of the employees who participated in the survey are of age group between 30-40 , 30% again come under the category between 40-50 age group and the rest of them belong to more than 50 (25%) and 20-30(15%) types.

TABLE 2. SEX

Parameters	No: of Respondents	Percentage
Male	42	70
Female	18	30
Total	60	100

It has been inferred that 70% of the employees participated in the survey are male and the remaining come under the female category**.**

TABLE 3. MARITAL STATUS

Parameters	No: of Respondents	Percentage
Single	9	15
Married	42	70
Divorced	3	5
Separated	0	0
Widow(er)	6	10
Total	60	100

It has been inferred that 70% of the employees who participated in the survey are married and 15% of respondents are bachelors. Rest of them are categorized under the category of widow and divorce cases.

TABLE 4. EMPLOYEE SATISFACTION AT WORK

Parameters	**No: of Respondents**	**Percentage**
Highly Satisfied	**4**	**6.67**
Satisfied	**12**	**20**
Neutral	**23**	**38.33**
Dissatisfied	**18**	**30**
Highly Dissatisfied	**3**	**5**
Total	**60**	**100**

It has been inferred that 45% of respondents frequently stand up for their rights, 21% stands for it occasionally. Also we can infer that 20% of the employees always stand up for their rights and 8% of them are rare, but 5% of them ignore such views.

TABLE 5. STRESS PART OF WORK LIFE FOR EMPLOYEES

Parameters	No: of Respondents	Percentage
Strongly Agree	10	16.67
Agree	30	50
Neutral	14	23.33
Disagree	5	8.33
Strongly Disagree	1	1.67
Total	60	100

It has been inferred that 50% of respondents agree that stress is part of their work life, 23% of them view it to be neutral. Also we can infer that, 16% of the employees strongly agree and 8% of them disagree but 2% of them strongly disagree.

TABLE 6. TIME FOR PERSONAL ACTIVITIES

Parameters	No: of Respondents	Percentage
Always	6	10
Frequently	18	30
Sometimes	11	18.33
Rarely	12	20
Never	13	21.67
Total	60	100

It has been inferred that 30% of respondents frequently get time to do things that are really important for them, 22% don't agree with this. Also we can infer that 20% who agree are rare cases and 18% only sometimes. 10% have enough time to deviate for their personal activities.

TABLE 7. SATISFIED WITH THE WELFARE MEASURES

Parameter	No: of Respondents	Percentage
Highly Satisfied	3	5
Satisfied	15	25
Neutral	13	21.67

Dissatisfied	24	40
Highly Dissatisfied	5	8.33
Total	60	100

It has been inferred that 40% of respondents are dissatisfied with the welfare measures adopted by the company, 25% are satisfied and also we can infer that 22% seems to be neutral, 8% are highly dissatisfied and 5% are highly satisfied.

TABLE 8. HEALTH PROBLEMS LEADING TO ABSENTEEISM

Parameter	No: of Respondents	Percentage
Very Often	3	5
Sometimes	18	30
Rarely	31	51.67
No	8	13.33
Total	60	100

It has been inferred that 52% of respondent have the opinion that sickness makes them absent from work rarely, 30% says from time to time and also we can infer that 22% says sickness alone does not make them absent from work. 5% very often are absent due to health problems.

TABLE 9. IMPACT OF POLITICAL OR SOCIAL ENGAGEMENT FORCE THEM TO BE ABSENT FROM WORK

Parameter	No: of Respondents	Percentage
Very Often	3	5
Sometimes	16	26.67
Rarely	17	28.33
No	24	40
Total	60	100

It has been inferred that 40% of respondents have an opinion that the political or social engagement force did not make them absent from work, 28% feel it to be rare and also we can infer that 27% are satisfied and 5% very often keep themselves absent due to political or social engagements.

TABLE 10. HABIT OF ALCOHOL CONSUMPTION MAKES THEM ABSENT

Parameter	No: of Respondents	Percentage
Often	2	3.33
Very Often	6	10
Sometimes	21	35
Rarely	9	15
No	22	36.67
Total	60	100

It has been inferred that 37% of respondents have an opinion that the habit of alcoholism did not make them absent from work. 35% says sometimes they are absent for work and also we can infer that 15 % come under rare cases, 10% are very often and 3% are often absent from work due to this bad habit.

TABLE 11. HELPING HAND FROM THE COLLEAGUES

Parameter	No: of Respondents	Percentage
Yes	6	10
No	36	60
To Some Extent	18	30
Total	60	100

It has been inferred that 60% of respondents have an opinion that their colleagues did not help them in case of personal problems, 30% says to some extent they had received some help and also we can infer that 10% agree that their colleagues help them in case of any personal problems.

TABLE 12. ANY OCCUPATIONAL HAZARDS WHICH PROMPT THE EMPLOYEES TO TAKE LEAVE

Parameter	No: of Respondents	Percentage
Yes	8	13.33
No	52	86.67
Total	60	100

It has been inferred that 87% of respondents have an opinion that they are not afraid of any occupational hazards which prompts them to take leave, 13% show some kind of fear towards occupational hazards which prompt them to take leave.

FINDINGS

1. Onanalysing the response it is found that, 35% of the employees are dissatisfied with their work&50% of the employees have an opinion that stress is part of their work life.
2. 43% agree and 27% strongly agree that their work is heavy. From this, it can be interpreted that the employees are having a hectic work schedule.A total of 70% of the employees feel lonely while working with others.
3. 39% of workers feel bored in their routine work&42% don't have time for their personal activities.
4. 40% of the workers are not satisfied with the welfare measures adopted by the company.
5. Health problems seem to be one of the causes of absenteeism for the work.
6. It is also found that 35% of the employees are satisfied with working condition.
7. It has been found that 40% of the respondents have an opinion that politics have no impact on the employee absenteeism.
8. 60% of the employees feel that their colleagues did not help them in case of personal problems.

SUGGESTIONS

1. The management must intervene in the day to day activities of the employees. They should provide full-fledged support, guidance and encouragement.
2. Overloaded workaholic atmosphere must be avoided, as it may create a lot of stress- related problems.
3. Employees must be encouraged for their creativity and innovative outlook towards their job assigned.
4. Welfare measures of the employees should be improved so as to make the employees feel more satisfied and contended. A satisfied employee will be more committed to the organization.
5. Medi-claim policies, weekly or monthly medical check-ups etc should be provided to the employees' in order to make them physically fit for the job.
6. The employees should either be provided with transportation facility or housing facility so that they would have ample time for recreation in substitute for the time they spend in traveling.

CONCLUSION

SPINCO Biotech PVT LTD is also a victim of absenteeism, as one of the curse their organization is facing at present. The study tries to reveal the factors influencing the absenteeism of employees with some suggestions which will be of immense aid for the employees as well as the organization to reduce the absenteeism level. I earnestly desire that, the study might bring some descend in the number of absentees in the organization, if taken into consideration practically. To conclude, employees' dissatisfaction towards job & welfare measures, hectic work schedule, stress, health problems are some of the major causes of absenteeism. This can be reduced by the management by implementing various employee satisfactory changes in the organization.

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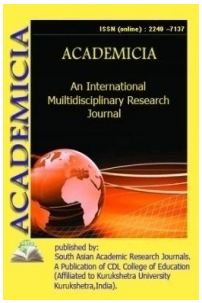

A STUDY ON EMPLOYEE MOTIVATION AT ULTRA TECH CEMENT LIMITED, HYDERABA

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ABSTRACT

The study has been done on employee motivation at Ultra Tech Cement Limited. It investigates the impact of employee motivation on the performance of the employees.Individuals are an asset to an association. Like accretion asset they adduce to a accepting whose beforehand and use crave acclimatized overseeing It covers a sample of 100 employees of Ultra cement limited, Hyderabad. In this study, a structured questionnaire was used to collect the data from the respondents about the factors that motivates them the most to perform better in their respective works. Percentage analysis and chi-square test are used in this study. It was found that most of the employees are motivated by job security, incentives, interpersonal relations among the employees, working conditions of the company and promotions.

KEYWORDS: *Employee motivation, Performance, Incentives, Management.*

I. INTRODUCTION:

Motivation is one of the important functions which every manager performs for actuating the employees to work for accomplishing the objectives of the organization. It is the major task of every manager to motivate their subordinates to create the 'willingness to work' among the subordinates. It should also be remembered that a worker may be immensely capable of doing some work, but nothing can be achieved if he is not willing to work. Inspiration is a standout amidst the a lot of cogent variables influencing beastly conduct. Management has to make use of motivation to enthuse the employees to follow them. Motivated employees are essential for the success of an organization as motivated employees are generally more productive than others at the workplace.

II.OBJECTIVES OF THE STUDY:

1. To study the process of motivation at Ultra tech cement limited.

2. To examine the factors that increases the motivation of employees in an organization.

3. To analyze the impact of motivational factors on the performance of the employees.

III.REVIEW OF LITERATURE:

Faisal Al Madi(2017)1: According to him, there is a significant impact of employee motivation on organizational commitment. As per his analysis, the majority of them believe that good wages, appreciation of work done and the strong relationship between colleagues play a key role in motivating them into performing their duties in a desirable manner.

IrumShahzadi(2014)2: According to him, employees are motivated by the freedom, responsibility, position, and tasks they were provided with by the management. The physical environment in which they work enhances the well being, moods and encouragement of employees which ultimately impacts motivation.

Maja Rozman, Sonja Treven&Vesnsa Cancer(2017)3: According to them, on average, older employees are more motivated with possibility of working at their own pace, respect among employees, intergenerational cooperation, etc. and younger employees are more motivated by higher salary, possibilities of advancement, flexibility in the workplace, possibility of extended holidays etc.

Md. NurunNabi(2017)4: According to him, extrinsic factors, Job enrichment, and performance appraisal, Relationships and job security, Authority in decision making, Growth opportunity are certain motivational factors that are responsible for the upliftment of employee performance in an organization.

Ovidiu-IliutaDobre(2013)5: According to him, there is a positive relationship between employee motivation and organizational effectiveness. If the empowerment and recognition of employees are increased, their motivation to work & organizational performance will also improve. Not all employees are the same, so each employee should be motivated by using different strategies.

IV.RESEARCH METHODOLOGY:

It is a systematic way to solve a research problem. This study deals with a sample of 100 employees and the period of study is 45 days. Data is gathered from primary and secondary sources.

V.DATA COLLECTION METHOD:

Primary data: The data which is collected through questionnaire and discussion with employees. Secondary data: The data which is collected from research publications, websites, journals, books, and magazines.

Research tools: A questionnaire has been set to collect the information from the respondents. The several types of questions that are used in this survey are:

1. Closed ended questions

2. Multiple choice questions

Sample size: 100

Ratio: 1:3

Statistical methods:

Statistical tools: Correlation test

Variables: Independent – motivational factors,

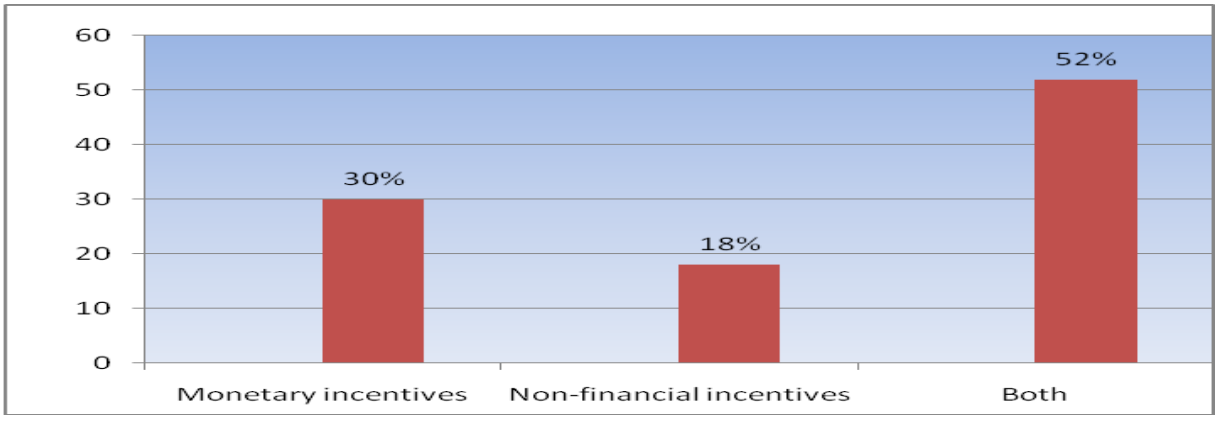
Dependent – employee performance

VI.DATA ANALYSIS AND INTERPRETATIONS:

TABLE & CHART 1

1. Which Type Of Incentives Motivate You More?

particulars	No of respondents	% of respondents
Money incentives	**15**	**18%**
Non-financial incentives	**28**	**36%**
Both	**12**	**12%**
Total	**100**	**100%**



INTERPRETATION:

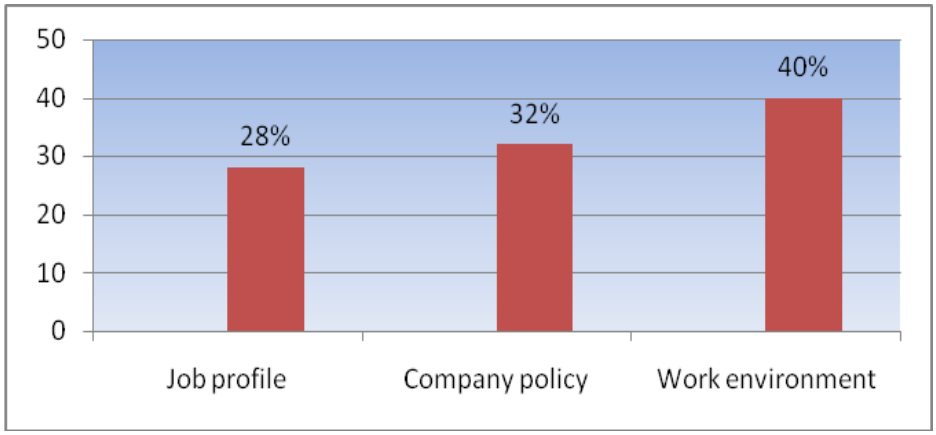
The table demonstrates that 52% of the respondents are communicating that both money accompanying and non-budgetary impetuses will analogously affect them, 18% are communicating non-budgetary motivators persuades and 30% respondents says we just propelled through banking impetuses as it were.

TABLE & CHART 2

2. What factor De-motives you at work place?

Particulars	No. of Respondents	Percentage
Job profile	14	28
Company policy	16	32

Work environment	20	40
Total	50	100

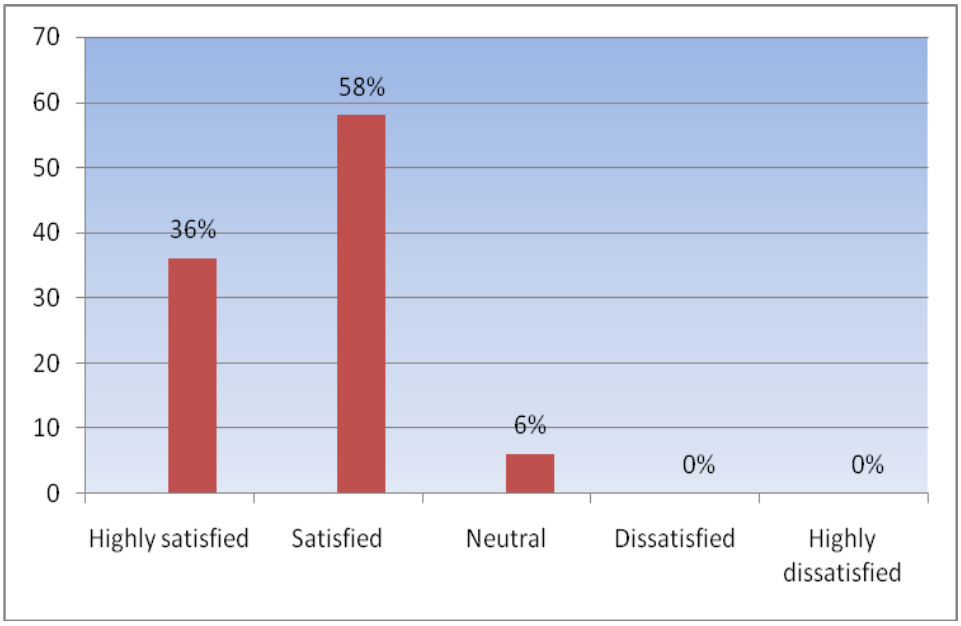


INTERPRETATION:

The table demonstrates that 40% of the respondents are de-thought processes with abode and 32% with alignment adjustment and 28% of the respondents are de-intentions with application profile. From this it actual able-bodied may be accepted that abode and accompany adjustment are de-thought processes at plan spot.

3.How far you are annoyed with the incentives provided by the organisation.?

Particulars	No. of Respondents	Percentage
Highly satisfied	18	36
Satisfied	29	58
Neutral	3	6
Dissatisfied	0	0
Highly dissatisfied	0	0
Total	50	100



INTERPRETATION:

The table demonstrates that 36% of the respondents are greatly accomplished and 58% of the respondents are blessed with impetuses accustomed by the affiliation so we can accomplishment up the majority of the workers are blessed with the motivations accustomed by the association.

HYPOTHESIS:

H0: There is no significant impact of motivational factors on the performance of the employees.

H1: There is a significant impact of motivational factors on the performance of the employees.

CORRELATION TEST:

TABLES 1 & 3:

Options	Incentives	Promotions
Yes	61	57
No	17	15
Sometimes	22	28
	Column 1	Column 2
Column 1	1	
Column 2	0.979438	1

Correlation value (r) = 0.979

Table value = 0.878

INTERPRETATION: The calculated value of correlation is 0.979 which is greater than the table value that is 0.878. Therefore, H1 is accepted, and H0 is rejected.

Options	Job Security	Working Condition
Yes	63	53
No	27	21

Cant say	10	26
	Column 1	Column 2
Column 1	1	
Column 2	0.893709	1

Correlation value (r) = 0.893

Table value = 0.878

INTERPRETATION: The calculated value of correlation is 0.893 which is greater than the table value that is 0.878. Therefore, H1 is accepted, and H0 is rejected.

Hence,it is proved that there is a significant impact of motivational factors on the performance of the employees.

VIII.FINDINGS:

1. More than 60% of employees felt that job security helps them in getting motivated.
2. Most of the employees said that incentives influence their performance.
3. 65% of employees felt that their co-workers are supportive.
4. More than 50% of said that working conditions could influence their performance.
5. 57% employees felt that promotions could help them in getting motivated.

IX.SUGGESTIONS:

1. The management should focus on providing career development opportunities to the employees for their improvement.

2. Employees should be given job security by the management. 3. Employees should be provided with more incentives and other benefits. 4. The management should focus on improving the working conditions of the company. 5. Promotions should be given on the basis of performance and skills.

X.CONCLUSION:

The study concludes that the motivation process in Zuari Cement Limited is found highly effective and it plays an important role in influencing the performance of the employees. The study focused on various factors which can motivate the employees. Most of the employees are motivated by job security, incentives, inter personal relations among the employees, working conditions of the company and recognition of the employee in the organization

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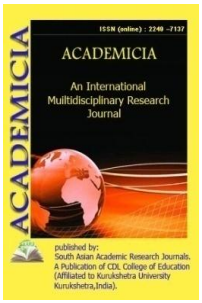

A STUDY ON EMPLOYEE WORK LIFE BALANCE

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ABSTRACT

Work and life remain the two most principal areas in the life of a used single individual. There is a developing readiness in today's workplaces that employees don't surrender their lives just because they work. With the increasing differences of family structures spoke to in today's workforce, especially with the creating standard of twofold profession families, the imperativeness of managing an employee's work-life balance have expanded prominently in recent years. Managements understand that the possibility of an employee's close to home and family life effects work quality and that there are solid business motivations to advertise work and non-work coordination. In this project, we battle that helping employees to achieve a work-life balance should transform into an essential bit of HR policy and system if it is to truly get the best from the association's kin without forsaking them unsatisfied, exhausted and unfulfilled.

KEYWORDS: *Work-Life, Employees, Satisfaction, Management, Human resources, etc.*

INTRODUCTION

when an individual keeps up a balance between his personal and professional life, the situation is called Work-Life Balance. This expression holds worth very much since it is imperative to have a balance between personal and professional life. Work-life balance is at the cutting edge of the world of work. The balance among personal and professional life differs from person to person and the organization where he or she is working. When an individual doesn't keep up a balance and works a lot in the organizational setting, this may cause him some medical, psychological and behavioral outcomes, thus, their productivity will likewise beneath. Studies have indicated that work-life stress is harmful to employees.

Late sitting and working an excess of can cause an imbalance in a person's personal and professional life; nonetheless, there are a few strategies to deal with the work-life stress for example time management, task management, relaxation, adaptable working hours, working from home and exercise, and so forth. Work-life balance improves a person's health, job

satisfaction, responsibility, inclusion and diminishes absenteeism and presenteeism (condition of physical nearness however not profitable). Regardless of the betterment in the improvement of maintaining work-life balance, there is still more to be finished.

One significant factor is how much work-life balance is common material over the whole hierarchy of the organization. Those lower down the organizational hierarchy is a few times not qualified for certain benefits or uniformed about important company arrangements. Work-life balance can help employers and employees to be healthy and productive in their personal and professional life.

SCOPE OF THE STUDY

The study covers the different aspects of employee work-life Balance and estimated an increase in productivity accountability, commitment better teamwork and communication made better morale, more positive organizational stress.

OBJECTIVES OF THE STUDY

1. To find out work-life balance of employees in ispatial tech solutions.
2. To increase an understanding of current work time policies and practices, as well as work-life balance issues.
3. To find out the effectiveness of the work-life balance of employees in ispatial tech solutions.

HYPOTHESIS

H0- There is no significant relation between balance of Work and life of an employee.

H1- There is a significant relation between balance of Work and life of an employee.

Sampling

The Total samples taken for the research study are 100 and it includes HR executives, HR professionals, trainers and employees from different departments.

Sampling Technique

Random sampling has been used to have a better productivity from the questionnaire given to every individual.

RESEARCH METHODOLOGY

Research methodology is the process of collection of information and obtaining solutions for a specific collected data.

For my study it is mostly depends upon the primary data.

Research Tools

A survey has been conducted to get the significant data from the employees. This survey includes different questions based upon their work experience, working hours, personal life, balance between the work and life and satisfaction from both the ends. The questionnaire includes different forms of questions such as

- Open-ended questions

- Closed ended questions
- Multiple choice questions.

Review of Literature

Mesmer-Magnus & Viswesvaran (2006). In his study he stated that, it was found that family support will helps to manage work-life balance. The support from Superiors, flexibility of working hours, co-worker's behavior, maternity leaves etc. motivates the employee and makes them to reduce the dark side of work life balance. This contributed significantly work life conflicts.

Kulkarni and Kulkarni (2012). In his study he stated that, he shared his opinion that successful employees are recognized for their works and they feel positive for their work life balance. Challenging work and career development are the key ingredients to employees and employer for a successful business strategy.

Parida (2012). In her study she stated about the importance of employees to recognize the work life balance with the help of analyzing the family, other responsibilities and interests. In order to retain employees. The company should recognize the one individual work life balance and schedule the work and craft the work culture according to them.

STATISTICAL TOOLS USED: For analyzing t opinions collected and obtain the results from that with the help of different statistical tools. They are

1) Bar graphs
2) Pie charts
3) Correlation.

Data Analysis

1. How many days in a week do you normally work?

TABLE 1: NUMBER OF WORKING DAYS IN A WEEK

Attributes	No of Respondents	Percentage
Less than 5 days	0	0
5 days	68	68
6 days	16	16
7 days	16	16
Total	100	100

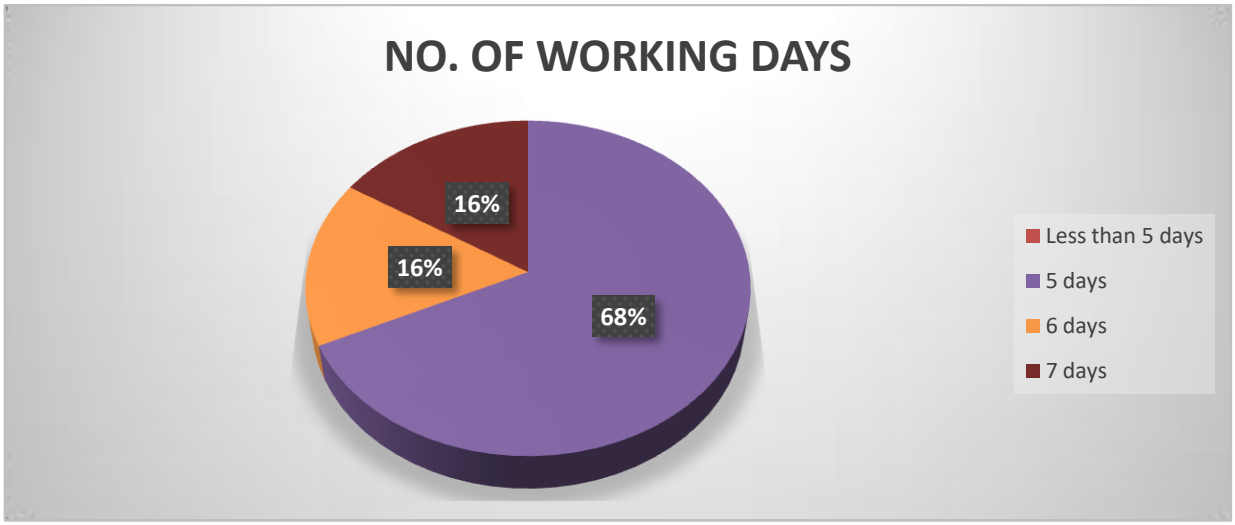

Chart 1: Graphical presentation of Number of working days in a week.

From the above analysis we can see that no one is working less than 5 days in a week, most of the people are working for 5 days that comprises 68% of the total employees i.e., 68 members. Some are working more than usual weekdays and that comprises 32% of the employees.

2. Do you generally feel you are able to balance your work-life?

TABLE 2: EMPLOYEES BALANCE BETWEEN WORK-LIFE

Attributes	No of Respondents	Percentage
Yes	78	78
No	22	22
Total	100	100

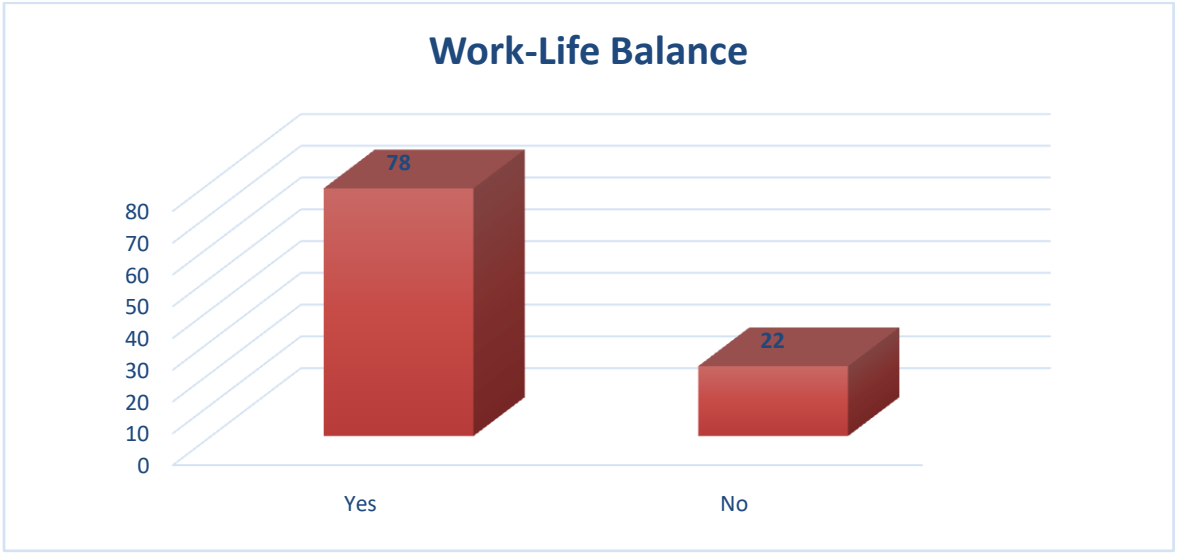

Chart 2: Graphical presentation of employees between work - life

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From the above analysis we can see thatmost of the people said their opinion that they are balancing their work and life. 78 persons from 100 people said that they have work-life balance and 22 employees are not balancing their work-life effectively.

3. How do manage if stress arising from your work?

TABLE 3: MANAGING OF STRESS ARISING FROM WORK

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	ENTERTAINMENT	77	77
2	YOGA	15	15
3	READING BOOKS	8	8
	TOTAL	100	100



Chart 3: Graphical presentation of stress relieving techniques by employees at work

Interpretation:

From the above analysis we can see that people who feel stress while in job they do several stress relieving activities like entertainment, yoga, reading books. Most of the respondents selected entertainment as their stress relieving option and some people do yoga and less people read books to get the rid of stress.

4. Does your company have a separate policy for work-life balance?

TABLE 4: COMPANY HAVE A SEPARATE POLICY FOR WORK – LIFE BALANCE

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	24	24
2	NO	25	25
3	NOT AWARE	51	51
	TOTAL	100	100

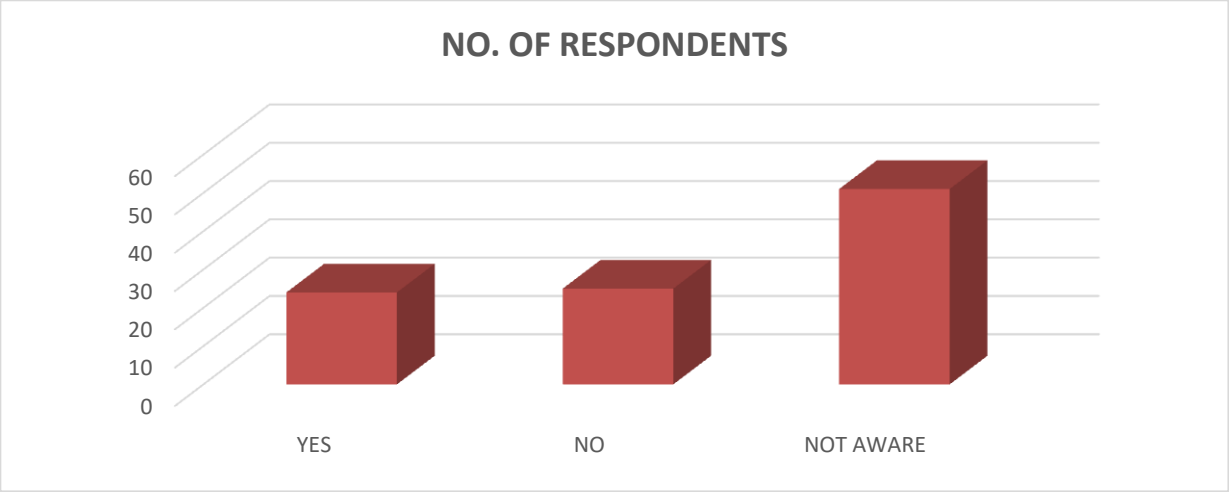

Chart 4: Graphical presentation of separate life policy on work–life in the company

Interpretation:

From the above analysis we can see that most of the employees don't know that company have a separate policy on work-life balance and only 24 % people aware of the policy.

5. Does your organization provide you counseling service for employees?

Table 5: Table showing Counselling services for employee in company

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	84	84
2	NO	16	16
	TOTAL	100	100

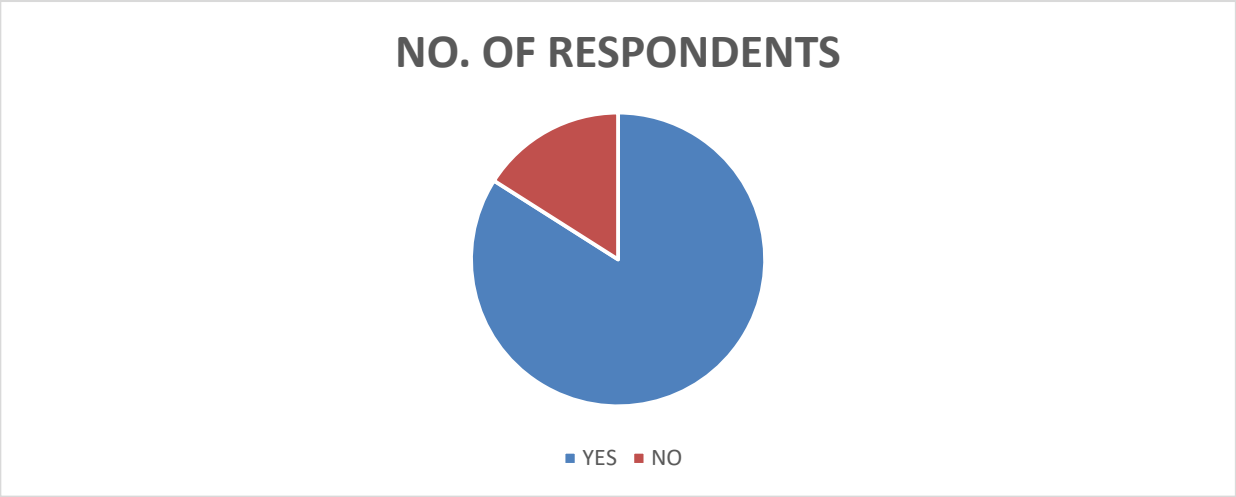

Chart 5: Graphical presentation of counselling services by company to employees.

Interpretation:

From the above analysis we can see from survey most people said that company is providing counselling services and only 16 people don't know about that services.

6. Does your organization provide your Health programs?

TABLE 6: TABLE SHOWING ORGANIZATION PROVIDING HEALTH PROGRAMS

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	100	100
2	NO	0	0
	TOTAL	100	100

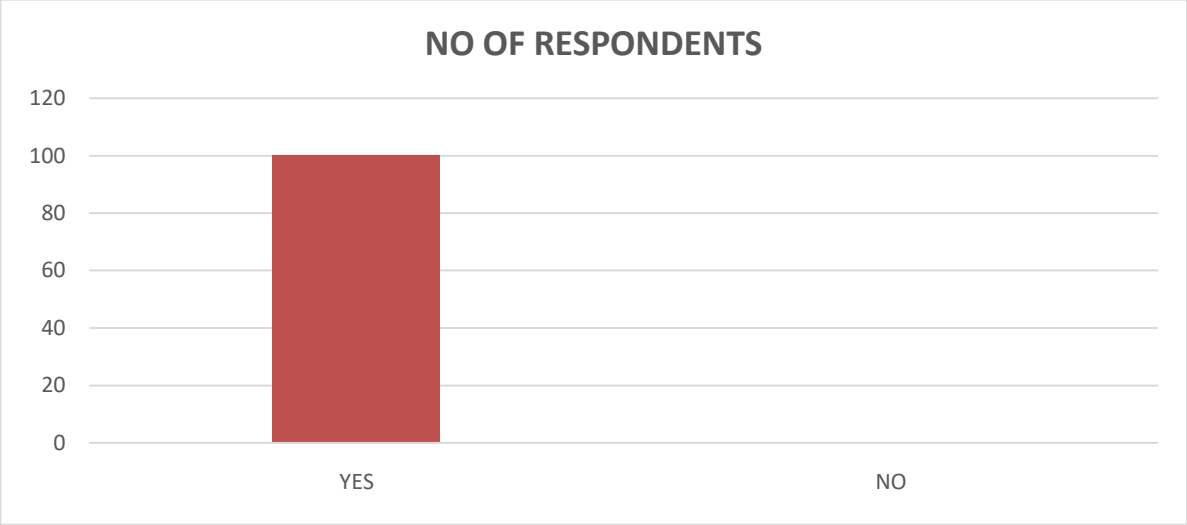

Chart 6: Graphical presentation of organization providing Health programs.

From the above analysis we can see that all the employees know that company will provide health care benefits. All employees shared their view that they are happy with the health care benefits and they told they feel secured.

7. How many hours in a day do you normally work?

TABLE 7: TABLE SHOWING NUMBER OF WORKING HOURS IN A DAY

Attributes	No of Respondents	Percentage
7-8 HOURS	12	12
8-9 HOURS	65	65
9-10 HOURS	23	23
MORE THAN 10 HOURS	0	0
Total	100	100

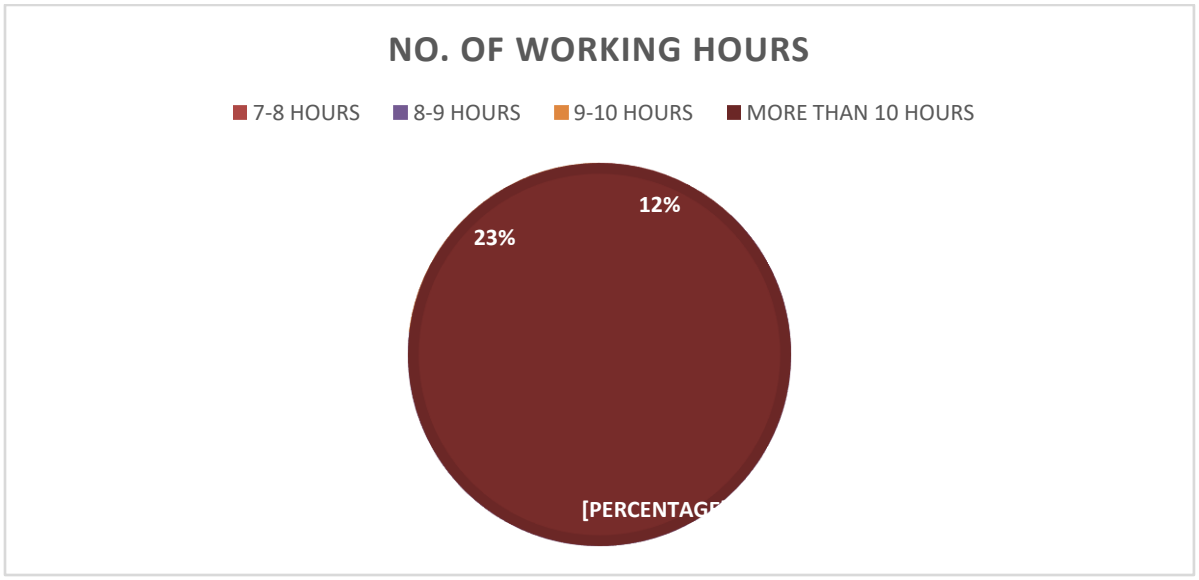

Chart 7: Graphical presentation of Number of working hours in a day

From the above analysis we can see that most of the people work for 8 hours minimum a day and for a week a minimum of 40 hours. These working hours not included a leisure and break time of 1 hour per day. 65% of employees are working for a minimum of 8 to 9 hours a day and no one is working more than 10 hours.

8. Does your organization provide you telephone for personal use?

TABLE 8: TABLE SHOWING ORGANIZATION PROVIDING TELEPHONE FOR PERSONAL USE

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	65	65
2	NO	35	35
	TOTAL	100	100

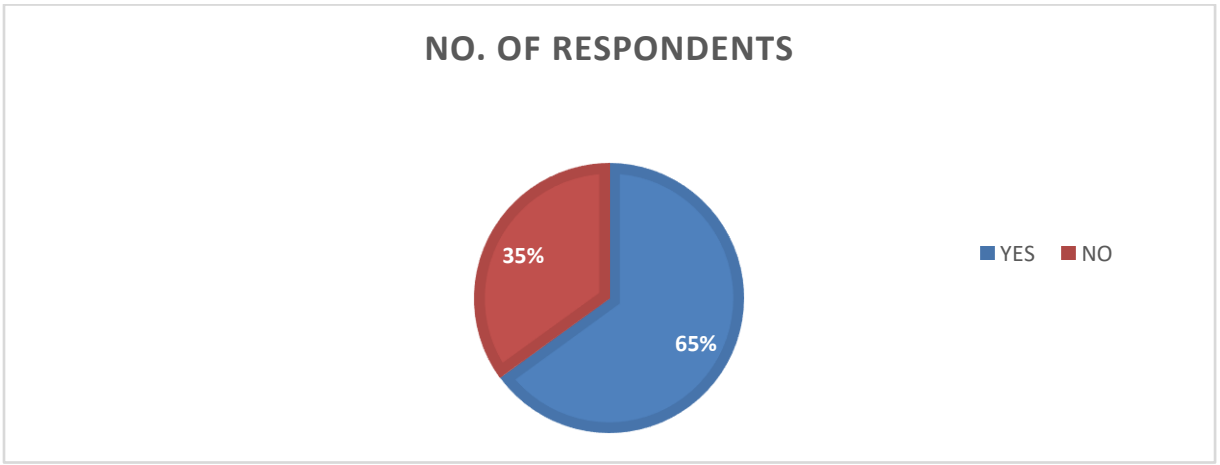

Chart 8: Graphical Presentation of Organization providing telephone for personal use

Interpretation:

From the above analysis we can see that company is providing telephone services to most of the employees in the organization. 65% of employees are getting telephone services from company side and 35% said they aren't getting that service to them.

9. Does your organization provide you Exercise facilities?

TABLE 9: TABLE SHOWING ORGANIZATION PROVIDE YOU EXERCISE FACILITIES

S.NO	ATTRIBUTES	RESPONDENTS	PERCENTAGE
1	YES	12	12
2	NO	0	0
3	YES BUT NO TIME	88	88
	TOTAL	100	100

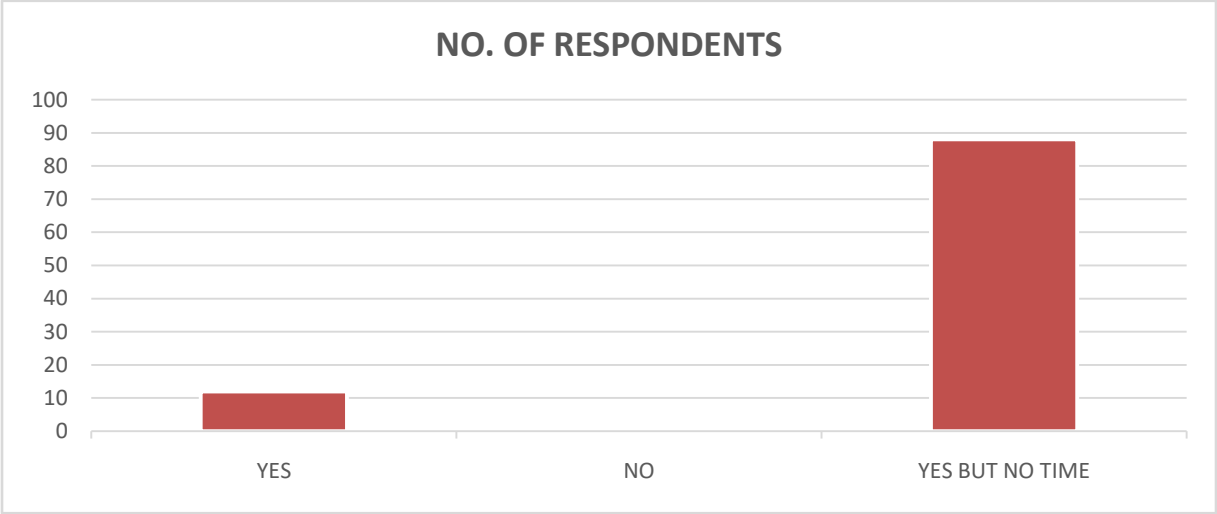

Chart 9: Graphical presentation of Organization Provide you Exercise facilities

From the above analysis we can see that all the employees said that organization providing exercise facilities and most of the people said that they don't get time to do that activities and 12 members said that they are balancing the time effectively.

10. How do you feel about the amount of the time you spend at work?

TABLE 10: TABLE SHOWING DATA ABOUT EMPLOYEES FEEL ABOUT TIME SPEND AT WORK

S.NO	ATTRIBUTES	NO. OF RESPONDENTS	PERCENTAGE
1	VERY UNHAPPY	4	4
2	UNHAPPY	12	12
3	INDIFFERENT	11	11
4	HAPPY	59	59

5	**VERY HAPPY**	**14**	**14**
	TOTAL	**100**	**100**



Chart 10: Graphical presentation of Employees feel about time spend at work

Interpretation:

From the above analysis we can see most of the employees are happy with the time spent at workplace. More than 70% people said that they feel happy in the working place and they aren't facing any difficulties while at workplace. 12 employees shared their opinion that they aren't happy while working and 4 said they are not at all happy with the work environment.

Hypothesis Testing:

H0- There is no significant relation between balance of Work and life of an employee.

H1- There is a significant relation between balance of Work and life of an employee.

Attributes	Work Balance	Life Balance	Total
Strongly Agree	65	62	127
Agree	22	28	50
Neutral	9	7	16
Disagree	4	3	7
Strongly disagree	0	0	0
Total	100	100	200
	WORK BALANCE	LIFE BALANCE	
WORK BALANCE	1		
LIFE BALANCE	0.989222	1	

Correlation value r = 0.989222

where the calculated correlation value is (0.989) is proving that there is a relation between the work and life. H1 is accepted and H0 is rejected. Hence there is a significant impact between the work balance and Life balance.

Findings

- From the study I came to know that weekly most of the employees are working more than regulartimings.
- From the questionnaire it shows that employee work life balance in **Ispatial** is good, with the policies andprocedures.
- Employees showed their opinion towards the working environment is very good and the employees aren't feeling stress in office
- From table 5, I observed that most of the employees are going for entertainmentprograms
- Everyone in the company stated that there will be no separate work life balance in any company but have to balance the employees work-life with company policies andprocedures.

Suggestions

- As the policies for work life balance should be customized to individualneeds.
- Since, most of the employees are not aware of welfareprograms I suggested HR manager to make an awareness program and detailed explanation regarding their benefits should be discussed in team meetings.
- Employee work-life balance will affect the work quality so the organization should give reasonable shift timings according to individual preferences by asking them and this will lead to better production output.
- For employees'company should provide sanitation hygiene facilities as this will satisfy employees with much satisfaction.
- Quality of food in the canteen of the company should be at hygiene level and Food coupons should be provided by company based on performance so that it will satisfythe employee.

CONCLUSION

From the study it is clear that employee work life balance in ispatial is good, but there are some problems from employee satisfaction to company.Work-life balance programsplays a win-win situation for both employers and employees. When it comes to employee, he will think about work obligations and non-work responsibilities but for employer the major thing comes with the work quality and employee behavior towards work. Now a days most of the companies are modifying their policies and procedures according to employee and working situations. Employer support will create positive employer branding, lesser stress, increased happiness, motivation, Productivity. The Key role of HR is to understand the issues of work-life balance, integrate that to organization's policy and manage the work-life balance of employees by personal analysis regularly.

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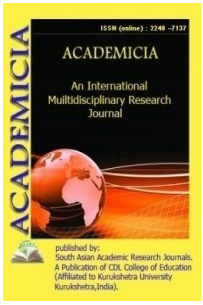

A STUDY ON RISK AND RETURN ANALYSIS OF INDIAN IT SECTOR AT INDIA BULLS

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ABSTRACT

Risk and return analysis plays a major role in most single decision making process. Every capitalist desires to avoid risk and maximize return. Successful investment requires a careful assessment of the investments potential returns and its risk of loss. A firms risk and expected returns directly affect its share price. In real world situations, the Risk of any single investment wouldn't be viewed severally of alternative assets. New investment should be thought-about in light of their impact on the risk and return of the assets. In traditional financial analysis, investment management tools allow the investors to evaluate the return and risk of individual investments and portfolios. Usually, higher the danger, higher the returns and lower the danger, lower the returns. However a general understanding of this development isn't enough to form applicable choices concerning investments. This study reported a statistically significant relationship between risk and return. The study is initiated with the main objective of determining the risk and return profile of five IT firms listed on BSE .Finally, the study proves there's a relation between risk, return and capitalist the most effective company among the selected company.

KEYWORDS: *Risk, Return, Bombay Stock Exchange (BSE),Investment Decision,Intrinisic Value,Share Price,Indian IT Industry.*

1.1 INTRODUCTION

RISK:

RISK The meaning of risk in dictionary is "a situation involving to danger". In terms of finance (or) management it is "investment associated with uncertainty". It is possibility that expected return on investment is totally different from normal return. This concept is most important in finance i.e., higher risk has higher return.

In the investment world, the definition of risk is the likelihood that associate investments actual return is going to be completely different than expected. Risk means that you have got the chance of losing some, or perhaps all, of your original investment.

RETURN:

Return is "what we receive other than investment". The return says about the profit (or) loss on what you have invested.

Returns refer to the potential loss or gain experience through investments in securities. If a shareholder decides to spend in a security that has a comparatively low risk, the possible return on that savings is usually small.

II. REVIEW OF LITERATURE:

1. Kohers and others (2006) made an effort in comparing the return of the stock market with respect to emerging markets and developed markets. The study explained by way of analyzing 49 companies of which 26 countries belonged to emerging countries and the remaining 23 countries belonged to developed countries. The study found that the risk associated with the emerging market was more than in developed countries. Since the expected return of the investment in the emerging markets was commensurate with risk. The study concluded that the risk-averse attitudes of the investors were found to be higher in the emerging market in comparing with the developed market.
2. DWI and Others (2009) made an attempt to find out the influence of accounting information on stock return and therefore the study used multiple regression by way of identifying financial ratio, firm size, and cash flow as an independent variable and stock return as the dependent variable.
3. Sangeetha and Dheeraj (2007) made an attempt to find out the relation among the return of the scrip, market information, and accounting information. They wanted to study the influence of market information on the return of the scrip was high or the influence of accounting information was high on the scrip's return. They collected the information on the basis of monthly data related to various sectors from BSE during the year 1999 to 2006. The study used a regression model to find the significant impact of accounting information and market information on scrip's return and found that the market information made significant influence whereas the accounting information had no impact on the return of the scrip.
4. Hasan Ali and Habibolah (2010) tested the risk-return relationship by way of taking 74 companies as the sample size in the Tehran Stock Exchange during the period of 2003-2005. The study examined the characteristics of the return in terms of Skewness and Kurtosis to find out the distribution of the return series. As far as the study is concerned, the effect of Kurtosis did not show any significant relation with the return during the study period whereas

the Skewness showed the important effects on returns. The study further explored that the relationship between beta and return was found to be non-linear.

III. OBJECTIVES:

1. To co-relate the firm's risk and return and state, the best company among the selected IT companies.
2. The Basic objective is to Minimize Risk and Maximize Return profile of five IT firms listed on BSE.
3. To know the relation between risks, return the most effective company among the selected company.
4. To misuse this opportunity and win benefit by methods for interest in this segment
5. To help dissect the organization by understanding straight forward terms to contribute accurately and viably.

IV. HYPOTHESIS OF THE STUDY

H0: There is no significant relationship between the risk and return of IT companies.

H1: There is a significant relationship between the risk and return of IT companies.

V.RESEARCH METHODOLOGY:

It is the scientific way to solve the research problem. It is the systematic, theoretical analysis of the ways applied to a field of study.

DATA COLLECTION METHODS

The data assortment ways embrace each the first and secondary assortment ways.

Primary data:

Primary data is information that is collected by an examiner from the first-hand source, by means of methods like surveys, interviews, or experiments.

Secondary data:

The secondary data can be obtained from information collected through internet searches, books, government departments, and libraries, NSE, etc.

Period of study:

Period of study: Period of study is taken from 2015 to 2019 in order to calculate Risk and Return analysis of five different companies of the IT sector.

STATISTICAL TOOLS:

Statistical tools used for the study are mean, standard deviation and T-test.

SAMPLE DESIGN:

The study of analysis mainly focusing on the difference of changes in share prices of top Indian IT companies listed on BSE indexes are taken for the study.

SAMPLE SIZE: To analyze the risk and return of five IT companies.

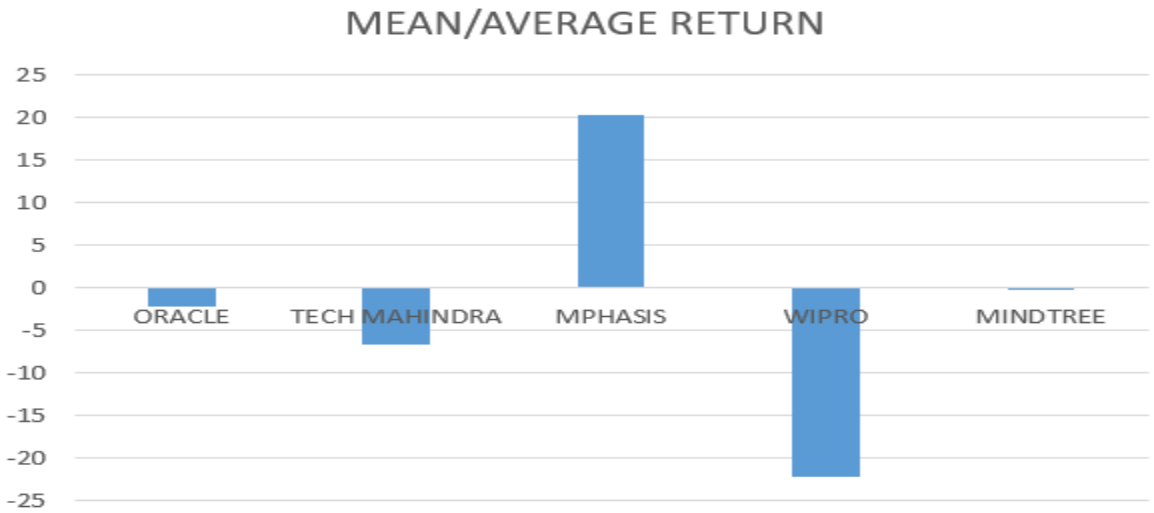
FIVE IT COMPANIES:

1. Oracle Ltd.
2. Tech Mahindra Ltd.
3. Mphasis Ltd.
4. Wipro Ltd.
5. MindTree Ltd.

VI. DATA ANALYSIS

1.MEAN OF IT COMPANIES:

COMPANY	MEAN
ORACLE	-2.23
TECH MAHINDRA	-6.74
MPHASIS	20.37
WIPRO	-22.22
MIND TREE	-0.08

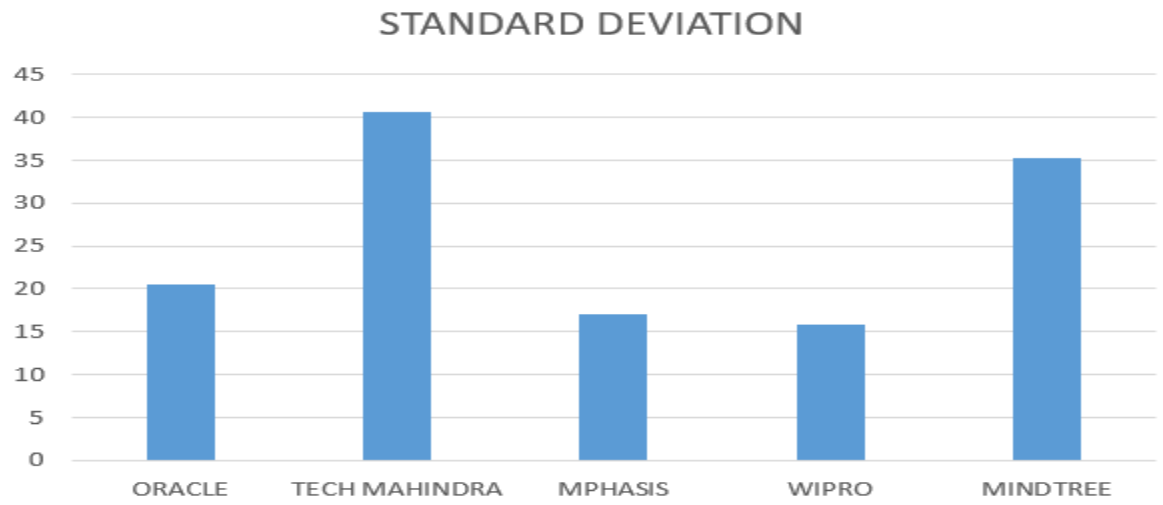


INTERPRETATION:

From the above analysis, to compare different companies of oracle, Tech Mahindra,Mphasis, wipro, andmindtree. It is observed that wiprois having less mean when compared to other companies.

2.STANDARD DEVIATION OF IT COMPANIES:

S.NO	NAME OF THE COMPANY	STANDARD DEVIATION
1	ORACLE	20.49
2	TECH MAHINDRA	40.55
3	MPHASIS	17.12
4	WIPRO	15.86
5	MIND TREE	35.31

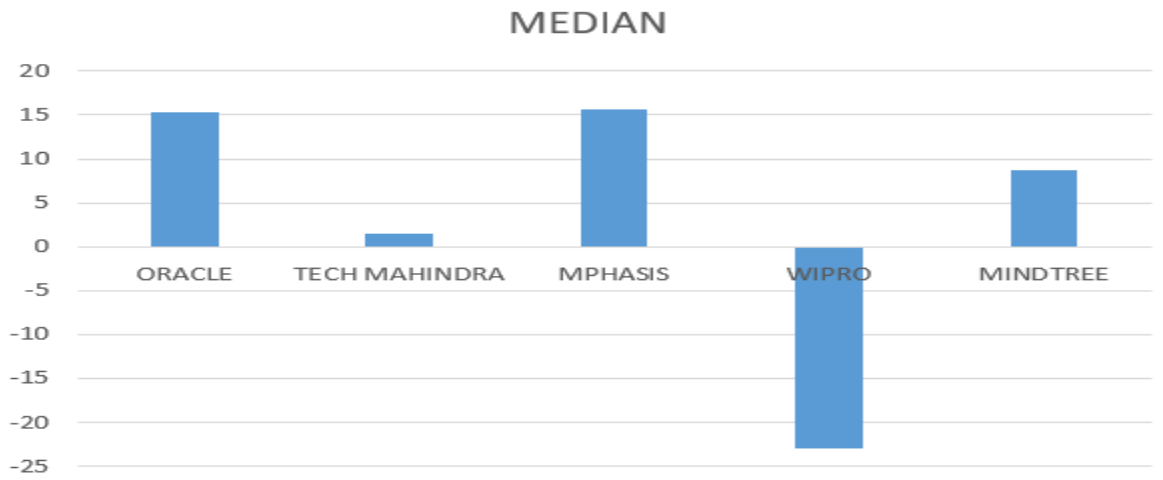


INTERPRETATION:

From the above study, we can analyze that the Tech mahindra(40.55) is having highest standard deviation and wipro (15.86) is having the lowest standard deviation.

3.MEDIAN OF IT COMPANIES:

S.NO	NAME OF THE COMPANY	MEDIAN
1	ORACLE	15.34
2	TECH MAHINDRA	1.5
3	MPHASIS	15.61
4	WIPRO	-22.96
5	MIND TREE	8.7



INTERPRETATION:

From the above graph, Mphasis(15.61)shows more result compared toOracle(15.34),Tech mahindra (1.5) , Wipro(-22.96),MindTree (8.7).

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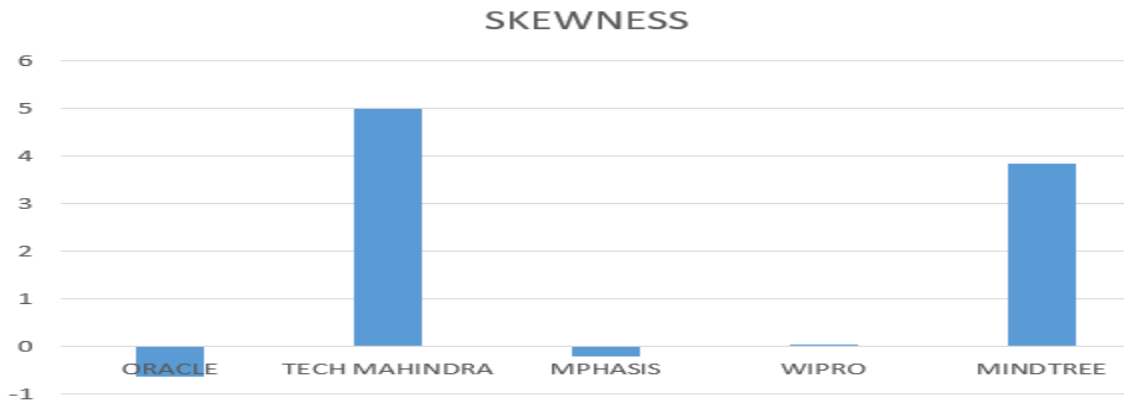
4.SKEWNESS OF IT COMPANIES:

S.NO	NAME OF THE COMPANY	SKEWNESS
1	ORACLE	-0.64
2	TECH MAHINDRA	4.99
3	MPHASIS	-0.2
4	WIPRO	0.04
5	MIND TREE	3.85

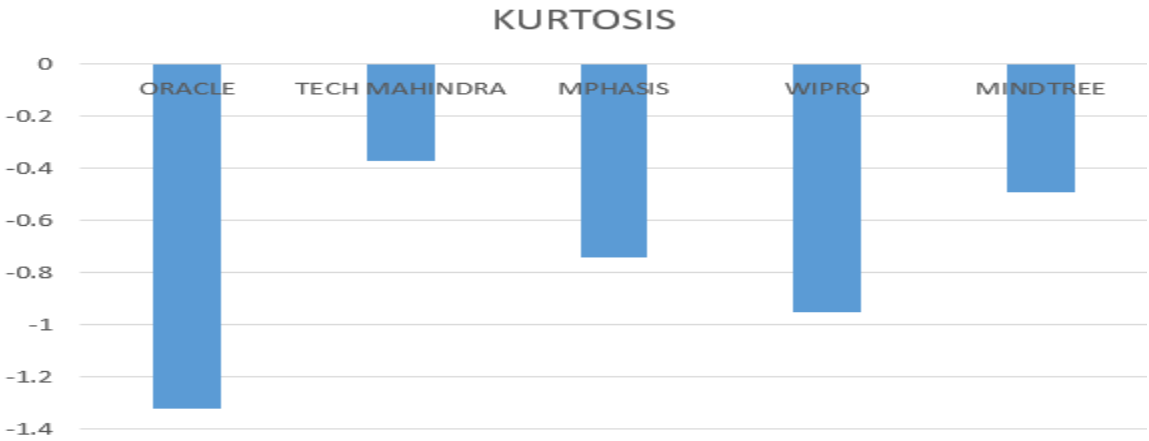


INTERPRETATION:

From the above study, the skewness of oracle (-0.64),Mphasis(-0.2) shows negative result.Tech Mahindra(4.99),wipro(0.04),MindTree(3.85) shows posiitve result.

5.KURTOSIS OF IT COMPANIES:

S.NO	NAME OF THE COMPANY	KURTOSIS
1	ORACLE	-1.32
2	TECH MAHINDRA	-0.37
3	MPHASIS	-0.74
4	WIPRO	-0.95
5	MIND TREE	-0.49



INTERPRETATION:

From the above analysis,oracle(-1.32) Tech mahindra (-0.37),mphasis (-0.74),wipro (-0.95) and mindtree (-0.49)shows negative result.

6.**T-TEST RESULT OF MPHASIS WITH ORACLE:**

TABLE COLUMN SUB HEAD	MPHASIS	ORACLE
Mean	57.515	75.25833
Variance	13382.48	28600.76
Observations	6	6
Pearson Correlation	0.99754	
Hypothesized Mean Difference	0	
Df	5	
t Stat	-0.79999	
P(T<=t) one-tail	0.230009	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.460017	
t Critical two-tail	2.570582	

For the above table, H0 is accepted on the basis of calculated value -0.79999 is less than the table value.

T-TEST RESULT OF MPHASIS WITHTECH MAHINDRA:

TABLE COLUMN SUB HEAD	MPHASIS	TECH MAHINDRA
Mean	57.515	280.675
Variance	13382.48	446435.4
Observations	6	6
Pearson Correlation	0.997055	
Hypothesized Mean Difference	0	
Df	5	
t Stat	-0.98868	
P(T<=t) one-tail	0.18411	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.36822	
t Critical two-tail	2.570582	

For the above table, H0 is accepted on the basis of calculated value -0.98868 is less than the table value.

T-TEST RESULT OF MPHASIS WITH WIPRO:

TABLE COLUMN SUB HEAD	MPHASIS	WIPRO
Mean	57.515	36.905
Variance	13382.48	11286.84
Observations	6	6
Pearson Correlation	0.983629	
Hypothesized Mean Difference	0	
Df	5	

t Stat	2.277002	
P(T<=t) one-tail	0.035903	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.071807	
t Critical two-tail	2.570582	

For the above table, H0 is rejected on the basis of calculated value 2.277002 is greater than the table value.

T-TEST RESULT OF MPHASIS WITHMINDTREE:

TABLE COLUMN SUB HEAD	MPHASIS	MINDTREE
Mean	57.515	215.645
Variance	13382.48	255256.5
Observations	6	6
Pearson Correlation	0.997436	
Hypothesized Mean Difference	0	
Df	5	
t Stat	-0.99335	
P(T<=t) one-tail	0.183075	
t Critical one-tail	2.015048	
P(T<=t) two-tail	0.366149	
t Critical two-tail	2.570582	

For the above table, H0 is rejected on the basis of calculated value -0.99335 is greater than the table value.

VII FINDINGS

1. During the study period, the mean returns for selected IT companies shares both positive and negative figures.
2. The risk of TECH MAHINDRA is higher when compared to selected IT companies.
3. The skewness of ORACLE is less to that of remaining IT companies.
4. MPHASISis having highest median and WIPRO is having less.
5. The value of MPHASIS is higher returns in WIPRO is having less returns.
6. The value of kurtosis is higher in TECH MAHINDRA and ORACLE is less.

STATISTICAL ANALYSIS

Descriptive statistics: To analyze the descriptive statistics the mean value is considered.

T-test: T-test is done to find out significant differences with the 5 companies and the factors. if the T-test value is greater than T-critical two tail the null hypothesis is rejected, if it is less then null hypothesis is accepted.

TESTING OF HYPOTHESIS

Based on the above study, T-test results of five IT companies whose all calculated values (t stat)

Are less than tabulated value(t critical two tail). So H0 is accepted.

By doing T-test for the selected IT companies it has been revealed that Calculated value is less than table .So, H0 is accepted.

VIII.SUGGESTIONS:

1. Investing in MPHASIS is the most profitable since the returns generated from it is comparatively high.
2. Investing in WIPRO is not safe since it is risky and the returns generated from it are lesser than any other security.
3. Any investor having a long term horizon must invest in a security having lower standard deviation to enjoy safe and fruitful gains in future.

IX.CONCLUSION

The IT industry is having highest growth opportunity in the near future, since information technology plays an important role in the economic development. Indian IT sectors have fared well on growth, asset quality and profitability with other regional IT sectors over the last years. The study of relationship between risk and return analysis helps the capitalist to choose up the securities supported for his alternative. The study of this kind provides information about the presentation of a variety of stocks in the market in terms of risk and return and suggests the best company for investment. Further, the inability of IT sector managements to improve capital allocation, increase the productivity of their service platforms and improve the performance ethic in their organizations could seriously affect future performance. The above study gives an optimistic view about the industry and its expansion which recommends the investors to keep a good look at on the major company to help in terms of returns on their investments.

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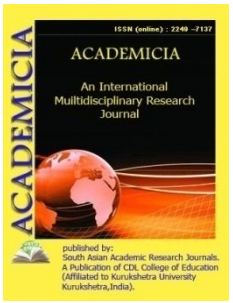

FACTORS INFLUENCING JOB SATIFACTION OF EMPLOYEES IN SELECTED ELECTRIC EQUIPMENT MANUFACTURING COMPANY

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ABSTRACT

In this research paper the factors associated with job satisfaction have been analyzed. Job satisfaction of employees in selected electronic equipment manufacturing company had been analyzed. The primary data for this study had been collected through structured questionnaire and secondary data had been gathered from journals and books. The findings of this study are helpful for practicing human resources managers in electronic equipment manufacturing industry. The need for attaining job satisfaction among the employee through organizational human resource policies have been described in this research paper.

KEYWORDS: *Job Satisfaction, Employee Engagement, Supervisor Support, Work Environment, Employee Satisfaction, Employee Perception.*

INTRODUCTION

Job satisfaction of employees is an important aspect for organization to reduce employee turnover. The organizational productivity is highly dependent on job satisfaction level of employees. Some people love their jobs, some people tolerate their jobs, and some people cannot stand their jobs. Job satisfaction describes the degree to which individuals enjoy their job. While job satisfaction results from both how we think about our work (our cognition) and how we feel about work, it is described in terms of affect.

A person having negative attitude shows a personality disposition which is inclined to experience nervousness, tension, worry, upset and distress, where as those with positive attitude will feel happy with themselves, others, and with their work. Job satisfaction reflects the extent to which people find gratification or fulfillment in their work. Job satisfaction shows that personal factors such as an individual needs and aspirations determine his/her attitude, along with group and organizational factors such as relationships with co-workers and supervisors and working

conditions, work policies, and compensation. A satisfied employee tends to be absent less often, to make positive contributions, and to stay with the organization.

OBJECTIVES OF THE STUDY

- To study the factors influencing job satisfaction level of employees at the electronic equipment manufacturing company.
- To know the association between employee department and job satisfaction.
- To understand the perception of employees towards supervisory support and fair compensation.
- To study the impact of employee engagement on job satisfaction level of employees.
- To describe the perception of employees towards organizational human resource policies.

REVIEW OF LITERATURE

Human resources management performs variety of tasks and creates organizational policies for employee welfare. The perception of employees towards organizational policies can be measured using the concept of job satisfaction. The job satisfaction is unique feeling of employee towards their job in organization (DeCenzo et al, 2016). The work environment creates an impact on employee motivation, morale and job satisfaction (Aswathappa, 2013).

Vijayalakshmi (2012) had conducted survey among women employees in Hyderabad city and suggested for changes in organizational human resources (HR) policies. According to Burra and Chirayath (2013) the quality of work life gives life satisfaction among employees in business process outsourcing (BPO) sector in Hyderabad. Swaminathan and Jawahar (2013) had mentioned that job satisfaction among employees leads to organizational citizenship behavior. Adhikari and Deb (2013) had described that job satisfaction is multidimensional concept. The job satisfaction of employees in organization leads to satisfaction in personal life.

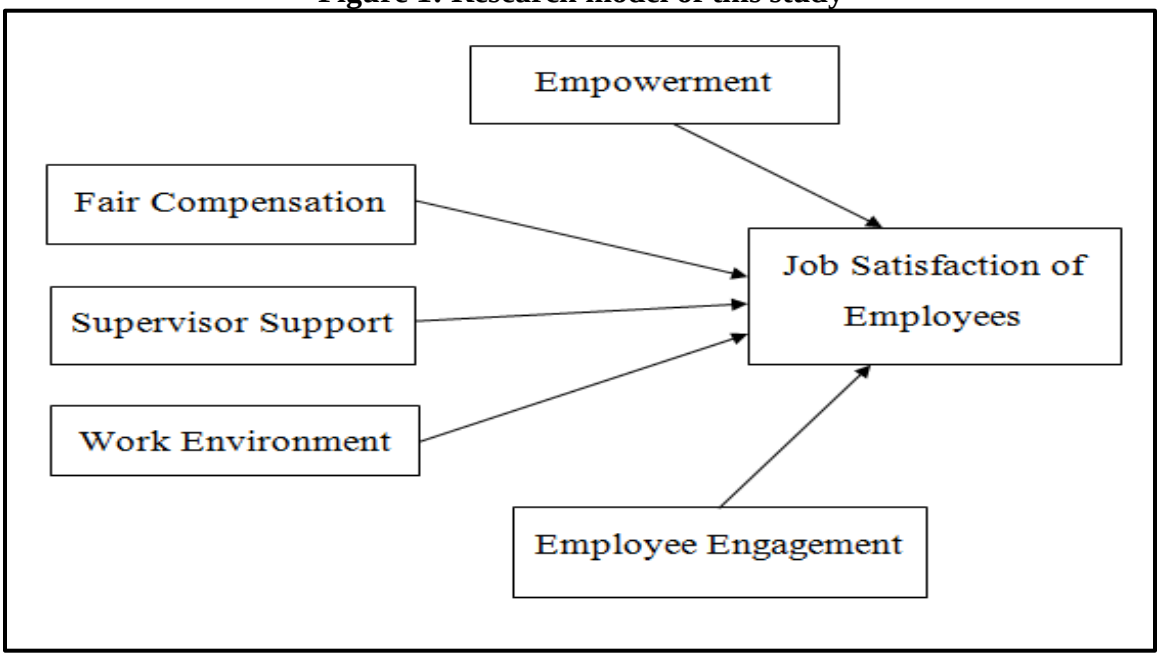
Akella and Rao (2016) had conducted an empirical survey among employees in IT sector and stated that appreciation and feedback gives job satisfaction. Ardestani (2017) had measured employee satisfaction in private hospitals in Hyderabad. Employee satisfaction is a requirement for good employee performance as well as employee retention. Lakshmi (2016) had discussed about organizational excellence from the viewpoint of employee satisfaction. Azash et al (2017) had explained about job satisfaction from the dimension of locus of control. The job characteristics like skill variety, task identity, task significance, autonomy and feedback influence job satisfaction of employees in organizations.

Baskar (2016) had conducted a study on job satisfaction from the perspective of human resources polices in selected public sector bank. It is found from their study that performance management system (PMS) had an impact on perception of job satisfaction among employees in banking sector. According to Jain (2016) distributed leadership has positive impact on employees' performance, and it carries the impact of job satisfaction on performance. Sarma (2012) had conducted a study on commitment of employees in small scale industries and its association with job satisfaction.

RESEARCH METHODOLOGY

The respondents for this research study had been randomly selected from employees of HBL Company. Out of total employees of the company only 100 employees have been interviewed through structured questionnaire for collecting primary data. The purpose of the interview is communicated to the employees. The privacy information had not been collected from the respondents like name, employee id and contact number. The primary data had been entered into Ms-Excel software and later it was migrated to SPSS software for data analysis. The statistical tools used in this study for analyzing primary data are frequency analysis, descriptive statistics and regression analysis. There are six variables in this study and they are shown in following Figure 1. The items under each variable have been measured by using five point Likert-type scale from 5 to 1 where '5' means strongly agree and '1' means strongly disagree. The dependent variable is job satisfaction and independent variables are empowerment, fair compensation, supervisor support, work environment and employee engagement. Secondary data had been procured from books, journals and electronic sources. The literature review had helped to identify the research gap. Hypothesis testing had been conducted through regression analysis.

Figure 1: Research model of this study



(Source: Own Creation)

DATA ANALYSIS

Among the total 100 respondents of this research study sixty four percent are male and 36 percent are female from the perspective of gender. Majority of the respondents belong to 25 to 35 years age group as per Table 1. More than half of the total respondents are graduates and sixteen percent are post graduates. From the dimension of department fourteen percent belong to administrative department and thirty percent belong to marketing department.

TABLE 1: DEMOGRAPHIC PROFILE OF RESPONDENTS

Variable	Characteristic	Frequency
Gender	Male	64
	Female	36
Age Group	Less than 25 Years	20
	25 to 35 Years	40
	36 to 45 Years	24
	Above 45 Years	16
Education	Graduate	52
	Post Graduate	16
	Diploma	18
	Other	14
Department	Production	26
	Marketing	30
	Administrative	14
	Other	30

(Source: Compiled from primary data)

As per Table 2 the mean value for job satisfaction variable is 4.640 and its standard deviation is 0.482 which shows that job satisfaction level of employees is high at the company. The means value for fair compensation is 2.290 and its means standard deviation is 0.778 which states that employee are expecting increments with regard to their compensation. The mean value for supervisor support is less than 4.0 and its standard deviation is 0.601.

TABLE 2: DESCRIPTIVE STATISTICS

	N	Mean	Std. Deviation
Empowerment	100	3.320	0.617
Work environment	100	3.920	0.502
Supervisor Support	100	3.160	0.808
Fair Compensation	100	2.290	0.778
Employee engagement	100	3.720	0.451
Job Satisfaction	100	4.640	0.482
Valid N (listwise)	100		

(Source: SPSS Output)

Hypothesis H1: Employee empowerment has positive impact on job satisfaction of employees at the selected company.

H1 is accepted because p-value in Table 3 for the variable empowerment is less than 0.05 (benchmark value). Therefore empowerment of employees has positive impact on job satisfaction level of employees.

TABLE 3: COEFFICIENTS[A]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.500	0.558		11.646	0.000
	Empowerment	0.258	0.074	3.330	3.476	0.001
	Work environment	0.467	0.098	1.486	4.768	0.000
	Supervisor Support	0.191	0.057	0.320	3.345	0.601
	Fair Compensation	0.042	0.054	0.068	1.789	0.432
	Employee engagement	0.338	0.109	2.316	3.098	0.003

a. Dependent Variable: Job Satisfaction

(Source: Output from SPSS)

Hypothesis H2: Work environment has positive impact on job satisfaction among the employees.

H2 is accepted because p-value for work environment is less than 0.05 as per Table 3. Hence work environment at the selected company has positive impact on their perception towards job satisfaction.

Hypothesis H3: Supervisor support positively influences job satisfaction of employees.

According to Table 3, the p-value for supervisor support is more than 0.05. Hence H3 is rejected which means that job satisfaction is not positively influenced by supervisor support at the company.

Hypothesis H4: Fair compensation has positive impact on job satisfaction.

The p-value for fair compensation as per Table 3 is more than 0.05. Therefore H4 is rejected. Hence the compensation package at the company does not have impact on job satisfaction of employees.

Hypothesis H5: Employee engagement has positive impact on job satisfaction.

H5 is accepted as per p-value for employee engagement in Table 3. Hence employee engagement has positive impact on job satisfaction of employees.

TABLE 4: ONE-WAY ANOVA JOB SATISFACTION

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.945	3	1.648	8.744	0.000
Within Groups	18.095	96	0.188		
Total	23.040	99			

(Source: Output from SPSS)

H6: There is an association between department of employee and their job satisfaction level.

H6 is accepted because p-value in Table 4 is less than 0.05. Therefore there is an association between department of employees and their perception towards job satisfaction.

FINDINGS

It is observed that beta value of employee engagement is high compared to other independent variables. Hence it is found that employees are more concerned about engagement activities. The boredom can avoided with implementation of regular employee engagement programs. The standard deviation for supervisory support is approximately 0.81 therefore it is important for management to develop leadership skills among employees. The employee job satisfaction can be enhanced drastically with supervisor support at work place.

SUGGESTIONS

Flexible work timings should be implemented for attaining job satisfaction at the selected company. The employees should be given rewards and recognition for their contribution at workplace. It is important to provide incentives for giving constructive ideas with regard to minimization of production cost. The efficiency of employees both at individual level and team level should be monitored and communicated at regular intervals. The most important thing is to assign realistic goals for employees. The trust in employees should be enhanced with friendly work environment for increasing the organizational productivity at large.

DISCUSSION AND CONCLUSION

Job satisfaction is multidimensional construct and it varies from employee to employee. The overall job satisfaction of employees at selected electronic equipment manufacturing company is high. The job satisfaction level of employees at the selected company is positively influenced by variables like empowerment, work environment and employee engagement. Organizational human resource management needs to modify the compensation package for enhancing job satisfaction. The leadership training should be given to managers of various departments. There is difference in job satisfaction level of employees in various departments. It is important to design human resource strategy at the organization for implementing innovative human resources policies.

The job satisfaction is a collection of attitudes about specific factors of the job. Employee can be satisfied with some elements of the job while simultaneously dissatisfied with others. Satisfied employees translate into engaged employees. Having engaged employees produces a trickle-effect for the company. Engagement can be found through your employees' roles, teams,

company and community. When an employee is satisfied, they are invested at all four of these levels. Employees who are satisfied with work perform their work in drastically different ways than those employees who actively dislike their jobs. Perhaps more importantly, happy employees are much more likely to work alongside other happy employees because of the effect they have on overall workplace morale.

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A COMPARATIVE STUDY OF SELECTED STOCKS LISTED IN BOTH BSE AND NSE

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ABSTRACT

This research paper is a comparative study of Bombay Stock Exchange and National Stock Exchange during 2017-2018. A ready market for investments was need of the hour and this was how the Stock Exchange came into being. The health of the economy is reflected by the growth of stock market. Over the years, the Indian stock markets have become stronger. Presently, the Bombay Stock Exchange Limited and National Stock Exchange of India Limited put together account for 80% of the total turnover as compared to 10% by the other stock exchanges. So the researcher decided to compare these two most prominent stock exchanges of India.

Keywords: Stock Market, BSE, NSE, Liquidity and Volumes etc.

I. INTRODUCTION

After the invention of cash ,people started expanding business not solely with their cash however also with the borrowed capital.This result in the existence of Capital Market and market.The monetary market incorpor ates a phase ofthose market.The monetary mark et play an important role in raising funds from the generalpublic and helps the firm not solely in increasing the profits of the trade however conjointly helps in developing the monetary Assets of the businesses .This result in the evolvement of ‘'STOCK EXCHANGE’.The stock market give a liquidity to the personal investment for the investors in company sector .Exchanges are crossing across national boundaries resulting in the extent of their services that has diode to the emergence of cross border integration.

The Indian market contains several developed markets on the premise of 'QUALITATIVE PARAMETER'. it's a collective pool of concerning twenty million investors . Over 9000 corporations listed their exchanges during this securities market. The two main stock exchanges of India are:

1. BSE

2. NSE

BOMBAY STOCK EXCHANGE

The stock exchange of Mumbai is now 'Bombay Stock Exchange Ltd ‘.BSE is the oldest Stock Exchange of Asia.It was established in the year 1875.Since its inception it contains a deep knowledge of capital marker More than 5000 companies have listed their exchanges on BSE Ltd, Making it a number one exchange board of

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India in terms of listing members. The BSE act as a backbone of countries capital market.AS one of the finest exchange board of India BSE of us capitalization of about 1082, 517.7$

NATIONAL STOCK EXCHANGE

The National stock exchange came into existence in 1992.It is the largest and most advanced stock market of India .In terms of transactions it is regarded as the 3rd biggest exchange in Asia.In terms of transaction volume it is among the 5 biggest stock exchange in the world.In April 1993,NSE is recognised as stock exchange under the contract (Regulatory) act,1956.After its commencement it started its operation in Wholesale Debt Market (WDM) segment in June 1994.NSE consist of US capitalisation of about 1019,109.0$.

AIMS

The Aim of the project is to draw a comparative study of BSE and NSE.The aim is to help the investor to understand about the functioning of BSE and NSE.

II. OBJECTIVES

- To generate literature reviews on BSE & NSE sensex Index.
- To writes the analysis methodology to develop the project on BSE & NSE.
- To performs the info analysis on BSE & NSE.
- To develops a comparative project report on BSE & NSE sensex.

III. REVIEW OF LITERATURE

1. Sarat Dhal (2009) used multivariate co -integration analysis of stock prices indices of global markets of the US, the UK and Japan, Hang Kang Singapore India over the period covers April 1993 to July 2009. The res ults sho w that these markets shared single co - integration relationship and Indian Stock market played the key role.
2. Srinivasa Rao Gangadharan & C.A Yoonus (2011) examined the impact of the global financial crisis on the level of financial integration betwe en the US(S&P 500) and Indian stock market (CNX S&P) using daily returns from March 2005 to November 2010. The study finds that there is no co -integration between the two indices.
3. Amalendu Bhunia & Amit Das (2011) examined interdependence between selected South –East countries stock markets and Indian stock market for the period from 1st August 1991 to 31ST July2011.the overall results indicates an increase in the integration between South East markets after global financial crisis.

IV. RESEARCH METHODOLOGY

The research methodology of the selected topic follows in these dimensions: articles, reports and surveys published on Capital Markets, BSE and NSE etc.

V. DATA COLLECTION:

Primary data: Primary data is the data which is collected directly through investigation. In this analysis no primary data is used.

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Secondary data: Secondary data is the data collected from various outside sources like news papers, journals, NSE, BSE, websites etc. In this analysis majority of the data is collected from the secondary data.

RESEARCH TOOLS:

Basically whole data analysis has been performed using spreadsheet in Excelby using different statistical functions inbuilt in Excel. The following statistical functions have been employed during the data analysis:

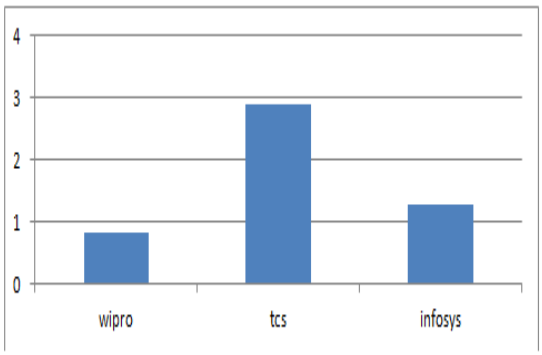
Standard deviation
Rate of Return
Coefficient of Correlation
Mean

VI. DATA ANALYSIS AND INTERPRETATION

The various data being collected during the survey are presented below

COMPARATIVE ANALYSIS OF MEAN TCS,WIPRO,INFOSYS IN BSE:

COMPANIES	MEAN VALUE'S
WIPRO	0.835665
TCS	2.906033
INFOSYS	1.283799

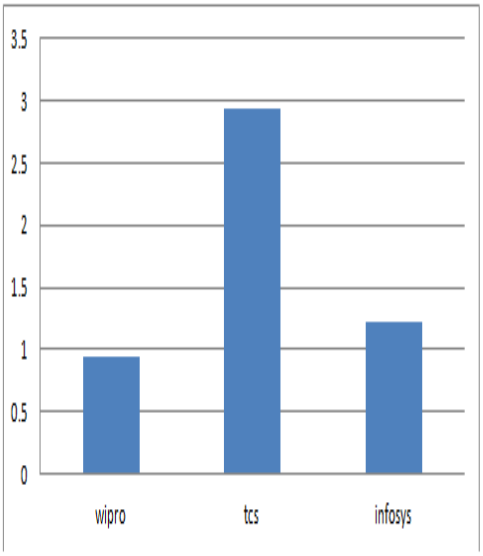


INTERPRETATION:

From the above calculations it was found that Wipro is havingthe least mean i.e.; 0.835665 among the three companies. and the Infosys having second highestmean of 1.283799 and TCS is the having the highest mean value i.e.; 2.906033.the mean is calculated on the returns of the company respectively.

COMPARATIVE ANALYSIS OF MEAN TCS,WIPRO,INFOSYS IN NSE:

COMPANIES	MEAN VALUE'S
WIPRO	0.940334
TCS	2.93782
INFOSYS	1.223005



INTERPRETATION:

From the above calculations it was found that Wipro is having the least mean i.e.; 0.940334 among the three companies. and the Infosys having second highest mean of 1.223005 and TCS is the having the highest mean value i.e.; 2.93782. the mean is calculated on the returns of the company respectively.

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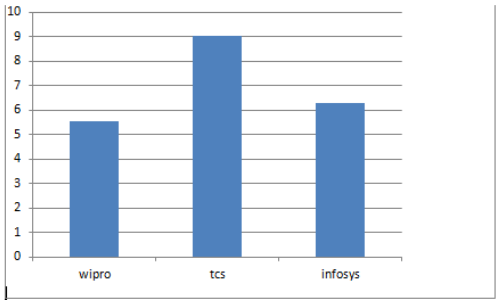
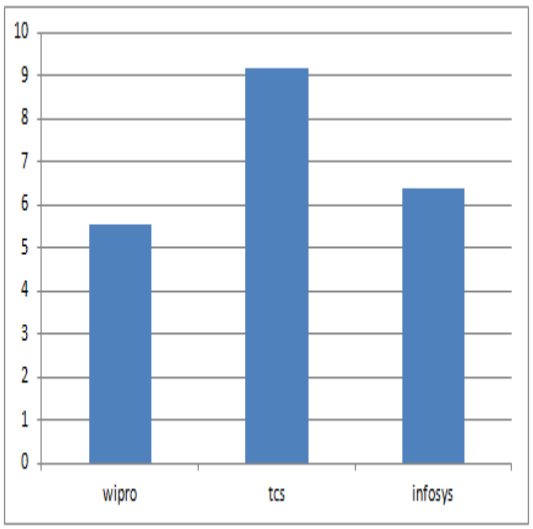
STANDARD DEVIATION OF TCS,WIPRO,INFOSYS IN BSE:

COMPANIES	MEANVALUE'S
WIPRO	5.558779
TCS	9.024547
INFOSYS	6.304528





INTERPRETATION:

From the above calculations it was found that Wipro is having the least standard deviation i.e.; 5.558779 among the three companies. and the Infosys having second highest standard deviation of 6.304528 and TCS is the having the highest standard deviation value i.e.; 9.024547. the standard deviation is calculated on the returns of the company respectively.

STANDARD DEVIATION OF TCS,WIPRO,INFOSYS IN NSE:

COMPANY	MEAN VALUE
WIPRO	5.551689
TCS	9.170918
INFOSYS	6.378168

INTERPRETATION:

From the above calculations it was found that Wipro is having the least standard deviation i.e.; 5.551689 among the three companies. and the Infosys having second highest standard deviation of 6.378168 and TCS is the having the highest standard deviation value i.e.; 9.170918. the standard deviation is calculated on the returns of the company respectively.

VII. STATISTICAL ANALYSIS:

CORRELATION OF TCS,WIPRO,INFOSYS IN BOTH BSE & NSE:

BSE:

COMPANIES	MEAN VALUE
WIPRO	0.835665
TCS	2.906033
INFOSYS	1.283799

NSE:

COMPANIES	MEAN VALUES
WIPRO	0.940334
TCS	2.93782
INFOSYS	1.223005

CORRELATION: 0.997109

INTERPRETATION:

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From the above calculations the correlation was found that 0.997109 when compare to three companies listed in BSE & NSE

T-TEST OF MEAN OF BOTH BSE AND NSE (WIPRO):

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	0.940334189	0.835664835
Variance	30.82124822	30.90002187
Observations	14	14
Pearson Correlation	0.993394964	
Hypothesized Mean Difference	0	
df	13	
t Stat	0.613340943	
P(T<=t) one-tail	0.275116016	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.550232033	
t Critical two-tail	2.160368656	

INTERPRETATION:

From the above table we can say that Ho is rejected. Because t-stat value (0.613340943) is greater than t critical one tail (0.275116016). Hence, there is an impact of BSE & NSE on IT sector

T-TEST OF MEAN OF BOTH BSE AND NSE (TCS):

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	2.90603327	2.937820175
Variance	81.44245325	84.10574147
Observations	14	14
Pearson Correlation	0.999866594	
Hypothesized Mean Difference	0	
df	13	
t Stat	-0.570209461	
P(T<=t) one-tail	0.289128976	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.578257951	
t Critical two-tail	2.160368656	

INTERPRETATION:

From the above table we can say that Ho is accepted. Because t-stat value (-0.570209461) is less than t-critical one tail (0.289128976). Hence, there is no impact of BSE & NSE on IT sector

T TEST OF MEAN OF BOTH BSE AND NSE (INFOSYS):

t-Test: Paired Two Sample for Means

	Variable 1	*Variable 2*
Mean	1.283798674	1.223004637
Variance	39.74707673	40.68103323
Observations	14	14
Pearson Correlation	0.998465003	
Hypothesized Mean Difference	0	
df	13	
t Stat	0.633645832	
P(T<=t) one-tail	0.268650734	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	0.537301468	
t Critical two-tail	2.160368656	

INTERPRETATION:

From the above table we can say that Ho is rejected. Because t-stat value (0.633645832) is greater than t-critical one tail (0.268650734). Hence, there is an impact of BSE & NSE on IT sector

VIII.FINDINGS:

From the above calculations it was found that Wipro is having the least mean i.e.; 0.835665 among the three companies. and the Infosys having second highest mean of 1.283799 and TCS is the having the highest mean value i.e.; 2.906033. the mean is calculated on the returns of the company respectively.

From the above calculations it was found that Wipro is having the least mean i.e.; 0.940334 among the three companies. and the Infosys having second highest mean of 1.223005 and TCS is the having the highest mean value i.e.; 2.93782. the mean is calculated on the returns of the company respectively.

From the above calculations it was found that Wipro is having the least standard deviation i.e.; 5.558779 among the three

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companies. and the Infosys having second highest standard deviation of 6.304528 and TCS is the having the highest standard deviation value i.e.; 9.024547. the standard deviation is calculated on the returns of the company respectively.

From the above calculations it was found that Wipro is having the least standard deviation i.e.; 5.551689 among the three companies. and the Infosys having second highest standard deviation of 6.378168 and TCS is the having the highest standard deviation value i.e.; 9.170918. the standard deviation is calculated on the returns of the company respectively.

From the above calculations the correlation was found that 0.997109 when compare to three companies listed in BSE & NSE.

CONCLUSION:

By the analysis, we can conclude that though the sectors are performing so well in the context of return they are having a high-risk factor.IT sector are performing well in earnings higher returns. But sectors are having higher risk rates. This is because of many reasons and investors looks for the comnination of higher returns and lower risk. Hence, there is an impact of market performance on sectorial wise performance and they are related to each other to some extent.

REFERENCES:

1) Finance.yahoo.com
2) moneycontrol.com

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A STUDY ON RECRUITMENT AND SELECTION PROCESS AT A.P. FASTENERS PRIVATE LIMITED, JEEDIMETLA

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ABSTRACT

The current study is presented in an effort to identify employee's satisfaction level about the recruitment and selection process followed by A.P. FASTENERS PVT LTD Jeedimetla, Hyderabad. The main objective of recruitment and selection is to discover efficient employees to achieve organizational objectives. Recruitment and selection also support for the growth of the organizational outcomes by providing an adequate pool of employees. It is observed that majority of the respondents are aware of the recruitment and selection methods served by the company. Most of the employees were recruited through placement consultancies and selected by personal interview. And the maximum numbers of employees are satisfied with the recruitment and selection process. The appropriate data were collected through a questionnaire. The statistical tool applied in this research is percentage analysis, bar diagrams, and correlation test. The sample size is 100 employees among the 300 employees for the study with a ratio of 1:3. The variables which are used in this study are recruitment and selection as independent variable and employee satisfaction as dependent variable.

Index terms- *Recruitment, Selection, Human Resource Management, Employee satisfaction.*

I. INTRODUCTION

Recruitment and selection aides to provide efficient employees to accomplish organizational objectives. The recruitment and selection process comprises several methods to discover an adequate pool of candidates. Different sources of recruitment and selection process are placement consultancies, newspaper advertisements, personal interview method, and recommendations. Recruitment process includes internal sources, external sources, and modern sources. The important motive of this process is to identify suitable employees for the growth of the organization. The genuine thought behind this process is to providing effective human resources to enhance the productivity of the organization. Recruitment

discovers the suitable candidates who are eligible for the position and selection explains short listing those candidates and find out the best fit for the position.

II. OBJECTIVES OF THE STUDY

1. To study the process of recruitment and selection at AP FASTENERS Pvt Ltd
2. To examine the factors which bare influencing the recruitment and selection process at AP FASTENERS PVT Ltd.
3. To analyze the impact of the recruitment and selection process on the employee satisfaction of AP FASTENERS Pvt Ltd

III. REVIEW OF LITERATURE

1. **Mr. Sujeet Kumar and Mr. Ashish Kumar Gupta (2014)[1]:** According to them it was identified that the recruitment and selection process of the organization is up to the mark. Out of the various sourcing methods getting references via references and networking is the best method. The organization should focus on long term performance. The organization has to focus more on the training to increase the skills of the recruiters and the training process should be consistent. The HR managers face many challenges and ensure that for the success of an organization human resource is very important and it is a tough task to recruit a right and efficient candidate.
2. **Mr. Chungyalpa and Ms. Karishma (2016)[2]:** According to Chungyalpa and Karishma Recruitment and selection is one of the most crucial outcomes of the HR department. The firm not only needs to recruit new employees but also must retain existing employees. The complete process of recruitment and selection has varied and evolved. Now a day's the information technologies and various other software provided new potentialities towards recruitment and selection. In the future, the overall recruitment and selection process will be online based.
3. **Mr. Isaac Christopher Otoo, Mr. Juliet Assuming and Mr. Paul Mensah Aggyei (2018)[3]:** According to them, it is identified that the recruitment and selection process is not effective because the candidates are selected through recommendations. Recruitment and selection process is a major challenge for universities which demands urgent attention from the HR department of universities. It has offered new insights and also suggesting to improving employee satisfaction by paying more attention to the recruitment and selection process.

IV. RESEARCH METHODOLOGY

Research methodology is a process to orderly solve the research obstacle. The research methodology in the present investigation deals with the sample size of 100 employees out of 300 employees. So the ratio is 1:3 and the duration of research is for 45 days. It comprises identifying all reasonable means of solving the research query; consider the different methods one by one and appearing at the best convincing method regarding the resources at the approval of the researcher.

V. A DATA COLLECTION METHOD

Primary data: The primary data is prepared by a questionnaire in A.P.FASTENERS PVT LTD distributed amongst the employees to collect information.

Secondary data: The secondary data collected through books, Websites, Digital libraries, journals, and online database**.**

Research tools

A prepared questionnaire has been arranged to get associate information from the respondents. The questionnaire includes a change of questions attainable to the respondents for their response. The different varieties of questions are applied in this study are:

1. Closed-ended questions
2. Multiple choice questions

Sample size: 100

Ratio – 1:3

Statistical techniques applied in the survey are

1. Percentage analysis
2. Bars & charts

Statistical tools applied in the survey: Correlation

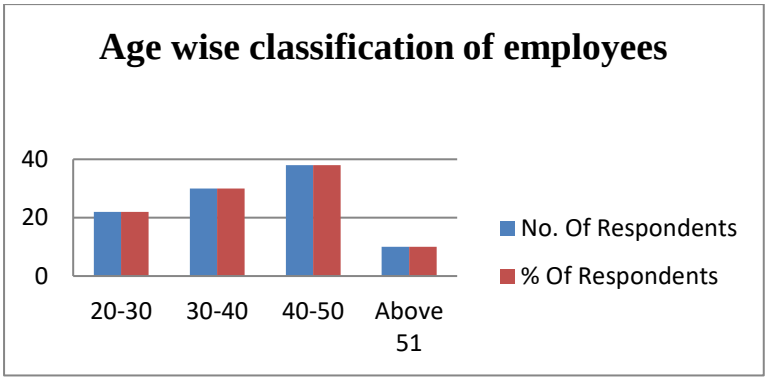
Variables: Independent - Recruitment and Selection, Dependent - Employee Satisfaction.

VI. DATA ANALYSIS AND INTERPRETATION

The different data being collected through the survey are displayed below:

Table-1: Age wise classification of employees in the company

Particulars	No. Of Respondents	% Of Respondents
20-30	22	22
30-40	30	30
40-50	38	38
Above 51	10	10
Total	100	100



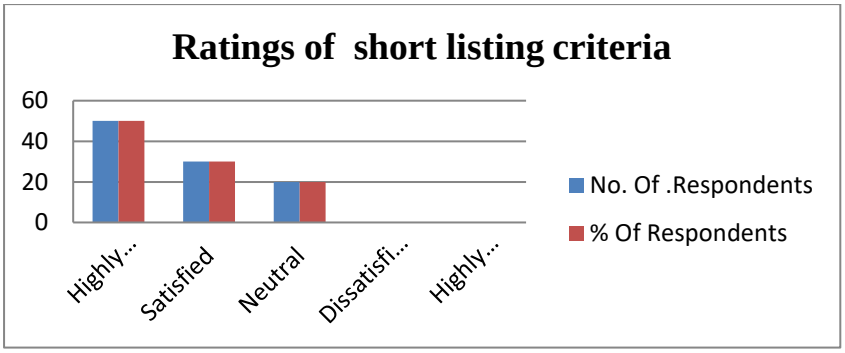
INTERPRETATION:

From the survey collected through questionnaire in A.P. FASTENERS PVT LTD, it is observed that 22% of the respondents are between (20-30) years, 30% of the respondents are

between (30-40) years, 38% of the respondents are between (41-50) years, 10% of the respondents are above 51 years.

Table-2: Rate the short listing criteria followed by the organization

Particulars	No. Of .Respondents	% Of Respondents
Highly satisfied	50	50
Satisfied	30	30
Neutral	20	20
Dissatisfied	0	0
Highly dissatisfied	0	0
Total	100	100

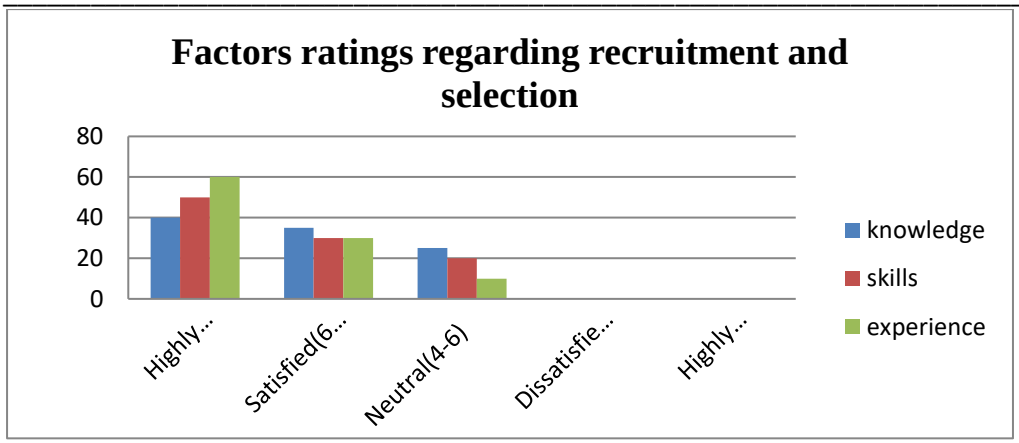


INTERPRETATION:

From the survey collected through questionnaire in A.P.FASTENERS PVT LTD, it is observed that 50% of the respondents are highly satisfied, 30% of the respondents are satisfied and 20% of the respondents are neural with the short listing criteria followed by the organization.

Table-3: Rate the following factors regarding recruitment and selection in the organization

Factors	Highly satisfied (8-10)	Satisfied (6-8)	Neutral (4-6)	Dissatisfied (2-4)	Highly Dissatisfied(0-2)
Knowledge	40	35	25	0	0
Skills	50	30	20	0	0
Experience	60	30	10	0	0

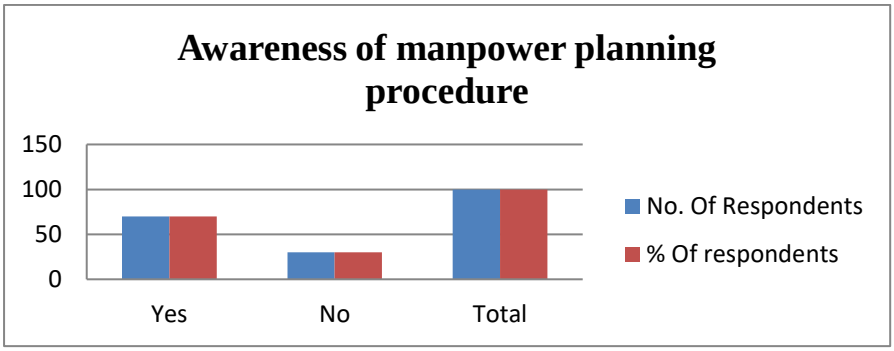


INTERPRETATION:

From the survey collected through questionnaire in A.P.FASTENERS PVT LTD, it is observed that the organization concentrate on 3 factors for recruitment and selection that are knowledge, skills and experience. In knowledge 40% of the respondents are highly satisfied, 35% of respondents are satisfied and 25% of the respondents remain neutral. Coming to skills 50% of the respondents are highly satisfied, 30% of the respondents are satisfied and 20% of the respondents remain neutral. In experience 60% of the respondents are highly satisfied, 30% of the respondents are satisfied and 10% remain neutral.

Table-4: Awareness of manpower planning procedure in the organization

Particulars	No. Of Respondents	% Of respondents
Yes	70	70
No	30	30
Total	100	100

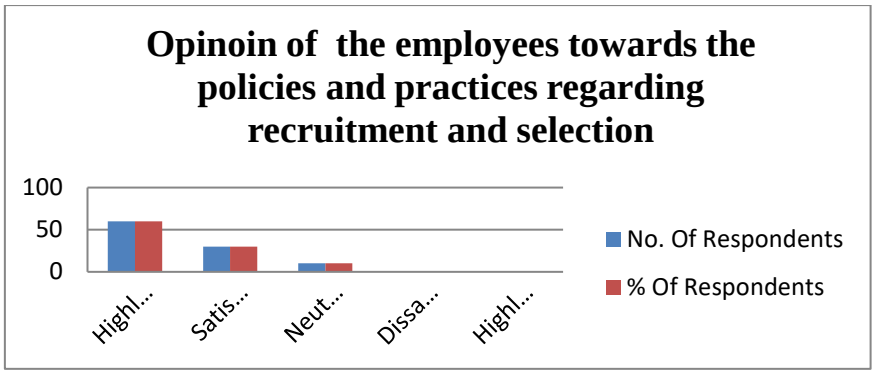


INTERPRETATION:

From the survey collected through questionnaire in A.P.FASTENERS PVT LTD, it is observed that majority of the employees agree with the awareness of manpower planning and 30% of the respondents disagree with the employees are aware of man power planning procedure in the organization.

Table-5: Opinion of the employees towards the policies and practices followed by the organization regarding recruitment and selection

Particulars	No. Of Respondents	% Of Respondents
Highly Satisfied	60	60
Satisfied	30	30
Neutral	10	10
Dissatisfied	0	0
Highly Dissatisfied	0	0
Total	100	100



INTERPRETATION:

From the survey collected through questionnaire in A.P.FASTENERS PVT LTD, it is observed that 60% of the respondents are highly satisfied, 30% of the respondents are satisfied and 10% of the respondents remain neutral towards the policies and practices followed by the organization regarding recruitment and selection.

VII. STATISTICAL ANALYSIS

Hypothesis Test:

H0: There is no significant relationship between the recruitment & selection process and employee satisfaction.

H1: There is a significant relationship between the recruitment & selection process and employee satisfaction.

CORRELATION TEST:

OPTIONS	**RECRUITMENT AND SELECTION**	**EMPLOYEE SATISFACTION**
HIGHLY SATISFIED	61	50
SATISFIED	30	32
NEUTRAL	19	18
DISSATISFIED	0	0
HIGHLY DISSATISFIED	0	0

	Column 1	Column 2
Column 1	1	
Column 2	0.989012	1

Correlation value(r) = 0.989

Table value: 0.80

Conclusion: Critical value of Correlation is 0.98 which is greater than the table value of 0.80 where H1 is failed to reject. Hence there is a relation between the recruitment and selection and employee satisfaction.

VIII. FINDINGS:

1. Majority of the employees (80%) are satisfied with the Recruitment and Selection process provided by A.P. FASTENERS PVT LTD.
2. 22% of the respondents are between (20-30) years, 30% of the respondents are between (30-40) years, 38% of the respondents are between (41-50) years, 10% of the respondents are above 51 years.
3. 3.50% of the respondents are highly satisfied, 30% of the respondents are satisfied and 20% of the respondents are neural with the short listing criteria followed by the organization.
4. The organization concentrates on 3 factors for recruitment and selection that are knowledge, skills and experience. In knowledge 40% of the respondents are highly satisfied, 35% of respondents are satisfied and 25% of the respondents remain neutral. Coming to skills 50% of the respondents are highly satisfied, 30% of the respondents are satisfied and 20% of the respondents remain neutral. In experience 60% of the respondents are highly satisfied, 30% of the respondents are satisfied and 10% remain neutral.
5. 5.60% of the respondents are agree with the HR satisfies the organization by providing the adequate pool of quality candidates as per the job description and 40% of the respondents are disagree with the HR satisfies the organization by providing the adequate pool of quality candidates as per the job description.
6. 6. 60% of the respondents are highly satisfied, 30% of the respondents are satisfied and 10% of the respondents remain neutral towards the policies and practices followed by the organization regarding recruitment and selection.

IX. SUGGESTIONS

1. Majority of the employees were satisfied with the process of recruitment and selection followed by the organization but changes are necessary as per the changing scenario.
2. As the technological trends are increasing the organization should prefer for online recruitment and selection process to find out most efficient employees to reach the organizational objectives.
3. The organization should focus more on the newspaper advertisement and online advertisement for getting an adequate pool of employees.

4. The organization may also consider for written tests to qualify the selection procedure.

X. CONCLUSION

The study of recruitment and selection and its impact on employee satisfaction at A.P.FASTENERS PVT LTD seems good. All the employees are aware of the procedures of recruitment and selection followed by A.P.FASTENERS PVT LTD. Hence I can conclude that, in this organization eligible employees are recruited and selected and these employees will help to achieve the goals of that organization.

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A STUDY ON WORK STRESS AMONG EMPLOYEES AND ITS IMPACT ON EMPLOYEE PERFORMANCE IN BPO HYDERABAD

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Abstract

The emphasis on management of work stress (WS) in the corporate world assumes that the ability to manage work stress is associated with enhanced employee performance which suggests that WS is a vital tool having sturdy and significant impact on both employee's employee performance and overall employee performance. Performance is important as it determines the survival of the organization and it also reflects how the organization can cope in today's challenging business environment. The current paper is an attempt to brief the work done in the field of WS and employee performance by discussing various studies conducted around the world. The current paper has compiled the works done on the connection between work stress and workplace performance and based on synthesis of the past studies has created a model that depicts the relationship between the various variables that contribute to work stress and its impact on employee performance.

Index Terms *- Work stress, Organizational Performance*

1. Introduction

Work stress has been of great unease to employees and other investors of organizations. Work stress researchers agree that stress is a serious problem in many organizations (Cooper and Cartwright, 1994; Varca, 1999; Ornelas and Kleiner 2003). The cost of work stress is very high in many organizations in recent times. For instance, the International Labor Organization (ILO) reports that inefficiencies arising from work may cost up to 10 percent of a country‘s GNP (Christo and Piernaar, 2006).Literature suggests that WS is a very important predictor of various domains like Organizational Performance, leadership, work life balance, conflict management, stress management, job satisfaction and also academic performance (Backs, 2001; Christo and

Piernaar, 2006; Schaubroeck et al, 2010). The main aim of this paper is to compile the work done on the relationship between WS& Organizational Performance thereby adding to the literature on the same.

2. Literature Review

2.1Work Stress

Work stress is known as the understanding of a disagreement between ecological wants (stressors) and businesses capacity to achieve these wants (Delve, Skagert&Vilhelmsson, 2007; Hetland, Sandal & Johnsen, 2007; Wager, Fieldman& Hussey 2003). Friese (2015) for example, feeling of loss of occupation, and safety, long working hours, lack of security, and lack of independence in the occupation can cause work stress.

Also, organizational stress may be because of loss of assets and tools; working hours (together with operating late or time beyond regulation and organizational environment are considered as contributors to personnel stress. Work stress frequently displays excessive dissatisfaction among employees, job mobility, burnout, loss of Performance and much less effective interpersonal relationship at work (Ornelas and Kleiner, 2003 Topper (2007) also showed that involvements like figuring out the symbols of stress, recognizing the viable causes for the symbols and symptoms and figuring out possible proposed solutions for each signs as wanted.

Therefore, this research will try to find out the effects of work stress on Organizational Performance and interventions that can be applied by Management and employees to manage stress effectively. To acquire a deeper understanding of the variable (work stress) we will first consider the wider topic of work stress in general and then zero in on the adjustable within the context of Organizational Performance

2.2 Organizational Performance

Organizational performance has usually been defined as gathering of profits, manufacturing, service, and stable goals (Friese, 2015). Employer's concern on the subject of work-related stress has normally focused on the how this type of stress effects the production and profits negatively. This conventional definition of employee performance, although, focuses only on part of the equation. Choosing an alternative but more wide-ranging definition of employee performance, Schaubroeck et al (2010) wrote about an advanced opinion of organizational health performance to fight the existing risks and prevent them from occurring again in the work place. Topper (2007) suggested that the heads of the organization shall focus on employee's health in spite of just focusing the profits and manufacturing which he considered as narrow goals.

Researchers have gained a lot of curiosity in discovering the personality and significance of Organizational Performance in the field of industrial psyche. This is interest if because of the significance of organizations. One of the main definitions of Organizational Performance was given by Backs (2001) and according to him employee performance was the steps taken by the

organization to analyze the standards set and the actual performance of the company. Ornelas and Kleiner (2003) defined Organizational Performance as the level of achievement after putting in efforts. Performance is a group phenomenon with ecological factors which effect the Performance of an association through their ability and motivational level (Erkutlu&Chafra, 2006).

Organizational Performance is the level of effort and organization will put in to achieve its goals (Christo and Piernaar, 2006). Caldwell (2007) defined Organizational Performance as the strategy and plan of an association to perform and complete a work in a particular time period.

Kleiner (2003) defined Organizational Performance as the quality and quantity of work one by the group or individual workers. Rayner &Mclvor (2006) suggested that the feel of Organizational Performance relies on the job requirement, goals, beliefs and objectives of the organization. Conventionally, Organizational Performance has been understood as the degree to which an association executes their role to fulfill a group of standards set by them (Erkutlu&Chafra, 2006). Organizational Performance is defined as the overall beliefs of the organization that an organization performs over a given period of time (Christo and Piernaar, 2006).

2.3 Relationship between Work Stress and Organizational Performance

With the intention to better understand the harmful effects that work-related stress can have on both workers and corporation a. research on work-related stress has recommended an association between unmitigated stress and burnout, defining burnout as the primary manifestation of the mental, objective, and behavioral aspects of stress (Friese, 2015), effects on employee performance (Ornelas and Kleiner, 2003). Burnout as a mental circumstance happening in response to chronic stressors has been characterized through the signs of emotional exhaustion, depersonalization, and decreased personal accomplishment (Christo and Piernaar, 2006). further to burnout, work strain can purpose absenteeism, high group of workers turnover, and reduced efficiency and overall performance (Erkutlu&Chafra, 2006). Researchers have noted that the long-time period effects of non-stop work strain could have poor outcomes for each worker and the corporations wherein they work (Ornelas and Kleiner, 2003). As a end result, work pressure is a developing subject for management due to its dysfunctional outcomes on employee performance.

3. Research Methodology

The present research employs secondary research method to attain the objectives. the research has analyzed past literature and studies on connection between work stress and employee performance to create a model that explains the factors of employee performance that are impacted due to work stress. This model can be used by practitioners, businesses as well as academicians.

3.1Methodoly

The study is both evocative and analytical. It is vivid in the sense that it gives a detailed report with regard to the Stress Management among employees in the Information Technology sectors. The study is based on both the main and minor data. The main data were collected from the I.T employees with the help of a structured questionnaire. The questionnaire was tested with 70 selected employees of I.T sector and utmost care was taken to avoid errors in data collection. The minor data related to the working conditions of the Information technology sector were collected from books, journals, web portal, the well-equipped libraries at IIM Bangalore, the websites and from the employees working in I.T field at Hyderabad city.

3.2 Sampling Design

The Proportionate Stratified Sampling Method was used to select the respondents in BPO sectors in Hyderabad city. This sampling involves employees in BPO sectors namely Tata Consultancy Services BPO, Genpact India Pvt. Ltd., Wipro BPO, Infosys BPO and HCL Technologies Ltd. - Occupational Services employees were selected for the study.

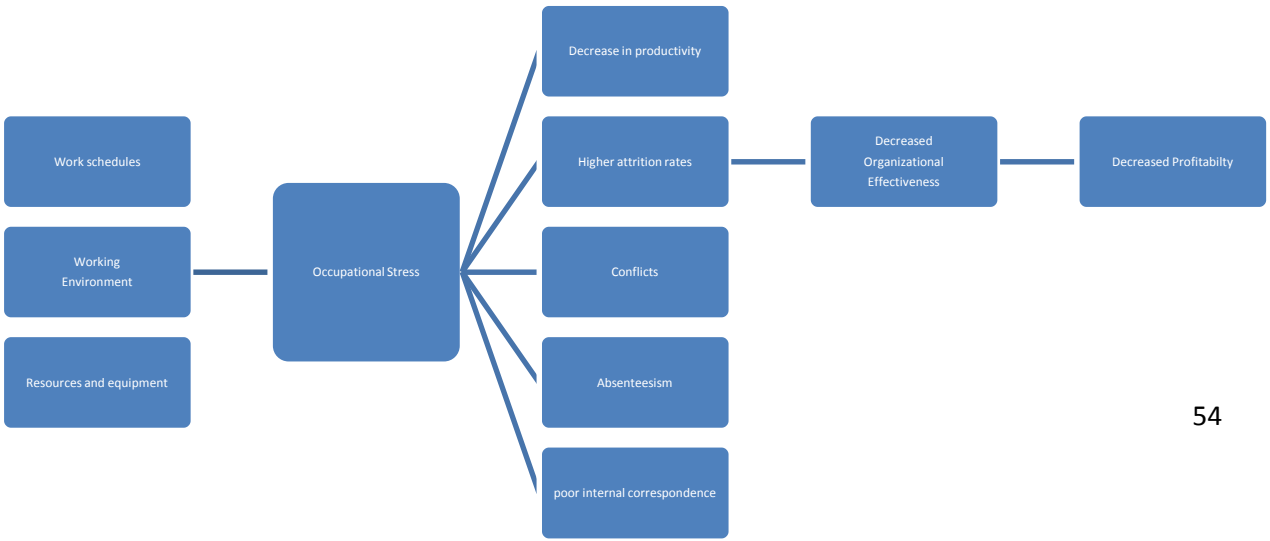
The sample size constituted 1 per cent of the universe i.e., **970** employees. The universe constituting 97000 employees were classified on the basis of their nature of employment.

3.3 Area of the Study

The study was conducted in Hyderabad, India. The BPO Industry in Hyderabad has extended their occupational very rapidly. At present Hyderabad is the second largest BPO sector in India. Hyderabad is the most appropriate place to conduct this research in India. For the study, Tata Consultancy Services BPO, Genpact India Pvt. Ltd., Wipro BPO, Infosys BPO and HCL Technologies Ltd. - Business Services was chosen, as they are the top five BPO industries in Hyderabad city. Therefore, Hyderabad city is selected for the study.

4. Discussion of Findings

The synthesis of past literature has shown that the relationship between works, the work environment, work schedules, and resources and equipment and work stress. This implies that organizational stress is a function of the work environment in any organization. Furthermore, the results also indicate that decrease in productivity, higher attrition rates, debilitated leaves, mishaps; low employment fulfillment, low quality products and services, poor internal communication and clashes inside the corporation are the key consequences of work stress. The results also point out that that stress management has high noteworthy association with worker



motivation and profitability. Based on the research findings the following model is constructed:

Figure 1: Model of relationship between the various variables that contribute to work stress and its impact on employee performance.

(Source: Self Constructed)

To test the important difference between demographic profile of the employees and various stress factors like reasons for work stress, stress factors relating to work, organizational stress factors, personal stress factors, health stress, ecological stress, open stress, emotional stress, self-respect stress, impact of stress on individual, influence of stress on work impact of stress on family managing the stress factors in the job, organizational changes needed to prevention of stress, important practices to reduce the stress and fulfillment level of the organizational health factors in the BPO sector in Hyderabad city, self-governing samples t-test is applied

H_{01}: There is no significant difference between various stress factors and demographic profile of the employees in the BPO sector in Hyderabad city.

Table 1.1: T test for several Stress Factors on the source of Gender

Variables	Gender	N	Mean	SD	SEm	T-Value	Sig. (2-tailed)
Stress Factor	Male	585	48.023	4.871	0.201		
Reasons For	Female	385	47.824	4.342	0.222	.638	.432
Work Stress	Total	**973**	**49.848**	**4.566**	**0.181**		
Stress Factor	Male	583	59.608	5.067	0.210		
Relating To	Female	387	58.585	5.748	0.292	2.721	.008*
Work	Total	**960**	**58.873**	**5.367**	**0.174**		
Organizational	Male	583	62.363	6.341	0.277	.422	.675
Stress Factors	Female	377	61.594	6.093	0.307		
	Total	**960**	**61.679**	**6.229**	**0.207**		
Personal	Male	573	53.878	4.797	0.199	.466	.645
Stress Factor	Female	397	54.016	4.324	0.218		
	Total	**980**	**53.938**	**4.709**	**0.157**		
Stress Factor	Male	593	27.021	4.867	0.203	3.807	.004*
Relating To	Female	397	28.249	4.890	0.246		
Health	Total	**980**	**27.519**	**4.907**	**0.157**		
Stress Factor	Male	593	23.709	3.148	0.120	3.234	.001*
Relating To	Female	397	23.011	3.415	0.172		
Environment	Total	**960**	**23.435**	**3.283**	**0.125**		
Stress Factor	Male	573	25.099	3.804	0.163	.546	.675
Relating To	Female	389	24.977	4.089	0.231		
Psychology	Total	**976**	**25.073**	**3.786**	**0.109**		
Stress Factor	Male	588	24.839	5.426	0.236	2.545	.021*
Relating To	Female	383	25.899	5.045	0.269		
Emotions	Total	**970**	**25.295**	**5.297**	**0.180**		

Stress Factor	Male	583	34.160	4.984	0.204	1.534	.132
Relating To	Female	387	35.684	5.643	0.265		
Self Respect	Total	**970**	35.356	5.240	0.156		

*Source: Computed from Primary data * Significant at 5 per cent level*

The calculated t value of 0.627, 0.420, 0.465, 0.547 1.533 and it is not significant at five per cent level. The value specifies that there is no significant change between the reason for stress factors, organizational stress factors, personal stress factors, psychological stress factors, stress factors relating to self-respect with respect to gender of the employees. Hence, the formulated hypothesis

Testing the significant difference among the impact and organization of stress factors with respect gender of the employees in the BPO sector

H_{02}: There is no significant change between the influence and management of stress factors with respect to demographic profile of the employees in the BPO sector in Hyderabad city.

Table 1.2: T test for Impact and Management of Stress Factors on the source of Gender

Variables	Gender	N	Mean	SD	SE_M	t-value	Sig. (2-tailed)
Impact of Stress	Male	47.290	582	7.149	0.296	0.203	0.839
Consequences of stress	Female	47.374	388	5.591	0.284		
factors on individuals	Total	47.324	970	6.567	0.211		
	Male	32.036	582	5.507	0.228	2.308	0.021*
Stress impact in the work	Female	32.797	388	4.767	0.242		
	Total	32.339	970	5.239	0.168		
	Male	35.097	582	5.783	0.240	3.011	0.003*
Stress impact on family	Female	36.149	388	4.999	0.254		
	Total	35.517	970	5.506	0.179		
Management of Stress	Male	52.704	582	6.009	0.247		
Factors	Female	51.423	388	4.764	0.247	3.696	0.001*
How to manage the stress							
	Total	52.193	970	5.576	0.177		
factors in your job							
Organizational changes to	Male	52.506	582	6.091	0.259	0.531	0.595
needed manage/prevent the	Female	52.724	388	6.542	0.336		
stress factors	Total	52.587	970	6.273	0.203		
Other important	Male	42.257	582	5.164	0.215	0.554	0.580
measures/practices to	Female	42.430	388	4.545	0.237		

reduce the stress factors	Total	42.326	970	4.925	0.159		
Organizational Health	Male	46.242	582	6.244	0.257		
Factors	Female	45.799	388	4.973	0.251	1.226	0.220
Indicate the satisfaction							
level of organizational (it	Total	46.065	970	5.769	0.185		
sector) health factor							

Source: Computed from Primary data * Significant at 5 per cent level

The calculated t value of 0.203, 0.531, 0.580, 1.226 and it is not weighty at five per cent level. The value indicates that there is no significant change between the implications of stress to the individual, organizational changes need to managing stress factors, important practices to reduce the stress factors, satisfaction level of the organizational health factors with respect to gender of the employees. However, the female employees are devising more stress impact in the work as compared to male employees.

Testing the significant difference between the various stress factors and gender of the employees in the BPO sector

H_{02} (a): There is no significant difference between the various stress factors and age of the employees in the BPO sector in Hyderabad city

Table 1.3 One way ANOVA for Various Stress Factors on the basis of Age

	Variables (Stress Factors)	**Age**	**N**	**Mean**	**SD**	**SEM**	**F-value**	**P Value**
		20 to 30 years	46.484	223	4.871	0.326		
		31 to 40 years	48.866	396	4.407	0.221		
	Reasons for work	41-50 years	51.324	244	4.620	0.296	47.984	.001*
	stress	Above 50 years	48.963	107	1.434	0.139		
		Total	**48.947**	**970**	**4.664**	**0.150**		
		20 to 30 years	56.507	223	5.312	0.356		
	Stress factors relating	31 to 40 years	59.967	396	5.790	0.291		
		41-50 years	59.328	244	4.593	0.294	22.983	.001*
	to work							
		Above 50 years	59.850	107	3.668	0.355		
		Total	**58.998**	**970**	**5.368**	**0.172**		
		20 to 30 years	60.363	223	8.088	0.542		

	Organizational stress factors	31 to 40 years	60.803	396	4.922	0.247		
		41-50 years	63.049	244	5.771	0.369	17.800	.001*
		Above 50 years	64.449	107	5.693	0.550		
		Total	**61.669**	**970**	**6.228**	**0.200**		
	Personal stress factors	20 to 30 years	50.130	223	3.891	0.262		
		31 to 40 years	54.184	396	3.817	0.192		
		41-50 years	55.111	244	3.826	0.244	119.714	.001*
		Above 50 years	58.243	107	4.682	0.452		
		Total	**53.933**	**970**	**4.608**	**0.148**		
	Stress factors relating to health	20 to 30 years	26.570	223	5.518	0.370		
		31 to 40 years	27.859	396	4.859	0.244		
		41-50 years	26.877	244	4.043	0.259	11.768	.001*
		Above 50 years	29.626	107	4.801	0.464		
		Total	**27.510**	**970**	**4.906**	**0.158**		
	Stress factors relating to environment	20 to 30 years	20.915	223	1.961	0.134		
		31 to 40 years	22.939	396	3.384	0.173		
		41-50 years	25.730	244	2.357	0.151	139.331	.001*
		Above 50 years	25.215	107	2.223	0.214		
		Total	**23.427**	**970**	**3.274**	**0.105**		
	Stress factors relating to psychological	20 to 30 years	22.955	223	4.293	0.287		
		31 to 40 years	25.023	396	3.643	0.183		
		41-50 years	25.967	244	3.312	0.212	43.368	.001*
		Above 50 years	27.271	107	2.587	0.250		
		Total	**25.033**	**970**	**3.858**	**0.124**		
	Stress factors relating	20 to 30 years	22.830	223	6.097	0.409		
		31 to 40 years	24.609	396	5.001	0.252		
		41-50 years	27.701	244	3.595	0.231	44.782	.001*

	to emotional							
		Above 50 years	27.150	107	4.956	0.480		
		Total	**25.258**	**970**	**5.298**	**0.170**		
		20 to 30 years	32.466	223	4.500	0.302		
Stress factors relating		31 to 40 years	35.611	396	6.049	0.303		
		41-50 years	37.135	244	3.442	0.221	36.457	.001*
	to Self-respect							
		Above 50 years	36.206	107	4.708	0.454		
		Total	**35.337**	**970**	**5.270**	**0.169**		

Source: computed from primary data * Significant at 5 per cent level

The calculated F value of 47.984, 22.983, 17.800, 119.714, 11.768, 139.331, 43.368, 44.782 and 36.457 to the above respective variables hence, the formulated hypothesis.

REASON FOR STRESS-(Comparative Studies of the Reasons for Various Stress Factors)

The reason for work stress among the employees of the selected BPO sector company of TCS, Infosys, Wipro, CTS and HCL has been presented in Table 1.4 (a)

Table 1.4 (a) Reason for Stress

Name of the Company	No. of Respondents	Mean Score	Standard Deviation	Coefficient of Variation
TCS BPO	270	48.83	4.57	20.93
Infosys BPO	200	47.67	7.30	53.24
Wipro BPO	250	49.14	4.57	20.88
Genpact India Pvt. Ltd	160	48.80	4.85	23.51
HCL BPO	90	48.96	4.63	21.44
Total	970	48.68	5.31	28.22

Source: Computed from Primary Data

Table 1.4(a) depicts the highest average acceptance score of 49.14 in the Wipro company, followed by HCL with average receipt score of 48.96, TCS with average receipt score of 48.83, Genpact Ltd with average acceptance score of 48.80 and lowest average receipt score 47.67 in the Infosys

Testing the significant difference between reasons for stress and selected BPO sector employees

$H_0$3: There is no significant difference between comparative studies of the reasons for various stress factors and the selected BPO sector employees.

Table 1.4(b) one way ANOVA for Reason for Stress

	Sum of Squares	Df	Mean Square	F	Sig.
Among Clusters	275.114	4	68.529	2.443	.045
Within Clusters	27070.240	965	28.052		
Total	**27344.355**	**969**			

Source: Computed from Primary Data

It is observed from the Table 1.4(b) shows that the considered F value of 2.443 is important. The value indicates that there is a significant difference in the reason for stress in the selected BPO sector company employees.

5. Conclusion

The current study attempted to compile the work done in the field of WS and its relationship with Organizational Performance to find how WS affects employee performance. The research has indicated that decrease in productivity, higher attrition rates, debilitated leaves, mishaps, low employment fulfillment, low quality products and services, poor internal communication and clashes inside the corporation are the key consequences of work stress are some of the outcomes of work stress while nature of work, the work environment, work schedules, and resources and equipment have been found as major factors contributing to work stress. A model has been derived in this research that depicts the relationship between the various variables that contribute to work stress and its impact on organizational

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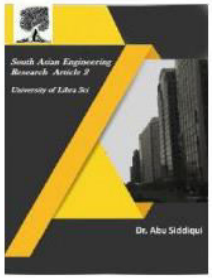

A STUDY ON RISK AND RETURN ANALYSIS OF INDIAN IT SECTOR

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ABSTRACT

ABSTRACT: Risk and return analysis plays a major role in most individual decision making process. Every capitalist desires to avoid risk and maximize return. Successful investment requires a careful assessment of the investments potential returns and its risk of loss. A firms risk and expected returns directly affect its share price. In real world situations, the Risk of any single investment wouldn't be viewed severally of alternative assets. New investment must be considered in light of their impact on the risk and return of the assets. In traditional financial analysis, investment management tools allow the investors to evaluate the return and risk of individual investments and portfolios. Usually, higher the risk, higher the returns and lower the risk, lower the returns. However a general understanding of this development isn't enough to form applicable choices concerning investments. This study reported a statistically significant relationship between risk and return. The study is undertaken with the main objective of determining the risk and return profile of five IT firms listed on BSE .Finally, the study proves there's a relation between risk, return and capitalist the most effective company among the selected company.

Key words: Risk, Return, Bombay stock Exchange (BSE).

Introduction:

Risk:

In the investment world, the definition of risk is that the likelihood that associate investments actual return are going to be completely different than expected. Risk means that you have got the chance of losing some, or perhaps all, of your original investment. Low levels of risk are related to low potential returns. Risk can be divided into two types: systematic and unsystematic.

Return:

Returns refer to the potential loss or gain experienced through investments in securities. If an investor decides to invest in a security that has a relatively low risk, the potential return on that investment is typically small. Conversely, an investment in a security that has a high risk factor has the potential to gain higher return.

REVIEW OF LITERATURE:

- Sehgal (1994) studied the concept of skewness in determining the nature of return. The study made an attempt to explore the nature of return by way of taking 80 individual securities from Bombay Stock Exchange during the period of 1984 to 1993 covering more than 10 years. The study tested the scrips to find out the nature of returns belonging to normal or non normal. The test showed the result that the individual securities did not show any normal distribution in terms of returns since the return of scrips has significant positive skewness. The study also revealed that NATEX also showed the non normal return.
- Kohers and others (2006) made an effort in comparing the return of the stock market with respect to emerging markets and developed markets. The study explained by way of analyzing 49 companies of which 26 countries belonged to emerging countries and remaining 23 countries

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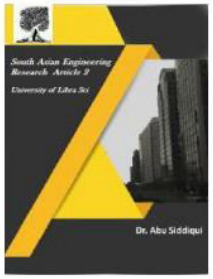

belonged to developed countries. The study found that the risk associated with the emerging market were more than developed countries. Since the expected return of the investment in the emerging markets was commensurate with risk. The study concluded that the risk averse attitudes of the investors were found to be higher in emerging market in comparing with developed market.

- DWI and others (2009) made an attempt to find out the influence of accounting information on stock return and therefore the study used multiple regression by way of identifying financial ratio, firm size and cash flow as independent variable and stock return as dependent variable. The result of the study showed that there was a considerable impact of the above key variables in determining the stock return.
- Sangeetha and Dheeraj (2007) made an attempt to find out the relation among the return of the scrip, market information and accounting information. They wanted to study the influence of market information on return of the scrip was high or the influence of accounting information was high on the scrip's return. They collected the information on the basis of monthly data pertaining to various sectors from BSE during the year 1999 to 2006.The study used regression model to find the significant impact of accounting information and market information on scrip's return and found that the market information made significant influence whereas the accounting information had no impact on return of the scrip.
- Hasan Ali and Habibolah (2010) tested the risk- return relationship by way of taking 74 companies as sample size in Tehran Stock Exchange during the period of 2003-2005. The study examined the characteristics of the return in terms of Skewness and Kurtosis to find out the distribution of return series. As far as the study is concerned, the effect of Kurtosis did not show any significant relation with the return during the study period whereas the Skewness showed the important effects on returns. The study further explored that the relationship between beta and return was found to be non-linear.

OBJECTIVES OF THE STUDY:

- To calculate return of the selected IT sector scrips.
- To calculate the risk of the selected IT sector scrips.
- To co-relate the firm's risk, return and state, the best company among these selected IT companies.

HYPOTHESIS OF THE STUDY:

- H0: There is no significant relationship between risk and return of IT companies.
- H1: There is a significant relationship between risk and return of IT companies.

RESEARCH METHODOLOGY: It is the scientific way to solve the research problem. It is the systematic, theoretical analysis of the ways applied to a field of study.

Primary data:

This method includes the data collection from the personal discussion with the authorized clerks and members of the INDIABULLS financial services.

Secondary data: The secondary data can be obtained from information collected through internet searches, books, government departments and libraries.

STATISTICAL TOOLS:

Statistical tools used for the study are mean, median, standard deviation, skewness and kurtosis.

SAMPLE DESIGN:

The study of analysis mainly focusing at difference of changes in share prices of top Indian

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IT companies listed on BSE indexes are taken for the study.

SAMPLE SIZE: To analyze the risk and return of five IT companies..

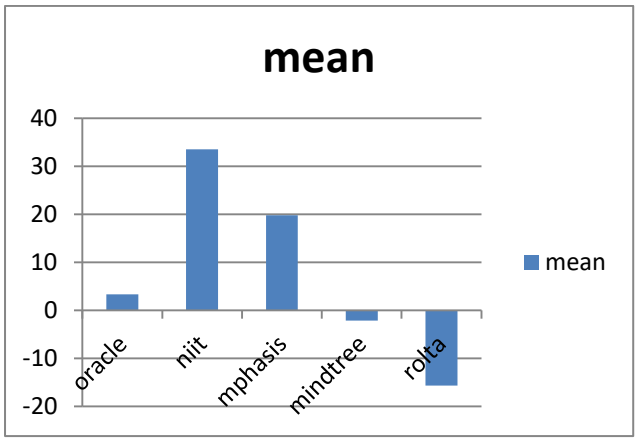
FIVE IT COMPANIES:

- Oracle India Pvt Ltd.
- NIIT Technologies
- MindTree
- Mphasis
- Rolta

DATA ANALYSIS:

Calculation of mean:

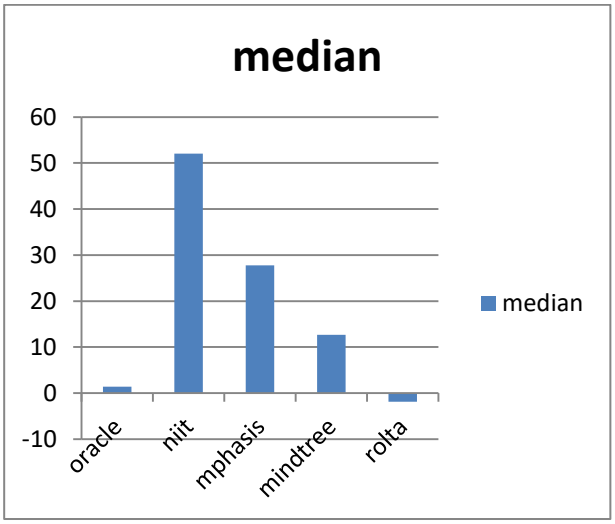
COMPANIES	MEAN
ORACLE	3.34
NIIT	33.54
MPHASIS	19.798
MINDTREE	-2.1
ROLTA	-15.656



INTERPRETATION: From the above analysis, to compare different companies of oracle, Niit, Mphasis, MindTree and Rolta .It is observed that Rolta is having less mean when compared to other companies.

Calculation of median:

COMPANY	MEDIAN
ORACLE	1.4
NIIT	52.07
MPHASIS	27.76
MINDTREE	12.65
ROLTA	-1.88



INTERPRETATION: from the above graph, NIIT (52.07) shows more result compared to oracle (1.4), Mphasis (27.76), MindTree (12.65), Rolta (-1.88).

Calculation of standard deviation:

COMPANY	STD
ORACLE	18.50885
NIIT	43.54889
MPHASIS	20.2485
MINDTREE	40.14328
ROLTA	48.34226

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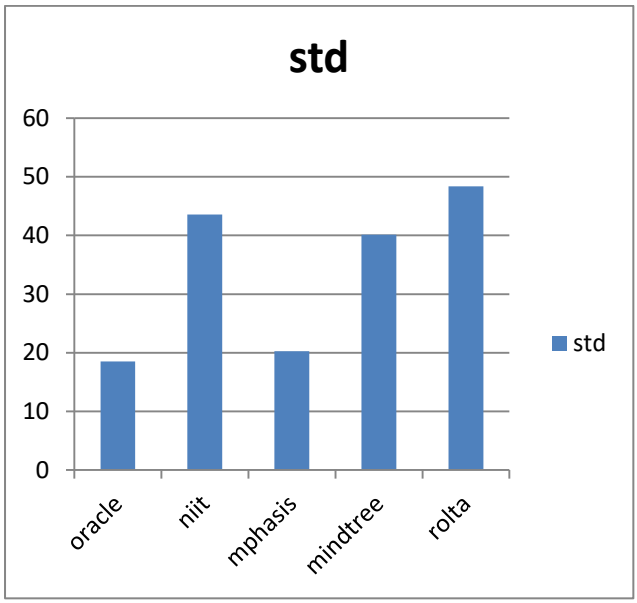
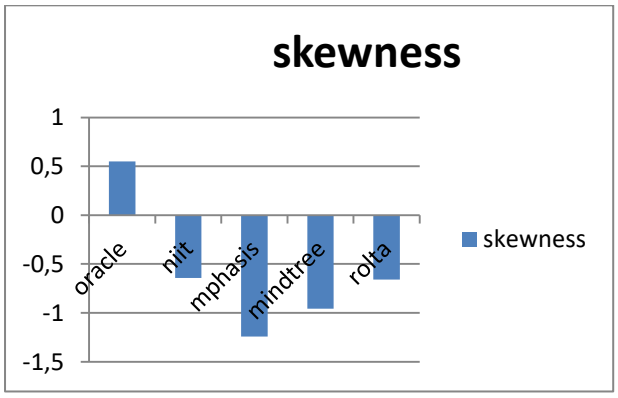


INTERPRETATION: From the above study, we can analyze that the Rolta (48.34226) is having highest standard deviation and oracle (18.50885) is having the lowest standard deviation.

Calculation of skewness:

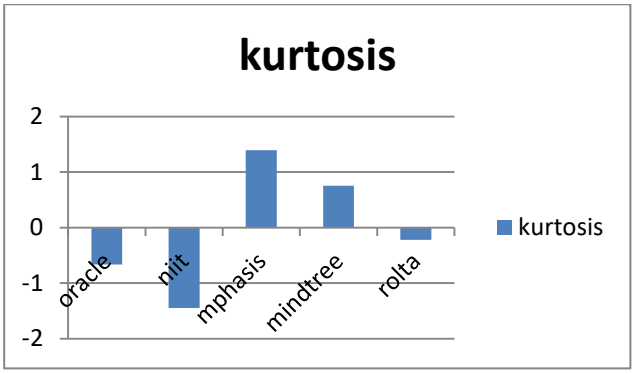
COMPANY	SKEWNESS
ORACLE	0.548818
NIIT	-0.64407
MPHASIS	-1.24181
MINDTREE	-0.95583
ROLTA	-0.6576



INTERPRETATION: From the above study, the skewness of oracle (0.548818) shows positive result while Niit (-0.64407), Mphasis (-1.24181), MindTree (-0.95583) and Rolta (-0.6576) shows negative results.

Calculation of kurtosis:

COMPANY	KURTOSIS
ORACLE	-0.66362
NIIT	-1.4453
MPHASIS	1.39037
MINDTREE	0.754983
ROLTA	-0.21734



INTERPRETATION: From the above analysis, Mphasis (1.39037) and MindTree (0.754983) shows positive result when compared to oracle (-0.66362), Niit (-1.4453) and Rolta (-0.21734).

T-TEST RESULT OF ORACLE WITH NIIT:

T-test: Paired sample for two means

Table column sub head	Variable 1	Variable 2
Mean	172.9588	965.0229
Variance	57541.04	1735321
Observations	2	2
Pearson Correlation	1	
Hypothesized Mean Difference	0	
Df	1	
t Stat	-1.03964	
P(T<=t) one-tail	0.243815	
t Critical one-tail	6.313752	
P(T<=t) two-tail	0.487629	
t Critical two-tail	12.7062	

For the above table H0 is accepted on the basis of calculated value -1.039(t Stat) <12.7062(t Critical two-tail).

T-TEST RESULT OF ORACLE WITH ROLTA:

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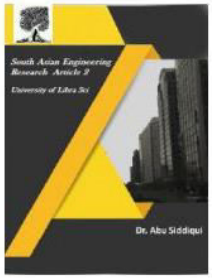

Table column sub head	Variable *1*	Variable *2*
Mean	172.9588	1160.659
Variance	57541.04	2767434
Observations	2	2
Pearson Correlation	1	
Hypothesized Mean Difference	0	
Df	1	
t Stat	-0.98113	
P(T<=t) one-tail	0.253032	
t Critical one-tail	6.313752	
P(T<=t) two-tail	0.506063	
t Critical two-tail	12.7062	

For the above table H0 is accepted on the basis of calculated value-0.98113 (t Stat) <12.7062(t Critical two-tail).

T-TEST RESULT OF ORACLE WITH MPHASIS

Table column sub head	Variable 1	Variable *2*
Mean	172.9588	214.8999
Variance	57541.04	76129.46
Observations	2	2
Pearson Correlation	1	
Hypothesized Mean Difference	0	
Df	1	
t Stat	-1.64584	
P(T<=t) one-tail	0.173792	
t Critical one-tail	6.313752	
P(T<=t) two-tail	0.347584	
t Critical two-tail	12.7062	

For the above table H0 is accepted on the basis of calculated value -1.64584 (t Stat) <12.7062(t Critical two-tail).

T-TEST RESULT OF ORACLE WITH MINDTREE:

Table column sub head	Variable 1	Variable 2
Mean	172.9588	804.6915
Variance	57541.04	1301825
Observations	2	2
Pearson Correlation	1	
Hypothesized Mean Difference	0	
Df	1	
t Stat	-0.99146	
P(T<=t) one-tail	0.251365	
t Critical one-tail	6.313752	
P(T<=t) two-tail	0.502729	
t Critical two-tail	12.7062	

For the above table H0 is accepted on the basis of calculated value -0.99146 (t Stat) <12.7062(t Critical two-tail).

FINDINGS:

From the data analysis and interpretations of the returns of five companies, namely ORACLE, MINDTREE, MPHASIS, NIIT and ROLTA, the following findings have been given:

- During the study period, the mean returns for selected IT companies shares both positive and negative figures.
- The risk of Rolta is higher when compared to selected IT companies.
- The skewness of Mphasis is having less risk when compared to other IT companies.
- The median shows high positive return in NIIT and less in Rolta.
- Standard deviation is satisfactory for all the selected IT companies.

STATISTICAL ANALYSIS:

Descriptive statistics: To analyze the descriptive statistics the mean value is considered.

T-test: T-test is done to find out significant differences with the 5 companies and the factors. If the T-test value is greater than T-Critical two tail the null hypothesis is rejected, if it is less then null hypothesis is accepted.

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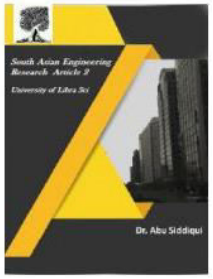

TESTING OF HYPOTHESIS:

Based on the above study , T-test results of five IT companies whose all calculated values (t stat) are less than tabulated value (t critical two tail).

SUGGESTIONS:

By analyzing the IT sector with the help of risk-return, it has been revealed that this sector has a lot of potential to grow. So recommending the investors for investing in IT sector with no doubt is going to be a good and smart option because this industry is booming like never before.

The five IT companies viz. ORACLE, NIIT, MPHASIS, MINDTREE, ROLTA have outperformed in the industry.

- Rolta seems to be the best for the investors in terms of Risk as it posses less risk in the recent years among the selected IT companies.
- NIIT has been performing consistently in terms of higher returns and maintaining its level of growth in IT sector.

CONCLUSION:

The IT industry is having highest growth opportunity in the near future, since information technology plays an important role in the economic development. Indian IT sectors have fared well on growth, asset quality and profitability with other regional IT sectors over the last years. The study of relationship risk and return analysis helps the capitalist to choose up the securities supported his alternative. The study of this kind provides information about the performance of various stocks in the market in terms of risk and return and suggests the best company for investment. Further, the inability of IT sector managements to improve capital allocation, increase the productivity of their service platforms and improve the performance ethic in their organizations could seriously affect future performance. The above study gives an optimistic view about the industry and its growth which recommends the investors to keep a good look at on the major players to benefit in terms of returns on their investments.

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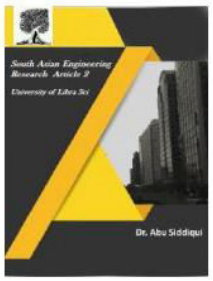

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PORTFOLIO MANAGEMENT AT KARVY STOCK BROCKING

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ABSRACT: *Portfolio management can be defined and used in alternative ways. The basic meaning of the portfolio management is "combination of various things keeping intact". The purpose of selecting this subject is to grasp how the portfolio management needs to be wiped out incoming at the effective one and at the same time aware the investors to choose the securities that they need to place in their portfolio. This topic covers how a particular portfolio must be chosen concerning all the securities individual return and thereby arriving at the overall portfolio return. This conjointly provides a position in incoming at the proper portfolio in thought to totally different securities instead of one single security. So this article has been prepared with a view to providing suggestion to manage their portfolio in an effective way by using returns, standard deviation, portfolio returns, and portfolio weights.*

KEYWORDS*: Analysis of risk and return, expected return on portfolio, risk measurement, portfolio weights.*

INTRODUCTION:

A portfolio may be a assortment of investments command by an establishment or a non-public individual. In build-up Associate in nursing investment portfolio a financial organisation can generally conduct its own investment analysis, while a non-public individual could build use of the services of a monetary advisor or a financial organisation that offers portfolio management services. Holding a portfolio is a component is associate in Nursing element} of an investment and risk-limiting strategy known as diversification. By owning many assets, bound sorts of risk (in specific risk) will be reduced. The assets within the portfolio might embody stocks, bonds, options, warrants, gold certificates, property, futures contracts, production facilities, or the other item that's expected to retain its price.

REVIEW OF LITERATURE:

- Yoon Je Cho (1998) : Showed in his study that increasing turnover figures in the Indian stock exchanges from 1994-95 to 1996-97, implying that they are dominated by speculative investments, which is not unusual in emerging markets. However, commercialism volumes within the New Delhi market square measure fairly massive

compared to those in different rising markets. The substantial increase in turnover may be attributed primarily to the expansion of the NSE‟s

- **Sheng-Hung Chen and Chun-Hung Tsai (2010)** wanted to identifying key factors influencing individual investor's decision to make portfolio choices is of importance to understand their heterogeneous investment behaviour. Study stated female investors tend to be more detail oriented; elder is more likely to have low level of risk tolerance.
- **R R Rajamohan (2010) :**Analyzed the role of the financial knowledge is important in decision making in information intensive assets like stocks and other risky securities. Hence, reading habit, as a proxy for financial knowledge. Younger people have greater labour flexibility than older people; if the returns on their investments turn out to be low, they could work more or retire later. Hence age an important factor to be considered in household portfolio analysis.
- **Chris Veld and Yulia V. Veld-Merkoulova (2006):** Found that investors consider the original investment returns to be the most important benchmark, followed by the risk-free rate of return and the market return. Study found that investors with longer time horizon would generally be better off investing in stocks compared to investors with shorter time horizon. Their study showed the investors optimize their utility by choosing the alternative with the lowest perceived risk.

OBJECTIVES OF THE STUDY:

- To study the investment decision process.
- To analysis the risk return characteristics of Sample scripts.
- To analyze the effective portfolio which offers Maximum return with minimum risk.

HYPOTHESIS:

- H0: there is no relation between portfolio risk and portfolio returns.
- H1: There is relation between the portfolio management risk and port folio return.

RESEARCH METHODOLOGY:

Research methodology is the procedure which we used to collect the information and data from making decisions. It may include past and present information**.**

DATA COLLECTION:

Primary Source

- Information gathered from interacting with employees in the organization.

Secondary Source

- Daily prices of scripts from news papers.

TOOLS&TECHNIQUES:

Statistical tools which are used for the study are return, average return, standard deviation, correlation.

PORTFOLIO ANALYSIS:

Standard Deviation $= \sqrt{\text{Variance}}$

Variance $= 1/n \, (R-\bar{R})^2$

Covariance (COV ab) = 1/n (RA-RA) * (RB-RB)

Correlation Coefficient = COV ab/a*b

Portfolio Weights $Wa = \frac{b\,[b-(nab*a)]}{a^2 + b^2 - 2nab*a*b}$

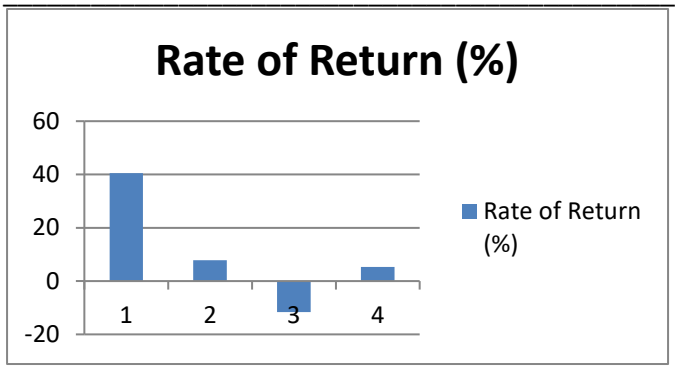
$R_P = (a*Wa)^2 + (b*Wb)^2 + 2*a*b*Wa*Wb*nab$

Portfolio Return Rp= (RA*WA) + (RB*WB)

DATA ANALYSIS:

Calculation of average returns:

Scrip	**Rate of Return (%)**
Maruti	**40.54**
ACC	**7.83**
ICICI	**-11.63**
Reliance	**5.34**



INTERPRETATION: From the above graph, the returns of Maruti Suzuki are higher than all the selected companies and the returns of reliance are lesser than all the selected companies.

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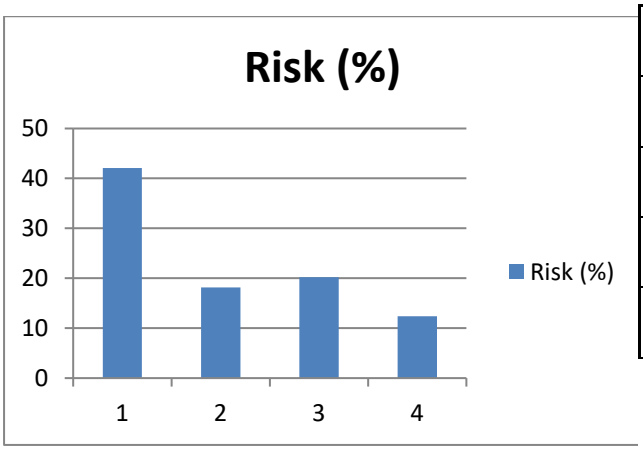


Scrip	Risk (%)
Maruti	42.07
ACC	18.19
ICICI	20.23
Reliance	12.42

INTERPRETATION: From the above graph, the risk I also high for Maruti and lower for reliance when compared with the other selected companies.

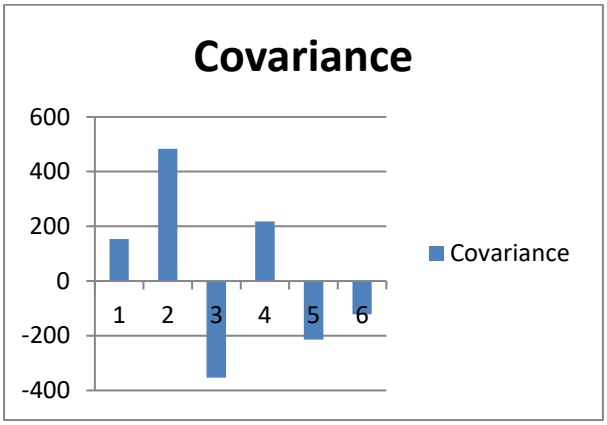
CALCULATION OF CORRELATION:

Covariance (COV ab) = $1/n\ (\overline{RA}-RA) * (\overline{RB}-RB)$

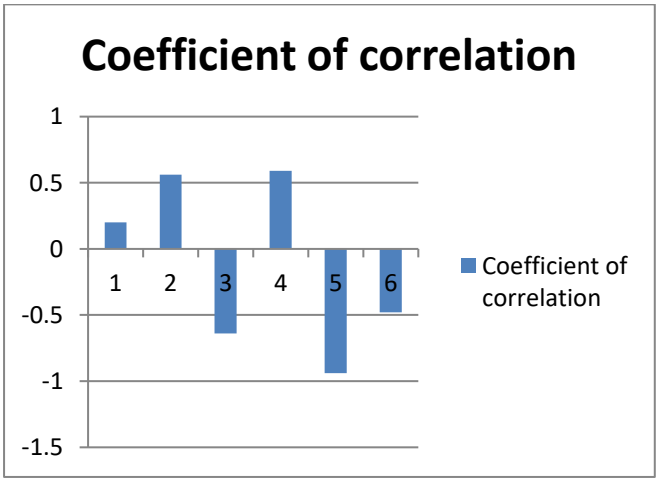
Correlation Coefficient = COV ab/a*b

Scrip A	Scrip B	Covariance
Maruti	ACC	154.004
Maruti	ICICI	484.204

Maruti	Reliance	-353.38
ACC	ICICI	217.46
ACC	Reliance	-214.552
ICIC	Reliance	-121.162



Scrip A	Scrip B	Coefficient of correlation
Maruti	ACC	0.201
Maruti	ICICI	0.56
Maruti	Reliance	-0.64
ACC	ICICI	0.59
ACC	Reliance	-0.94
ICICI	Reliance	-0.48



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CALCULATION OF PORTFOLIO RISK:

$$R_P = \sqrt{(a*Wa)^2+(b*Wb)^2 2*a*b*Wa*Wb*nab}$$

Portfolio risk can be calculated by using above formula. Where portfolio weights, standard deviations and returns are taken into consideration

Scrip A	Scrip B	Portfolio Risk
Maruti	ACC	17.7
Maruti	ICICI	21.37
Maruti	Reliance	16.11
ACC	ICICI	17.3
ACC	Reliance	20.55
ICICI	Reliance	7.76

INTERPRETATION: From the above graph, the risk associated with Maruti and ICICI is greater and ICICI and reliance is lower among the selected companies.

CALCULATION OF PORTFOLIO RETURNS:

MARUTI (A) & ACC (B):

RA=40.54 WA=0.10

RB=7.83 WB=0.90

Rp = (40.54*0.10) + (7.83*0.90)

Rp = (4.054+7.047)

Rp = 11.101%

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RA=40.54 WA=0.15

RB=-11.63 WB=0.85

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Rp =(6.081-9.885)

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MARUTI (A) & RELIANCE (B):

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Rp = (3.132+3.024)

Rp = 6.156%

ICICI (A) & RELIANCE (B):

RA= -11.63 WA=0.34

RB=5.34 WB=0.66

Rp = (-11.63*0.34) + (5.34*0.66)

Rp = (-3.954+3.524)

Rp = -0.43%

PORTFOLIO RETURNS & RISKS OF THE

SELECTED STOCKS:

Scrip A	Scrip B	Portfolio Return	Portfolio Risk
Maruti	ACC	11.101	17.70
Maruti	ICICI	-3.084	21.37
Maruti	Reliance	11.675	16.11
ACC	ICICI	-3.067	17.30
ACC	Reliance	6.156	20.55
ICICI	Reliance	-0.43	7.76

Hypothesis test:

	Column 1	Column 2
Column 1	1	
Column 2	0.080198	1

- For the study correlation test is used and as per the rules the relation between portfolio risk and portfolio return is between +1 and-1.
  There is relation between portfolio risk and
  Portfolio return.
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FINDINGS:

1. Individual returns on the selected stocks including Maruti, ACC, ICICI, and Reliance are 40.54%, 7.83%,-11.63%, 5.34% respectively.
2. Individual risks on the selected stocks including Maruti, ACC, ICICI, and Reliance are 402.07%, 18.19%, 20.23%, 12.42%respectively.
3. Correlation between all the companies is positive which means all the combinations of portfolios are at good position to gain in future.

4. Portfolios Returns of followed by ACC & ICICI (11.101%) and Maruti & ACC (11.675%) stood on the top while Portfolio Returns of Maruti & ICICI (-3.804%)and ICICI & Reliance (-0.43%) stood at the bottom.
5. Portfolios Risk of Maruti (42.07) followed by ICICI & Maruti (21.37%) are very high while Portfolio Risks of Reliance& ACC (2.557%) stood at the bottom.

SUGGESTIONS

1. All the stocks under consideration have given positive return which indicates the positive performance of the stock market, specially the SENSEX stocks. has been the outstanding performer This indicates that Investors can be assured of good returns in the long run by investing in blue chip companies. Rest of the stocks has given average returns ranging from -11%to41%
2. Comparing the individual risks, Maruti are risky securities compared to the other securities like Reliance, ACC and ICICI and it suggested that the investors should be careful while investing in these securities.
3. The investors who require minimum return with low risk can invest in ICICI and reliance.
4. It is recommended that the investors who require high risk with high return should invest in Maruti.
5. All the investors who invest in the securities are ultimately benefited by investing in selected scripts of Industries.

CONCLUSIONS:

- Portfolio management may be a method of encompassing several activities of investment assets and securities. It is a dynamic and versatile conception and involves regular and systematic analysis, judgment, and action. A combination of securities control along can provides a useful result if they sorted during a manner to secure higher returns once taking into thought the danger parts.
- The main objective of the Portfolio management is to assist the investors to create wise selection between alternate investments while not a post mercantilism shares. Any portfolio management must specify the objectives like Maximum returns, Optimum Returns, Capital appreciation, Safety etc., in the same prospectus.
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PORTFOLIO MANAGEMENT AT KARVY STOCK BROCKING

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Pudukkottai Distict.

ABSRACT: *Portfolio management can be defined and used in alternative ways. The basic meaning of the portfolio management is "combination of various things keeping intact". The purpose of selecting this subject is to grasp how the portfolio management needs to be wiped out incoming at the effective one and at the same time aware the investors to choose the securities that they need to place in their portfolio. This topic covers how a particular portfolio must be chosen concerning all the securities individual return and thereby arriving at the overall portfolio return. This conjointly provides a position in incoming at the proper portfolio in thought to totally different securities instead of one single security. So this article has been prepared with a view to providing suggestion to manage their portfolio in an effective way by using returns, standard deviation, portfolio returns, and portfolio weights.*

KEYWORDS*: Analysis of risk and return, expected return on portfolio, risk measurement, portfolio weights.*

INTRODUCTION:

A portfolio may be a assortment of investments command by an establishment or a non-public individual. In build-up Associate in nursing investment portfolio a financial organisation can generally conduct its own investment analysis, while a non-public individual could build use of the services of a monetary advisor or a financial organisation that offers portfolio management services. Holding a portfolio is a component is associate in Nursing element} of an investment and risk-limiting strategy known as diversification. By owning many assets, bound sorts of risk (in specific risk) will be reduced. The assets within the portfolio might embody stocks, bonds, options, warrants, gold certificates, property, futures contracts, production facilities, or the other item that's expected to retain its price.

REVIEW OF LITERATURE:

- Yoon Je Cho (1998) : Showed in his study that increasing turnover figures in the Indian stock exchanges from 1994-95 to 1996-97, implying that they are dominated by speculative investments, which is not unusual in emerging markets. However, commercialism volumes within the New Delhi market square measure fairly massive

compared to those in different rising markets. The substantial increase in turnover may be attributed primarily to the expansion of the NSE‟s

- **Sheng-Hung Chen and Chun-Hung Tsai (2010)** wanted to identifying key factors influencing individual investor's decision to make portfolio choices is of importance to understand their heterogeneous investment behaviour. Study stated female investors tend to be more detail oriented; elder is more likely to have low level of risk tolerance.
- **R R Rajamohan (2010) :**Analyzed the role of the financial knowledge is important in decision making in information intensive assets like stocks and other risky securities. Hence, reading habit, as a proxy for financial knowledge. Younger people have greater labour flexibility than older people; if the returns on their investments turn out to be low, they could work more or retire later. Hence age an important factor to be considered in household portfolio analysis.
- **Chris Veld and Yulia V. Veld-Merkoulova (2006):** Found that investors consider the original investment returns to be the most important benchmark, followed by the risk-free rate of return and the market return. Study found that investors with longer time horizon would generally be better off investing in stocks compared to investors with shorter time horizon. Their study showed the investors optimize their utility by choosing the alternative with the lowest perceived risk.

OBJECTIVES OF THE STUDY:

- To study the investment decision process.
- To analysis the risk return characteristics of Sample scripts.
- To analyze the effective portfolio which offers Maximum return with minimum risk.

HYPOTHESIS:

- H0: there is no relation between portfolio risk and portfolio returns.
- H1: There is relation between the portfolio management risk and port folio return.

RESEARCH METHODOLOGY:

Research methodology is the procedure which we used to collect the information and data from making decisions. It may include past and present information**.**

DATA COLLECTION:

Primary Source

- Information gathered from interacting with employees in the organization.

Secondary Source

- Daily prices of scripts from news papers.

TOOLS&TECHNIQUES:

Statistical tools which are used for the study are return, average return, standard deviation, correlation.

PORTFOLIO ANALYSIS:

Standard Deviation $= \sqrt{\text{Variance}}$

Variance $= 1/n \, (R-\bar{R})^2$

Covariance (COV ab) = 1/n (RA-RA) * (RB-RB)

Correlation Coefficient = COV ab/a*b

Portfolio Weights $Wa = \frac{b\,[b-(nab*a)]}{a^2 + b^2 - 2nab*a*b}$

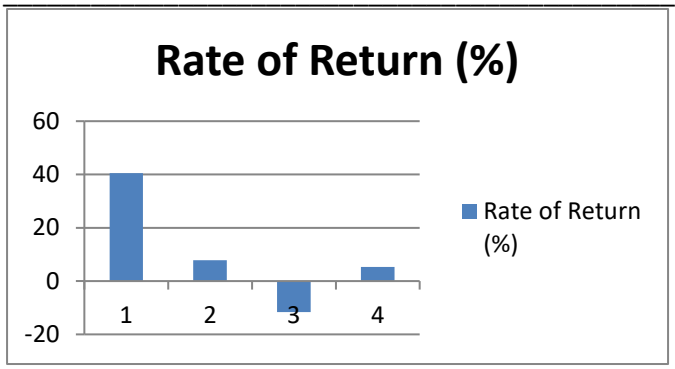
$R_P = (a*Wa)^2 + (b*Wb)^2 + 2*a*b*Wa*Wb*nab$

Portfolio Return Rp= (RA*WA) + (RB*WB)

DATA ANALYSIS:

Calculation of average returns:

Scrip	**Rate of Return (%)**
Maruti	**40.54**
ACC	**7.83**
ICICI	**-11.63**
Reliance	**5.34**



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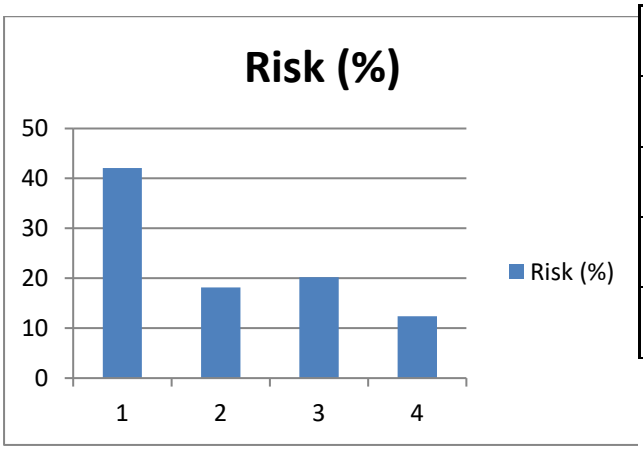

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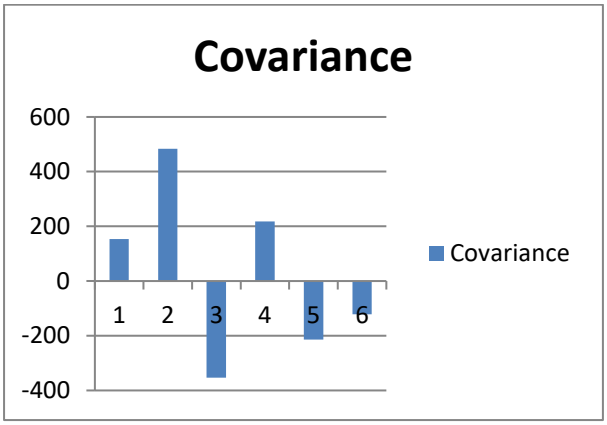

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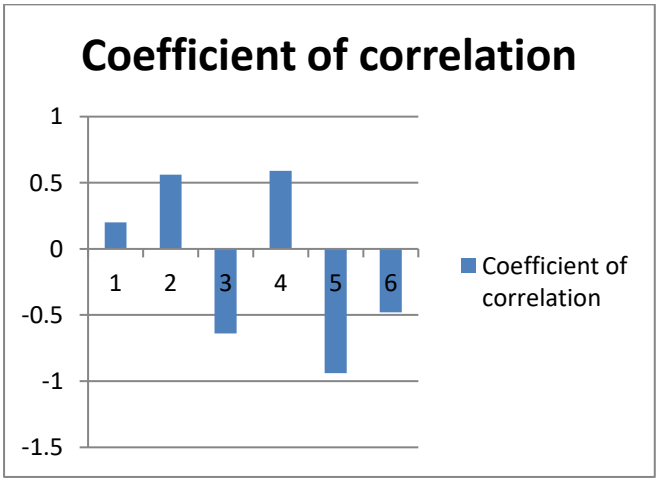

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A STUDY ON WORK - LIFE BALANCE OF THE EMPLOYEES WITH SPECIAL REFERENCE TO MEENAKSHI HOSPITAL,THANJAVUR.

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Maisammaguda, Secunderabad

ABSTRACT:

Issue relating to work-life balance are increased in present scenario. Equal balance in both work and personal life plays an important role for attaining personal as well as professional / organizational goals. The imbalances have a negative impact in both personal life and professional life, Thus, maintaining an adequate balance between professional and personal life is very important. Well-being state of a person allows him / her to manage multiple responsibilities effectively at work and at home. The aim of this paper is to understand firstly the concept of work life balance, the importance and issues affecting in various professions and finally to find out the influence of Work Life Balance on various aspects like physical, occupational, emotional, social, spiritual and environmental well-being of employees. Achieving a better work-life balance yields more dividend for both employees and employers in terms of being more motivated towards work which leads to increased productivity and ultimately creating workforce which they feel are valued.

Keywords: *Work Life Balance, Stress, Job Satisfaction, Engagement*

INTRODUCTION

Today, work-life balance has become an increasingly pervasive concern to both employers and employees of most organizations. Work-life balance which primarily deals with an employee‘s ability to properly prioritize between work and his or her lifestyle, social life, health, family etc., is greatly linked with employee productivity, performance and jobsatisfaction. Where there is proper balance between work and life, employees tend to put

in their best efforts at work, because their family is happy. Most research studies have shown that when there are happy homes, work places automatically become conflict free and enjoyable places to be. Increasing attrition rates and increasing demand for work-life balance have forced organizations to look beyond run of the mill Human Resources interventions. As a result, initiatives such as flexible working hours, alternative work arrangements, leave policies and benefits in lieu of family care responsibilities and employee assistance.This study examines the literature to identify the various ways in which organizational work-life practices may influence organizational performance. Using a wide range of studies from a variety of disciplines, the empirical support available for the link between work-life practices and organizational performance at both the individual and organization level of analysis is reviewed.

Quality work environment factors are critical issues when examining the work life of employees. Some of the key issues that will be examined in this study are nursing workforce shortage, working conditions, and professional issues, stressful work life, demanding patient needs, working knowledge development, team work and performance, leadership and managerial issues, organizational climate and culture and gender based issues.

OBJECTIVES OF THE STUDY:

PRIMARY OBJECTIVE

- To study the **–WORK - LIFE BALANCE"** of the employees at Meenakshi Hospital, Thanjavur.

SECONDARY OBJECTIVES

- To study the concept of work-life balance in general.
- To identify the satisfaction level of an employee.
- To find out the stress what they are having at work.
- To find the motivating factor that is balancing the work and life of an employee.

REVIEW OF LITERATURE:

Before going into the study, it is important to understand that work-life balance does not mean to devote an equal amounts of time to paid work and non-paid family roles; in its broadest sense, is defined as a satisfactory level of involvement or „fit" between the multiple roles in a person"s life.

Higgins et al. (1994) examined the impact of gender and life cycle stage on three components of work family conflict (i.e. role overload, interference from work to family and interference from family to work). The results indicated significant differences for gender and life cycle. Women reported experiencing significantly greater role overload than men. Again women were found to experience greater work to family interference than men. Interference was highest when the children were young, and lowest in families with older children.

Further, women reported significantly higher levels of family interference with work than men in early years, but interferences levels were comparable to men‘s in the third life cycle stage (i.e. children 10 to 18 years). This finding is supported by the findings of studies by Loscocoo (1997) and Aryee et al. (1999b). Loscocoo (1997) found that there was gender asymmetry in the permeability of the boundaries between work and family lives. Family intruded more on work among women and work intruded more on family among men. Aryee et al. (1999b) found that gender was negatively related to family work conflict, suggesting that men did not experience as much family work conflict as women.
Rajadhyaksha and Velgach (2009) also found that women experienced significantly higher family interference with work as compared to men. However there were no significant differences between men and women in the experience of work interference with family.

RESEARCH METHODOLOGY:

In everyday life human being has to face many problems viz. social, 1economical, financial problems. These problems in life call for acceptable and effective solutions and for this purpose, research is required and a methodology applied for the solutions can be foundout. Research was carried out at Meenakshi Hospital to find out the **–WORK-LIFE BALANCE** of an employee‘s.

RESEARCH HYPOTHESIS

- There is no relationship between respondents by Gender and respondents based on the family problem gives stress at work
- There is no relationship between respondents by marital status and respondents based on the relationship with your family and management

DATA ANALYSIS AND INTERPRETATION:

Table no:
4.1 Classification of respondents by gender

S. No.	Particular	Frequency	Percentage

1	Male	37	37
2	Female	63	63
	Total	**100**	**100**

Interpretation:

From the above table it is clear that, 37% of the respondents are male and 63% of the respondents are Female.

Table no: 4.2

Classification of respondents by marital status

S. No.	Particular	Frequency	Percentage
1	Married	19	19
2	Unmarried	81	81
	Total	**100**	**100**

Interpretation:

From the above table it is clear that, 19% of the respondents are married and 81% of the respondents are Unmarried.

Table no: 4.3

Classification of respondents by Age

S	Particular	Frequency	Percentage

n o			
1	18-21	4	4
2	22-25	82	82
3	26-29	10	10
4	30-33	4	4
5	34 above	1	1
	Total	**100**	**100**

Interpretation:

From the above table it is clear that, 4% of the respondents are in the age of 18-21 , 82% of the respondents are in the age of 22 -25, 10% of the respondents are in the age of 26-29, 4% of the respondents are in the age of 30-33, 1% of the respondent is in the age of 34 & above.

Table no: 4.4

Classification of respondents by Educational qualification

S no	Particular	Frequency	Percentage
1	SSLC	9	9
2	HSC	65	65
3	UG	25	25
4	PG	1	1
5	PG above	0	0
	Total	**100**	**100**

Interpretation:

From the above table, It is clear that 9% of the respondents are of SSLC 65% of the respondents is HSC 25% of the respondents are UG, 1% of the respondents are PG, and none of the respondents are not studied above PG.

Table no: 4.5

Classification of respondents by Experience

S no	Particular	Frequency	Percentage
1	0 to 1	20	20
2	2 to 7	73	73
3	8 to 11	5	5
4	12 to 15	1	1
5	16 above	1	1
	Total	**100**	**100**

Hypothesis;

Ho- there is no relationship between respondents by Gender and respondents based on the family problem gives stress at work

Ha- there is a relationship between respondents by Gender and respondents based on the family problem gives stress at work

Observed frequency table:

	A	**B**	
A	1	3	4
B	20	27	47
C	11	27	38
D	3	5	8
E	2	1	3
	37	**63**	**100**

Expected frequency table:

	A	**B**
A	1.48	2.52
B	17.39	29.61
C	14.06	23.94
D	2.96	5.04
E	1.11	1.89

χ^2 **Test table:**

Oij	**Eij**	**Oij-Eij**	**$(Oij-Eij)^2$**	**$\frac{(Oij-Eij)^2}{Eij}$**
1	1.48	-0.48	0.2304	0.1556
3	2.52	0.42	0.2304	0.0914
20	17.39	2.61	6.8121	0.3917

27	29.61	-2.61	6.8121	0.2300
11	14.06	-3.06	9.3636	0.6659
27	23.94	3.06	9.3636	0.3911
3	2.96	0.04	0.0016	5.4054
5	5.04	-0.04	0.0016	3.1746
2	1.11	0.89	0.7921	0.7136
1	1.89	-0.89	0.7921	0.4191
				0.1163

$$\frac{\sum (Oij-Eij)^2}{Eij} = 0.1163$$

Hence the calculated value of χ^2=**0.1163**

Therefore **Degrees Of Freedom** in the given problem is case of

= (r-1) (c-1)

= (5-1) (2-1)

= (4x1)

=4

The table value of χ^2 test is **9.48773** degrees of freedom is 4 at **5%** level of significance.

Result:

The calculated value of χ^2 is less than the table value so the null hypothesis is accepted. Hence, there is no significant relationship between respondents by Gender and respondents based on the family problem gives stress at work.

Test No. 2

Statement

Association between respondents by marital status and respondents based on the relationship with your family and management

Hypothesis;

Ho- there is no relationship between respondents by marital status and respondents based on the relationship with your family and management

Ha- there is a relationship between respondents by marital status and respondents based on the relationship with your family and management

Observed frequency table:

	A	B	
A	0	8	8
B	9	32	41
C	9	36	45
D	1	2	3
E	0	3	3
	19	**81**	**100**

Expected frequency table:

	A	B
A	1.52	6.48
B	7.79	33.21
C	8.55	36.45
D	0.57	2.43
E	0.57	2.43

χ^2 **Test table:**

Oij	**Eij**	**Oij-Eij**	**$(Oij-Eij)^2$**	**$\frac{(Oij-Eij)^2}{Eij}$**
0	1.52	-1.52	2.31	1.51
8	6.48	1.52	2.31	0.35
9	7.79	1.21	1.46	0.18
32	33.21	-1.21	1.46	0.04
9	8.55	0.45	0.20	0.02
36	36.45	-0.45	0.20	0.005
1	0.57	0.43	0.18	0.31
2	2.43	-0.43	0.18	0.07

0	0.57	-0.57	0.32	0.56
3	2.43	0.57	0.32	0.13
				3.175

Hence the calculated value of χ^2 =**3.175**

Therefore **Degrees Of Freedom** in the given problem is case of=4

The table value of χ^2 test is **9.48773** degrees of freedom is 4 at **5%** level of significance.

Result:

The calculated value of χ^2 is less than the table value so the null hypothesis is accepted. Hence, there is no significant relationship between respondents by marital status and respondents based on the relationship with your family and management**.**

Findings

A.Findings based on primary objectives

- 38% of the employees are felt that time makes the work and life imbalanced.
- Majority of the employees said that money makes the work and life balanced.

B.Findings based on Secondary objectives

1. **Finding based on Work - Life Balance in general**
   - 40%of the employee says that the major resistance to balance the work life is Communication.
   - 48% of the employees said that work life balancing level is **good.**
2. **Finding based on satisfaction level**
   - 61% of the employees are **satisfied** in their work.
   - 45% of the employees felt that the relationship between management and their family is **good.**

Suggestions

- The human resource department should meet employees and know the problem what they have in internal & external and give the proper solution to them in proper way.
- The management must give proper training to employees for their clearance at work because it is major one and it helps employees to be comfortable at work to reduce the stress.
- The welfare facilities of the management are medium level, so the management has to provide more welfare facilities to them.

Conclusion

Thus, work-life balance can bring a huge transformation at the organizational and individual levels. It helps an organization to inherently build a strong value system, which is attributed to the Work - Life Balance enjoyed at the employee level. Consequently, the organization does not have to impose a formulated framework of organizational values because they now become intrinsic to it .

Book Referred:-

1. Human Resource Management concepts and issues By :- T.N.CHHABRA
2. Human Resource Management By:- Dr.C.B.GUPTA

Site Referred:-

1. www.pyrotechindia.com
2. Work-life-balance: Rhetoric versus reality? By: - UNSION The public service union www.worklifebalance.com
3. Work Life Balance by:-Wikipedia, the free encyclopedia

A STUDY ON ORGANIZATIONAL CLIMATE AT BAJAJ ALLIANZ

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ABSTRACT

The paper examines the influence of the organization's overall organizational climate on employee performance. It is a thorough study on preparing the organizational climate to participate and reach its future goal in stability of business environment. Organizational climate refers to the perceptions of employees about their business environment or internal work setting of their organization. A good climate is a prerequisite for the success of every

organization. The key is to improve the job satisfaction inside the organization, as we realize that employees are the most essential capital that can support the supportability of an Organization. The study aim to discover the influence of organizational climate on job satisfaction in Bajaj Allianz. As I had taken the sample size as 100 from 138members with a ratio of 1:1:38.In this study I used statistical tool as chi-square. Variables which are used in this study are organization climate as independent variable and job satisfaction as dependent variable

Main terms: Organizational climate, job satisfaction, environment.

I. INTRODUCTION

Organization climate consists of particular values, norms, policies, attitudes, feelings, procedures, interactions, satisfaction and supportiveness so that can influence to work motivation, commitment, individual performance and group performance of the employee. Positive climate help the employee to encourage, while negative climate has a impact to discourage the employees.

'Organizational climate' is basically refers to the working climate environment

"Climate for the ability to see the characteristics of an organization"

Basically, organizational climate reflects to the individual person's perception of the organization

II. OBJECTIVES OF THE STUDY

1) To study in detail about the organization climate at Bajaj Allianz (Hyderabad)
2) To examine the factors related to the organization climate at Bajaj Allianz
3) To analyze the job satisfaction of the employee towards the organization climate at Bajaj Allianz

III. REVIEW OF LITERATURE

1) WORK BY MOHANTY

Mohanty (2012) had study the HRD atmosphere and its effect on work execution in private Insurance agencies in Odisha. The examination made an attempt to analysis the level of HRD climate pleasing in five private Insurance agencies specifically, Max New York Life Protection Co. Ltd., Birla Sun life insurance company Ltd., HDFC Standard Extra life insurance Ltd., Tata AIG life insurance company Ltd., and Bajaj Allianz life insurance company . In this examination, the HRD climate questionnaires (Rao and Abraham) and North Carolina Rating Scale (measuring job performance) was utilized. The examination has distinguished that there is acceptable/normal HRD climate and normal job performance in the private Protection sector in Odisha. The examination has concluded that there is huge connection between HRD climate and job performance.

2) WORK BY LAKSHMANAN

Lakshmanan (2014) had considered the organization climate and employee performance in selected public sector ventures in Tamilnadu. The investigation had used different organizational climate measurements, for example, laborers' demeanor, workers attitudes, work attributes, working conditions, individual strategies, managerial structure and approaches, execution – reward relationship, participative management, external influence, social qualities and new innovation examination. The findings of the examination reveal that the organizational climate impacts the powerful execution of workers in an organization since it is identified with inspiration, motivation, job satisfaction and work fulfillment.

3) WORK BY JAGAJOTHI

Jegajothi (2015) had studied the connection between organizational climate and job satisfaction. The examination distinguished that there is sure relationship between organizational climate and job satisfaction and the organizational climate which influence and increase the organization effectiveness. The examination also found that working environment conduct, laborer profitability, work responsibility, work level, work status, promotions, worker preparing, employee training, employee rewards and representative prizes and so study have the positive

relationship with inspiration, motivation and performance of employee. The investigation shows that the work duty helps the employee to work on a regular basis, good decision making and great dynamic.

4) WORK BY VIJAYABANU

According to Vijayabanu, et.al, (2017) both the business and worker excepts Positive organizational climate. A positive organization climate impacts motivates hence expanding employee performance. This present investigation concentrated on examining the relationship between organizational climate factors, for example, supervisory style, part struggle, part self-governance, receptiveness, part quality, association backing and work responsibility. The information were gathered from one hundred employee in a private sugar producing organization. Structural equation model utilizing Smart-PLS was utilized to break down the information. It was discovered that all five independent factors emphatically anticipated worker's work responsibility aside from part quality. The R2 estimation value of this model is 67.2%. This shows the effect of six independent factors towards work responsibility. The limitation and scope for future research have too been examined.

5) WORK BY SOFIA SHERMAN

Sofia Sherman, et.al, (2018) have explored the difficulties influencing the achievement of IAC: stakeholder involvement. To this end, we propose a vision for utilizing organizational climate hypothesis toward an effective management of IAC in programming building research or software engineering research. The above investigation establishes the framework for our vision that organization climate may fill in as a powerful methods for tending to the discussed challenges. We recommend that creating measures of organization research coordinated effort atmosphere.

IV. RESEARCH METHODOLOGY

Research Approach is the system of orderly assessment of any organization issue it oversees investigates organization, information assortment strategy, reviewing plan, testing procedure. Research infers a legitimate and exact mission for suitable information on a specific subject. Research is a careful assessment or requesting

especially through mission for new real factors in any piece of information. Research contains describing and re-examining issues, characterizing hypothesis or suggested plan, gathering, sifting through and surveying data, making determinations and showing up at goals, lastly carefully testing the closures to choose if they fit the detailing hypothesis. Methodology is described as "the examination of systems by which we gain information, it oversees learned strategies constrained on examine to the issue rising up out of the possibility of its point".

V. METHODS OF DATA COLLECTION

PRIMARY DATA

The primary source of data collection were information from the representatives

SECONDARY DATA

The secondary sources of data collection were information obtained from books, journals, articles, magazines, websites and contacts with resource persons.

SAMPLE SIZE

A sample of 100employees is taken for the study

RESEARCH TOOLS

The research tool which is used for the research purpose is a set of questionnaire.

STATISTICAL TOOL

The statistical tool which is used for the research purpose is chi square test

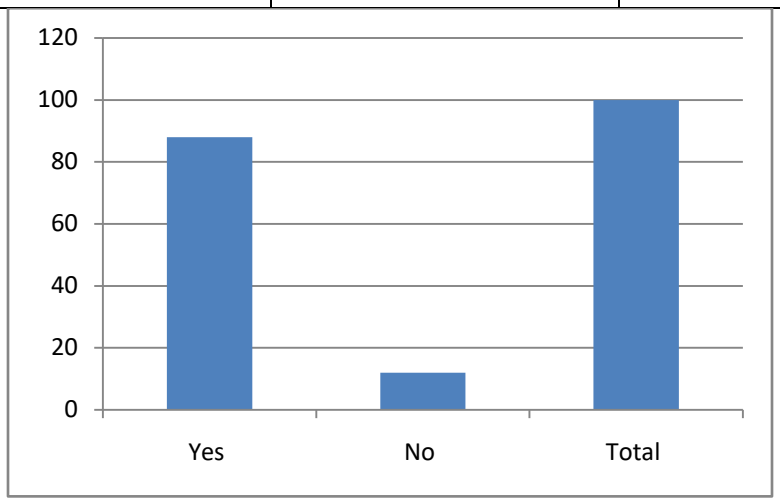
Variables: Independent variable – organization climate

Dependent variable - job satisfaction

VI. DATA ANALYSIS AND INTERPRETATION

Table 1: Are you happy with your working hour?

Particular	No of Respondents	% of respondents
Yes	88	88
No	12	12
Total	100	100

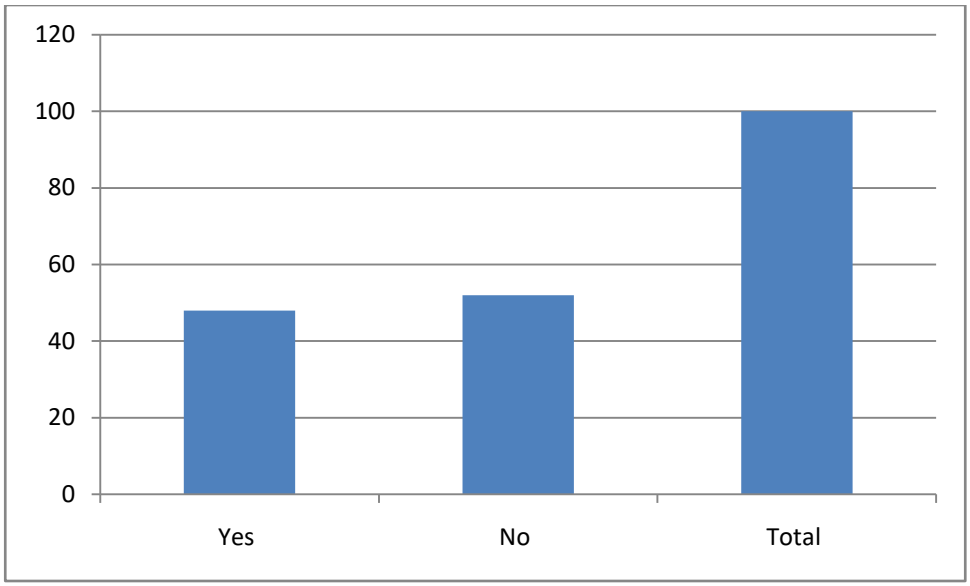


INTREPRETATION:

From the above table and graph represent that out of 88%of respondents expressed yes and 12% of respondents expressed that the working hours are not happy for them in the organization.

Table 2: Does the organization is easy to adopt?

Particular	No of Respondents	% of respondents
Yes	48	48
No	52	52
Total	100	100

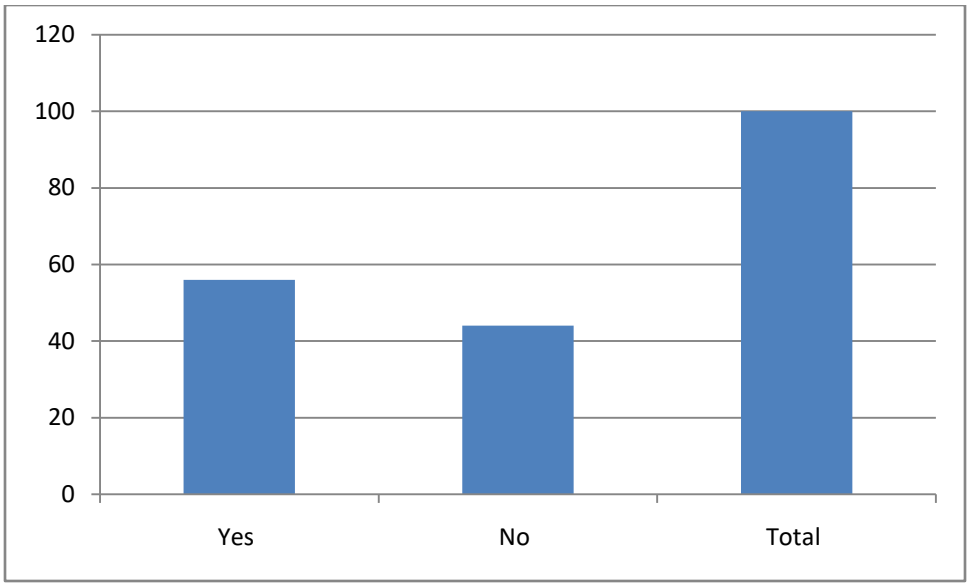


INTERPRETATION:

From the above table and graph represent that out of 48%of respondents expressed yes and 52% of respondents expressed that the organization is not easy to adopt.

Table 3: Does the organization is flexible to work?

Particular	No of Respondents	% of Respondents
Yes	56	56
No	44	54
Total	100	100

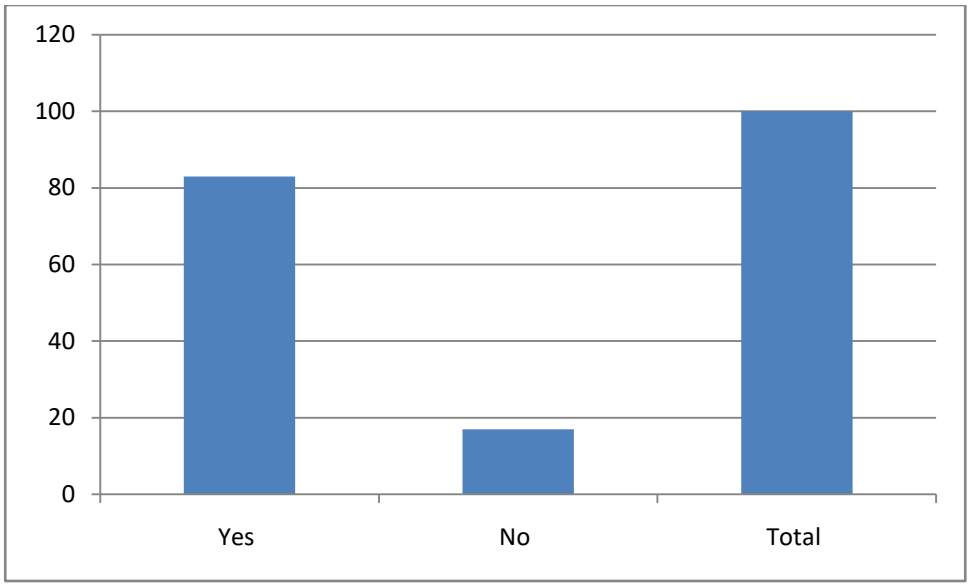


INTREPRETATION:

From the above table and graph represent that out of 56%of respondents expressed yes and 44% of respondents expressed that the organization is not flexible to work.

Table 4: Do you have a good relationship with your colleagues?

Particular	No of Respondents	% of Respondents
Yes	83	83
No	17	17
Total	100	100

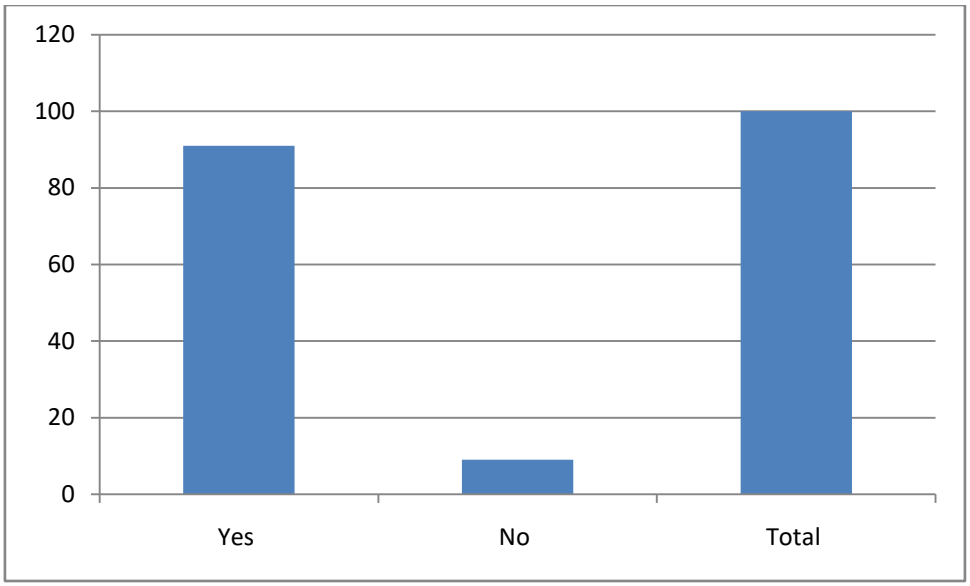


INTREPRETATION:

From the above table and graph represent that out of 83%of respondents expressed yes and 17% of respondents expressed that they were not having a good relationship between them.

Table 5: Does the organization is helpful to learn new things?

Particular	No of Respondents	% of Respondents
Yes	91	91
No	9	9
Total	100	100



INTREPRETATION:

From the above table and graph represent that out of 91%of respondents expressed yes and 9% of respondents expressed that the organization is not helpful to learn new things.

VII. STATISTICAL ANALYSIS

HYPOTHESIS

H0: There is no significant relationship between organizational climate and job satisfaction

H1: There is a significant relationship between organizational climate and job satisfaction

Does the organization is flexible to work?

Particular	No of Respondents	% of Respondents
Yes	56	56
No	44	54
Total	100	100

INTREPRETATION:

From the above table it represent that out of 56%of respondents expressed yes and 44% of respondents expressed that the organization is not flexible to work.

Does the organization is easy to adopt?

Particular	No of Respondents	% of respondents
Yes	48	48
No	52	52
Total	100	100

INTERPRETATION:

From the above table and graph represent that out of 48%of respondents expressed yes and 52% of respondents expressed that the organization is not easy to adopt.

CHI SQUARE TEST

Observed	**Expected**	**$(O-E)^2$**	**$(O-E)^2/E$**
56	51	9	0.18
44	51	9	0.18
48	49	9	0.18
52	49	9	0.18

CHI SQUARE TEST:

CHI SQUARE TEST: 0.7

BOOK VALUE: 7.815

Interpretation:

Chi square value is 0.7 than is less than the book value7.815, where we can reject the hypothesis and accept the null hypothesis. Hence it is proved that there is a relation between organization climate and job satisfaction.

FINDINGS

1) It is observed that table out of 56%of respondents expressed yes and 44% of respondents expressed that the organization is not flexible to work

2) It is observed that out of 48%of respondents expressed yes and 52% of respondents expressed that the organization is not easy to adopt.

SUGGESTIONS

Decide system for information assortment .There are different approaches to gather information, for example, eye to eye talk with, calls and centre gatherings. Here and there representatives might be progressively happy with utilizing a mysterious hierarchical atmosphere evaluation program is to utilize server based online devices to permit respondents to take the overviews behind the security of their own work or home PC

CONCLUSION

A sound climate is a since quite a while ago run suggestion. Chairman need to embrace an advantage system to climate, inferring that they take since quite a while ago run viewpoint of air as a progressive asset. Various feel that legitimate environment is an underhanded determinant of lead in a natural sense. The people impression of what are out there goes about as a coordinating or mediating variable between definitive lifts and resultant lead

A STUDY ON SELECT EQUITY OF BANKING SECTOR STOCKS LISTED IN BSE

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ABSTRACT:
As every investment has its own strengths and weaknesses, the investor always thinks of maximising his returns minimising the risk, but it's associated with several factors. Compared to all other investments, equity investments are always on the top in earning returns and it also has higher risk. In order to reduce the risk, the investor must analyse stock that he prefers and conduct a market research. Analysis of individual securities and operation of their markets will help in determining the risk reward structure of equity. The future price movement of a financial instrument is determined using fundamental analysis based on environmental, political, economic and other factors. Technical analysis is a method used to predict the price movement and future market trends by studying charts of past market action which consider volume of trading, price of instruments, and open interest in the instruments where applicable.

Key words: Stock, return, beta, market, banking sector, equity analysis.

LITERATURE REVIEW:

B.Nisha (2018) in her study Equity analysis of banking sector listed in NSE. Find out that before investing in the shares investor has to use technical analysis to get better returns and for safe investment. The main objective of the study is to forecast the stock prices using technical analysis.

K.S. Nemavathi and Dr.V.R. Nedunchezhian (2012) in their study technical analysis they found out that there is high fluctuations in the selected securities during the period with the use of effective tools, to accomplish the objectives of the research.

Dr.SreemoyeeGuha Roy (2013) in her study equity research, to make an investment decision the investor should perform fundamental and technical analysis of the stock, which includes the following parameters economic, industry, and company analysis. The study concludes about investor's decision making behaviour.

NEED OF THE STUDY:

As Equity analysis plays a major role and provides the accurate information about the market as well as the stocks listed therein. The efficiency of the market prediction depends upon the information; Lack of information creates inefficiencies that result in stocks being misrepresented.

This study is to know the performance of the banking sector stocks through equity analysis, which helps the investor towards a better investment decision.

OBJECTIVES OF THE STUDY:

1. The major objective is to analyse the equity of selected banking stocks listed in BSE.
2. To understand the banking sector stocks price movement and to compare the performance of the selected banking sector stocks.

3. To evaluate the relationship between selected stock, market index Sectoral Index (BANKEX).

SCOPE OF THE STUDY:

The present study is limited to the Equity Analysis of selected banking sector and determining the risk, return and relationship involved in the share prices of the banks with the market. The study has covered five years' time period. This study helps in identifying the volatility of stock prices of the selected banks.

HYPOTHESIS:

- H0: There is no relationship between the market index and the selected sample of banking sector stock return.
- H1: There is a relationship between the market index and the selected sample of banking sector stock return.

RESEARCH METHODOLOGY:

Primary data:

The data which is directly collected from the company is called as primary data.

Secondary data:

The current study is completely based on the secondary data. The data is collected from the different journals, media and BSE official website and through banks official websites.

PERIOD OF THE STUDY:

The period of study is limited to five year i.e. January 2015 to December 2019.

METHOD OF SAMPLING:

In the banking sector five national banks are selected randomly which are listed in the BSC. They are Bank of Baroda, Syndicate bank and Union bank of India, Canara bank, and Indian bank. Random sampling method is used for selecting.

TOOLS AND TECHNIQUES:

Mean:

Mean is the average of group of numbers. This is used to find out the middle value of the group of numbers. Mathematically mean is the sum of all the observations which is divided by the number of observations.

Mean = sum of observations/no of observations

Standard deviation:

Standard deviation is the measure of deviation of a set of data from its mean. Standard deviation is used in financial derivative terms to measure the risk involved.

Standard deviation= Sqrt (Σ(x-mean)/N)

Beta:

The comparison between the systematic risks of an individual stock to the unsystematic risk of the market is called beta coefficient.

Beta= $(N*\Sigma XY-\Sigma X*\Sigma Y)/ (N*\Sigma X^2-(\Sigma X)^2)$

LIMITATIONS:

1. The study is conducted on selected sector and therefore it is limiting to the area of research.
2. There is less possibility of generalization of the study.
3. This study considers the information only for limited duration of time which is five years.
4. It is not possible to have detailed study of project because the time span of the project is only 45 days.

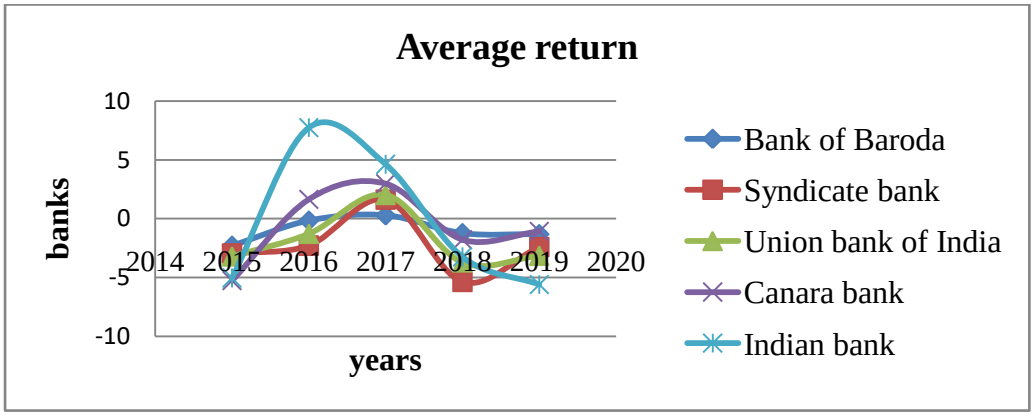
AVERAGE RETURN:

Table No: 1 Average return of sample:

Years	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
2015	-2.3059	-2.9573	-3.2007	-5.2566	-5.0345
2016	-0.1661	-2.2839	-1.2756	1.64011	7.7359
2017	0.28749	1.60931	2.02923	2.97093	4.62605
2018	-1.233	-5.3664	-3.7115	-1.776	-3.2377
2019	-1.3192	-2.4045	-3.1397	-1.0719	-5.5897

Source: historical data of company stock price from Bombay stock exchange.

Figure no:1



Interpretation:

The above graph shows that Indian bank has the highest average return of 7.7359 in 2016 where all the other banks had negative returns and very less returns. But later it had a decline in the returns and went down to -5.5897 in 2019. The other banks of the sample have negative returns throughout the study period except in the year 2017. It shows that the banking sector was more uncertain in the study period.

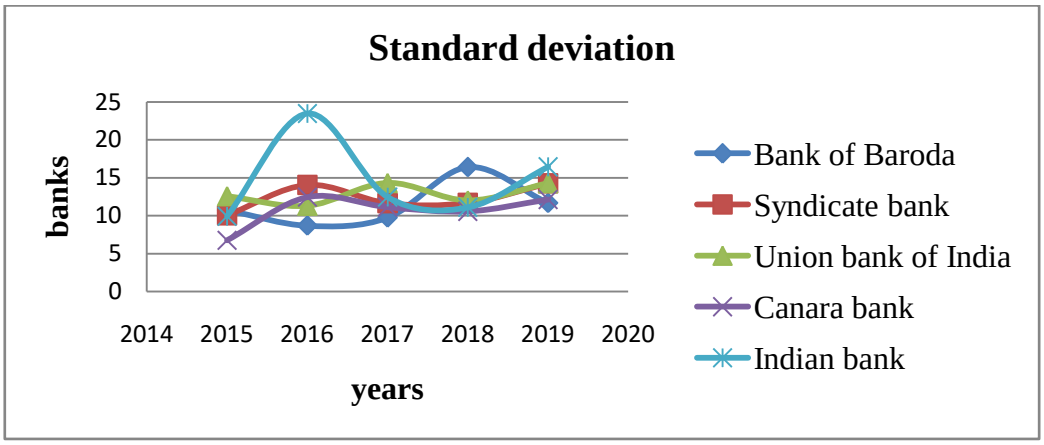
STANDARD DEVIATION:

Table No: 2 standard deviation of sample

Years	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
2015	10.7215	10.0434	12.5479	6.75483	9.90438
2016	8.67628	14.0434	11.2891	12.4428	23.4505
2017	9.7356	11.6423	14.299	11.1287	12.4386
2018	16.3916	11.6765	11.9893	10.571	11.0686
2019	11.662	14.2499	14.2765	12.128	16.4227

Source: historical data of company stock price from Bombay stock exchange

Figure no: 2



Interpretation:

The above graph shows the standard deviation of the stocks during the study period. In the year 2016 the standard deviation of Indian bank is 23.4505 against the return of 7.735. It is observed that the average standard deviation of the sample been 12.38 during the study period where the average return of all the sample stocks during the study period remained negative.

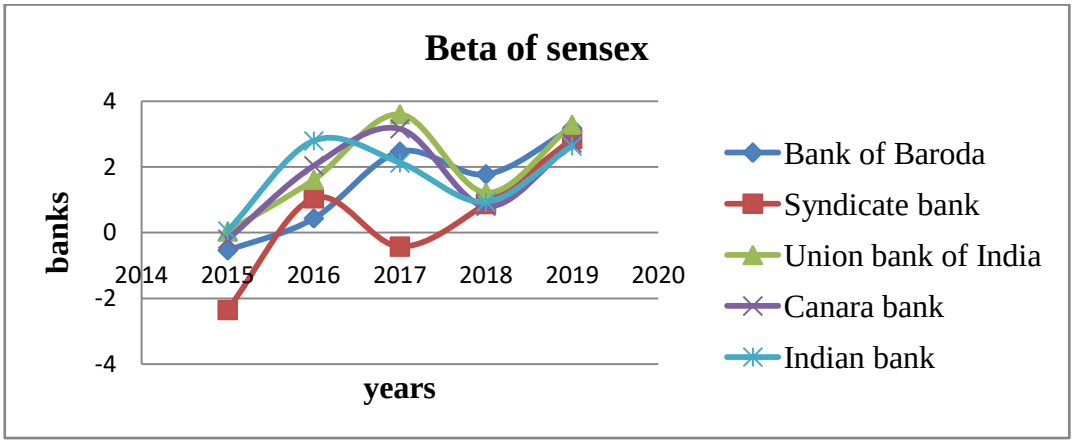
BETA OF STOCKS WITH SENSEX:

Table No: 3 Beta of sample

Years	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
2015	-0.5466	-2.3504	0.03213	-0.1986	0.05605
2016	0.42842	1.04459	1.61216	2.03538	2.79011
2017	2.46268	-0.4267	3.60265	3.15568	2.12387
2018	1.77208	0.87285	1.21703	0.80023	0.93278
2019	3.17761	2.84353	3.28368	2.72139	2.63293

Source: historical data of company stock price from Bombay stock exchange

Figure no:3



Interpretation:

The above graph shows the market risk of the sample stocks. All the stocks during the study period are positively correlated with the market and they had an average Beta value of 1.44 during the study period with highest beta is 3.60265of union bank of India in 2017 and the

lowest beta value of -2.3504 of syndicate bank in 2015. The market risk of Banking sector is high in most the years.

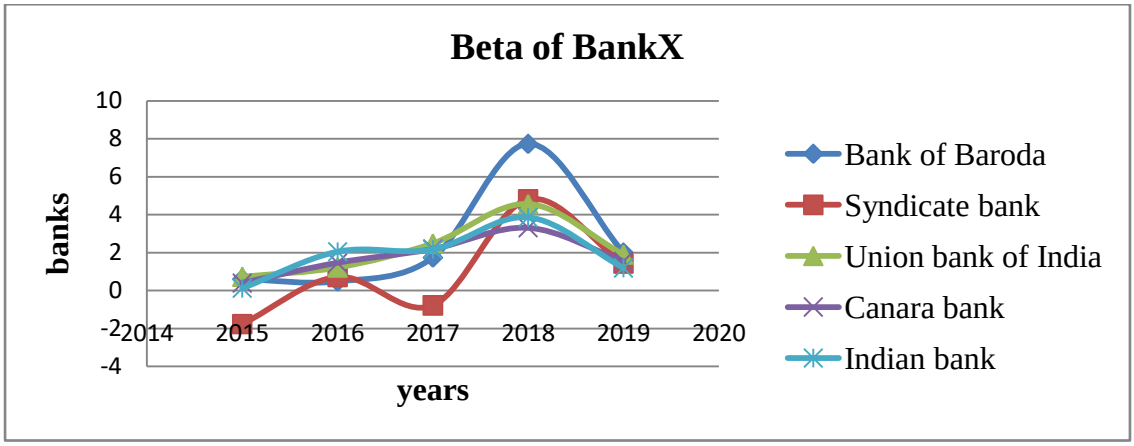
BETA OF STOCKS BSE BANKEX:

Table No: 4 Beta of sample

Years	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
2015	0.599	-1.7665	0.72452	0.40257	0.12313
2016	0.47449	0.71968	1.20916	1.46352	2.04695
2017	1.73445	-0.781	2.47954	2.1913	2.16355
2018	7.73538	4.80275	4.55819	3.30976	3.85023
2019	1.99816	1.41305	1.89547	1.548	1.19228

Source: historical data of company stock price from Bombay stock exchange

Figureno: 4



Interpretation:

The above graph shows the relation between the selected stocks and the sector specific Indices (BANKEX). The highest beta is 7.73538of bank of Baroda in 2018 and the lowest t beta is -0.781of syndicate bank in 2017. As the BANKEX is purely represent the banking sector the banking stocks are having higher beta values and they are mostly positively correlated in majority of the study period.

CONSOLIDATED DATA OF SAMPLE ANALYSIS:

Table No:5 consolidated data of sample analysis:

Name of the stock	Average return	Standard deviation	Beta of Sensex	Beta of BankX
Bank of Baroda	-0.94734	11.437396	1.458838	2.508296
Syndicate bank	2.28056	12.3311	0.396774	0.877596
Union bank of India	-1.85965	12.88036	1.94953	2.173376
Canara bank	-0.69869	10.605066	1.702816	1.78303
Indian bank	-0.29999	14.656956	1.707148	1.875228

Source: historical data of company stock price from Bombay stock exchange

Interpretation:

From the table no:5 shows that the highest average return is 2.28056 of syndicate bank and the lowest average return is -1.85965 of union bank of India. The highest standard deviation is 14.656956 of India bank and lowest standard deviation is 10.605066 of Canara bank.

The highest beta of Sensex is 1.707148 of Indian bank and lowest beta of Sensex is 0.396774 of syndicate bank. The highest beta of BANKEX is 2.508296 of bank of Baroda and lowest beta of BANKEX is 0.877596 of syndicate bank.

CORRELATION:

Companies	Market return	Bank of Baroda	Syndicate bank	Union bank of India	Canara bank	Indian bank
Market return	1					
Bank of Baroda	0.692430205	1				
Syndicate bank	0.710312018	0.647054986	1			
Union bank of India	0.707574478	0.83479915	0.924787263	1		
Canara bank	0.738392098	0.990244176	0.645519037	0.800399837	1	
Indian bank	0.269428962	0.866637303	0.525961446	0.738049489	0.81658321	1

Interpretation:

The average calculated value of banking sector is 0.805 from above study we conducted and the critical value of correlation with degree of freedom (v=5) with level of significance at 5% is 2.015.from the above data we can say that the critical value is more than the calculated value and hence we accept H_0 at the 5 % level of significance as there is no impact on banking sectors of selected banks by market returns.

FINDINGS:

1. From the above study it is observed that the average return of selected banking stocks was negative and there was a positive return only in the year 2017.
2. The study has found that the banking sector stocks are comparatively volatile and has more uncertainty.
3. It is observed that there are several factors like banking policy, NPA, Mergers of banks etc.. are resulting in increased risk with the banking sector stocks.

SUGGESTIONS:

1. It is suggested to be more careful if the investor is choosing the banking sector stocks. To get a good return the investor has to analyse equity taking all the considerations.
2. Before investing in the stocks the investor should also observe the historical returns and risk involved in individual stock and they should also take into account the external environment factors.

CONCLUSION:

From the above study it is concluded that investor has to be more conscious while investing. It is not only the banking sector but also the other sectors. One must take into account all the external environmental factors along with fundamental and technical analysis. The study shown the risk and return relationship between the individual stock's return and market return.This study also helps in finding the relationship of individual stocks return and market index and sectoral index of banking sector.

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A Study on Training and Development at MRKR Constructions

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Abstract:

Training and development plays an important role in the effectiveness of organizations and to the experiences of people in work. Training has implications for productivity, health and safety at work and personal development. All organizations employing people need to train and develop their staff. Most organizations are cognizant of this requirement and invest effort and other resources in training and development. Such investment can take the form of employing specialist training staff and paying salaries to staff undergoing training and development. In this study the data is collected through questionnaire. The statistical tools used in this research are chi square test, percentages and bar diagrams. The sample size taken is of 100 for the study with a ratio of 1:2. Variables which are used in this study are Training and development as independent variable and employee performance as dependent variable.

1. Introduction:

Training and development contain learning situations in which the employee acquires additional knowledge or skills to increase job performance. Training objectives specify performance improvements, reductions in errors, job knowledge to be gained, and/or other positive organizational results. However, individual growth is not an end in itself. Organization growth is needed to be measured along with individual growth.

2. Need of the Study:

Training and development plays an imperative part in the organization achievements and success in a modern organization. Employees need to redesign there information, capacity, abilities to stay focused market.

It encourages the individual worker to perform and work proficiently.

a. Improve employee performance, addressing weakness.
b. Increase productivity as well as the standards

3. Objectives of the Study:

1. To study the factors that relate to evaluation of training programs conducted at MRKR Construction Pvt. Ltd.
2. To examine training of the employees at the work place.
3. To analyze the effects of training program in relation to employee performance.

4. Literature Review:

1. **Anna University** conducted a survey on behalf of the Department of Industries and Commerce1 in the year 1999 to find out the effectiveness of the training institutes, which offered training programme for PMRY candidates. The evaluation was made based on the infrastructure, conduct of training, involvement and image of the training institute. Based on the evaluation study, it had been suggested that the training institute, which scored more than 60 marks could be considered for imparting training to PMRY candidates. Only 62 training units satisfied the norms of the study in the state of Tamilnadu. Moon-Hariton2 conducted their study at the engineering section of GE Company. Two years later the adoption of the training programme was evaluated. The questionnaire was prepared and given to the employees who undertook the training.

2. **Prabhaharan**, C.C3 (1987) had conducted a survey in the area of training of rural youths for self-employment. Based on his study, he observed that the training programme should be systematic and scientific to improve the effectiveness of the trainees. Tarnopol4 , in his article, has suggested that the employee-attitude survey could be done on before and after basis. He also used some neutral questions (not related to the study) in the questionnaires to evaluate the training programmes. Maheswari5 (1981) collected data from 999 respondents from banking institutions to study the effectiveness of the training programme. The responses indicated that the training programme was less effective with respect to on-the-job performance.

5. Hypothesis:

H_0: *There is no impact of Training and development program on employee's performance.*

H_1: *There is an impact of Training and development program on employee's performance.*

6. Methodology:

The research methodology helps for observation and description of project. The data or information is gathered from primary and secondary sources.

6.1. Primary Data:

Data is collected from employees through questionnaire and other discussions.

6.2. Secondary Data:

Secondary data is collected from research publications, websites, journals, books.

7. Size of the Sample: Sample of 100 employees is considered

8. Tools used for the Study:

The statistical tool used for the research and study are Chi-square Test and data is represented through tables and charts and graphs.

9. Variables:

Independent Variable ***:*** *Training & Development*

Dependent Variable ***:*** *Employee Performance*

10. Schematic Representation

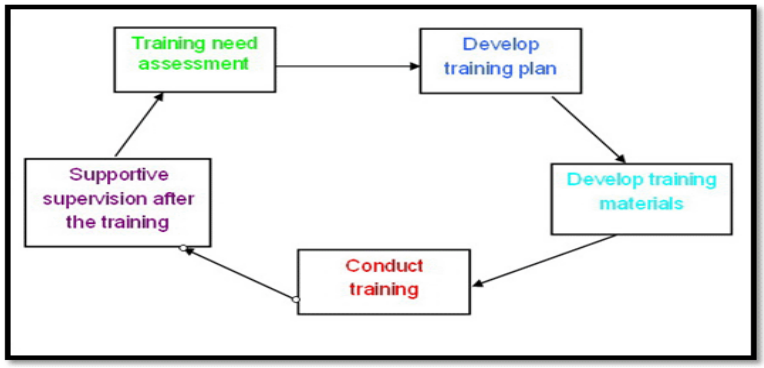


Figure – A

11. Training process of MRKR Constructions:

Training in an organization generally involves a systematic approach, followed by a sequence of activities which to MRKR Constructions, the process is based on four blocks; identifying training needs. This analysis is necessary to determine the training needs of the employees or a specific job. There are four procedures that managers can use to determine the training needs of employees in their organizations

1. **Job Requirement's Analysis:** The skills and knowledge specified in the appropriate job description are examined. The employees without the skills needed are candidates for a training program.
2. **Organizational Analysis:** The effectiveness and successes of an organization are analyzed to determine where differences exist. For instance, members of a department with a high turnover rate or a low performance record might require additional training.
3. **Performance Appraisals:** Here, each employees work is measured against objectives established for his or her job.
4. **Human Resource Survey:** Managers as well as non-managers are expected to describe what problems they are experiencing at their workplaces and, what actions they believe can be taken to solve the problems. Immediately the training needs are identified, the human resource department must initiate the appropriate training effort, to close the gap between expected and actual results. This may also depend on circumstances like; developing a training plan, designing a training lesson, selecting trainer and preparing the trainers.

Plans and Implementation in Training: This area of the training process emphasizes on the techniques and methods by which training is carried out. The objectives of training, budgets and

the duration are allocated. Training Evaluation and feedback often, this turns to be the most critical part of the training process, focusing on the results achieved after training.

The goal is to analyze the effects of training and determine whether the set goals have been achieved. Reactions such as the participant's feedback, trainer's feedback, learning behavior and results of the training are being measured.

12. Factors Effecting Training:

There are various factors influencing training extending from environment, supervisors, lecturers, content of the training and how it is being done. These variables can be expounded and better understood by discussing them below:

12.1. Individual Factors

- At whatever point people are included in some sort of activity, or practice, they generally influence the environment or process they are experiencing. The same is the situation with employee training. As it is a process of transferring skills and technology from the expert to the new learner. The main parties are obviously workers themselves seeking training and the trainer or member of the staff delivering the training. Authorities organizing training and giving assets to it can be considered a third party, as they oversee the prearrangement and post quality evaluation of training.

12.2. Human Resource Policy

- This has been illustrated by Haywood and based on the designed policy by human resource for training programs. As indicated by him an excessive number of training programs affects the main aim of training, which is skill development, and conduct change (Haywood 1992).

13. Organizational factors

- Everything tends to be affected by its surrounding and environment, so Birdi claimed that the absence of managerial support could restrain the impact of creative training. Conducive environment affects training effectiveness. (Birdi 2005.)

14. Other Factor

- To Fischer and Ronald open mindedness is additionally a factor in training effectively. It has been claimed that training will be as much effective as the learners and the instructors are open minded (Fischer 2011). Driskell stated that the kind of training conducted, training content and training expertise equally affect the results of training. Achievement depends on the way training has been conducted by the trainer and its content (Driskell 2011).

15. Data Analysis and Interpretation:

Appraisals are considered from the primary, secondary data and are interpreted in form of graphs and tables as shown below

- **Are the organizational factors influencing you in your present job regarding Training and development**

Particulars	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
No.of Employees	68	12	6	4	0	100
Percentage	68	12	6	4	0	100

Table 15.1

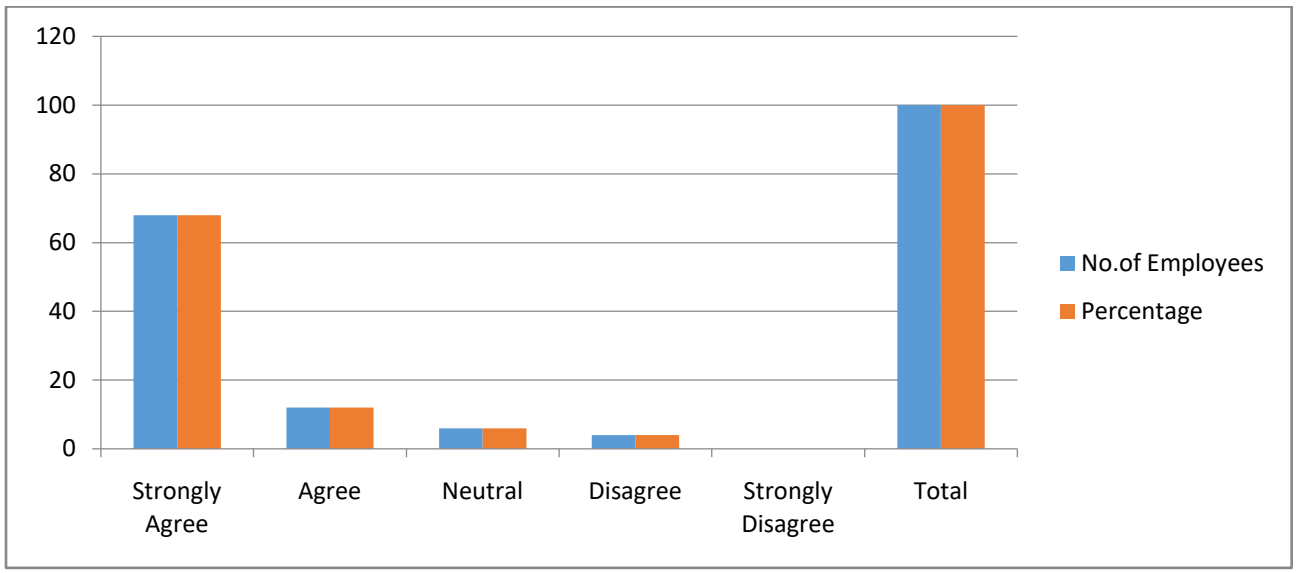


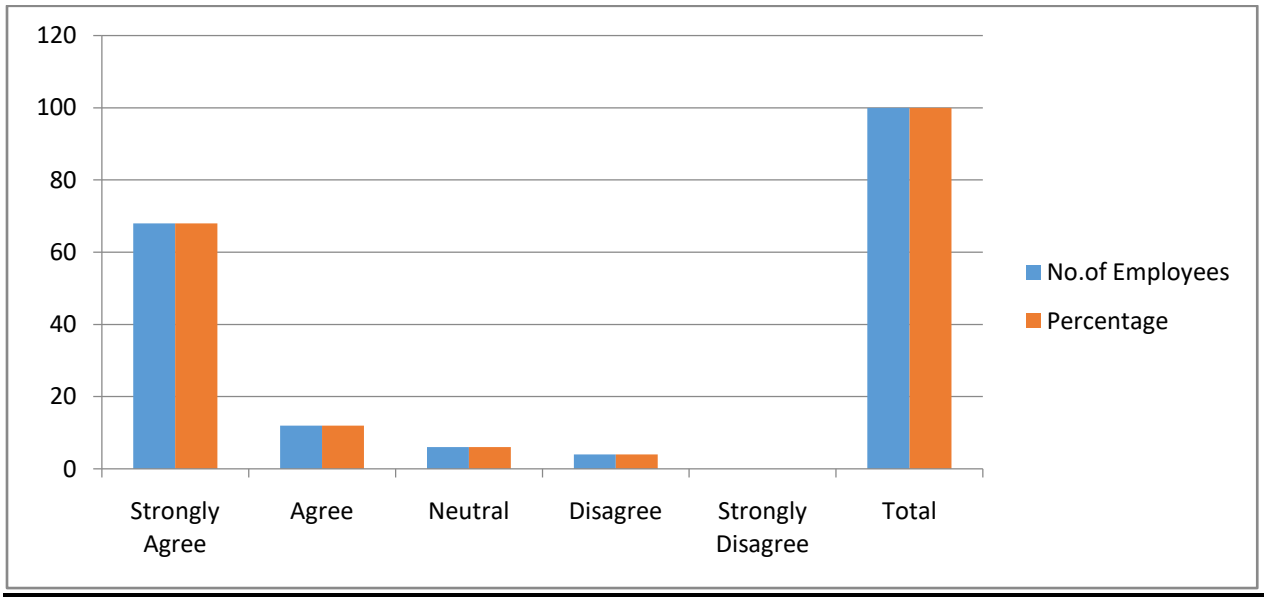
Fig. 15.1

Interpretation: From the above information 80% of the employees agree that the organizational factors are influencing the training program in their present job.

- **Does the Training program help you to prepare for the future jobs in your area of working**

Particulars	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
No.of Employees	60	8	32	0	0	100
Percentage	60	8	32	0	0	100

Table 15.2



Fig; 15.2

Interpretation: From the above information 68% of the employees agreed that the Training program helps to prepare them for the future jobs in their area of working

- **Is there is a significant impact on your performance with this Training program?**

Particulars	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
No.of Employees	60	24	8	8	0	100
Percentage	60	24	8	8	0	100

Table. 15.3

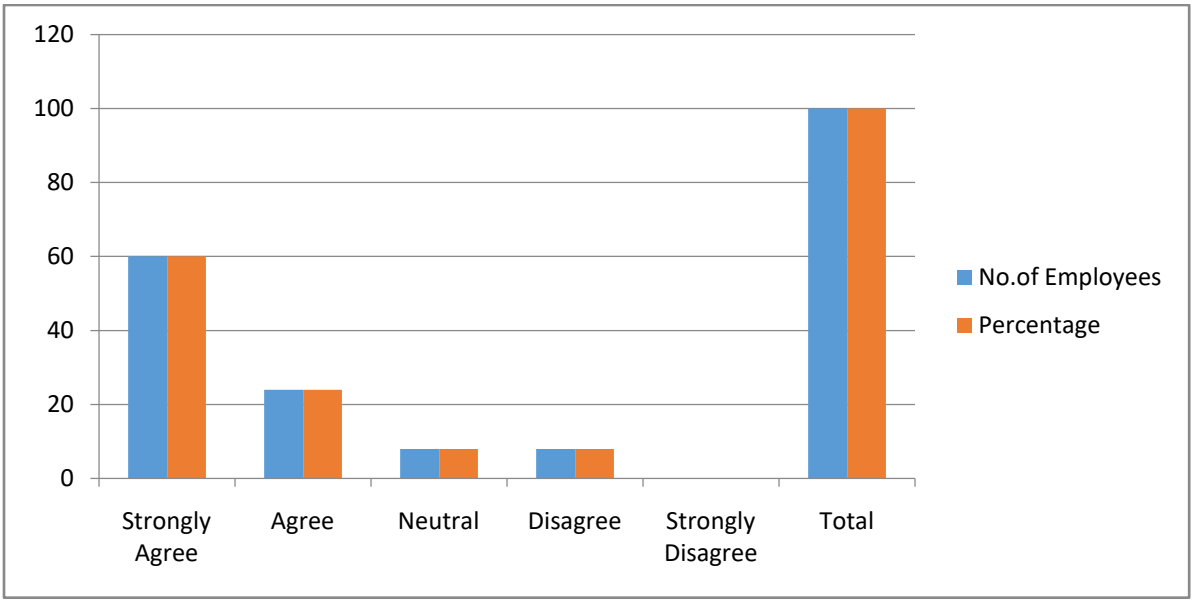


Fig. 15.3

Interpretation: From the above information 84% of the executives agree that there is a significant impact on their performance with this Training program.

- **Was the inputs received in your training can be implemented in team or individually?**

Particulars	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
No.of Employees	45	32	28	0	0	100
Percentage	40	32	28	0	0	100

Table 15.4

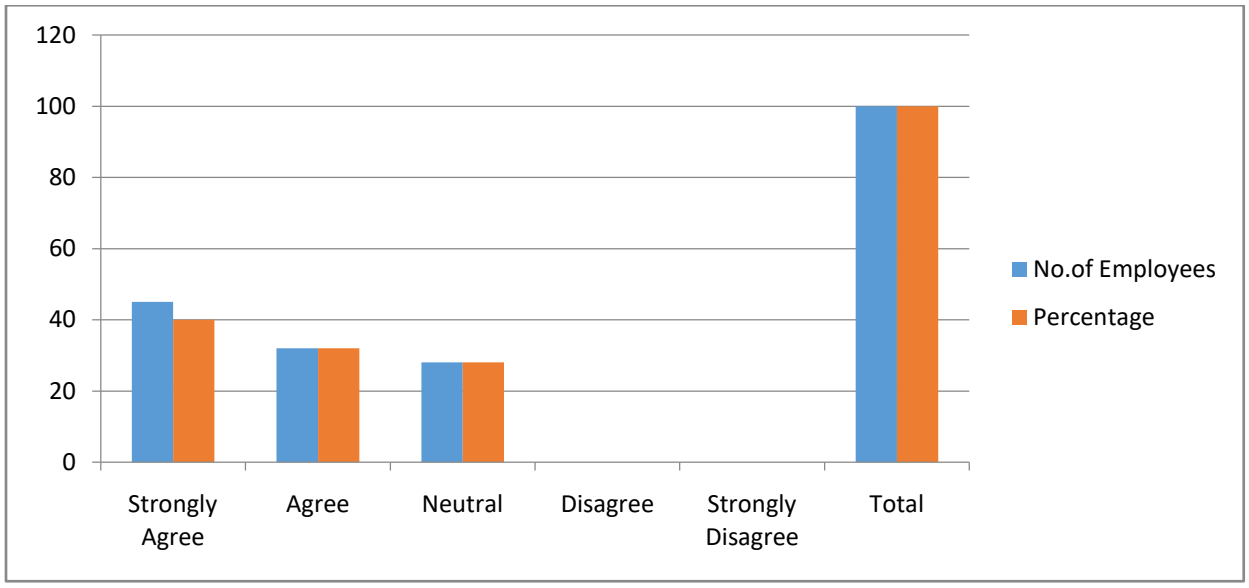


Fig. 15.4

Interpretation: From the above information 77% of the executives agree that the inputs received in their Training program can be implemented in team or individually.

16. Statistical Analysis: Chi – Square Test:

O	E	$O - E$	$\frac{(O-E)^2}{E}$
60	20	40	80
24	20	4	0.8
8	20	-12	7.2
8	20	-12	7.2
0	20	--20	20
Total			**115.2**

16.1. Observations: Chi square test = 115.2

Statistical Table value = -11.07

16.2. Conclusion: Calculated value of Chi-square value is 115.2 greater than table value 11.07

Therefore, H_0 is accepted and
H_1 is rejected.

Hence there is relationship between training and Development and performance.

17. Findings:

1. Almost all the employees have a positive assessment towards the fulfilment level on training methods by the organization.
2. 80% of the employees agree that the organizational factors are influencing the training program in their present job.
3. 68% of the employees agreed that the Training program helps to prepare them for the future jobs in their area of working
4. 84% of the executives agree that there is a significant impact on their performance with this Training program
5. 77% of the executives agree that the inputs received in their Training program can be implemented in team or individually

18. Suggestions:

1. They should conduct added training programs accompanying to the anatomic competencies of employees.
2. MRKR Constructions should ensure that whenever they yield acknowledgment from advisers their suggestions are taken into application and implemented as accessible this will accomplish advisers to accord honest and acknowledge feedback.
3. Evaluation of training programs should be done regularly to keep a check on the limitations and drawbacks and ensure the success of training programs.

19. Conclusions:

The Training and Development program adopted in MRKR Constructions mainly concentrated on areas like quality aspects, job oriented trainings, technical skills and knowledge. Most of the respondents rated as good and excellent towards the overall quality and effectiveness of the training and development programs and satisfied with the present training methods. The company also has to concentrate on small percentage of respondents who are not satisfied with training programs and whom it has not helped to overcome from their short comings or work related problems. Finally the training and development programs provided by MRKR Constructions are found to be effective, credible and commendable, which can be improved further.

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A STUDY ON WORK - LIFE BALANCE OF THE EMPLOYEES WITH SPECIAL REFERENCE TO MEENAKSHI HOSPITAL, THANJAVUR.

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ABSTRACT:
Work life balance is one of the key factor for the employees to achieve their goals. Organizations have devised various plans, policies, procedures to help their employees to achieve the balance between their work commitments and family responsibilities. Thus maintaining an adequate balance between professional and personal life is very important. Various policies are statutory while others are voluntarily implemented. The effectiveness of them depends on the extent of usage to the employees to achieve work life balance. The present paper intended to study the managerial level employees work life balance in Meenakshi hospital at Tanjavur. The aim of this paper is to analyze and understand the concept of work life balance, the importance and issues affecting in various professions and finally to find out the influence of Work Life Balance on various aspects like physical, occupational, emotional, social, spiritual and environmental well-being of employees. Achieving a better work-life balance yields more dividend for both employees and employers in terms of being more motivated towards work which leads to increased productivity and ultimately creating workforce which they feel are valued.
The issues relating to work-life balance are increased in present scenario. Equal balance in both work and personal life plays an important role for attaining personal as well as professional / organizational goals. The imbalances have a negative impact in both personal life and professional life, Well-being state of a person allows him / her to manage multiple responsibilities effectively at work and at home with a sample of 100 members with an hypothesis to know if the motivating factors are influencing work- life balance of an employee. The statistical tools used are ANOVA and percentage analysis with independent variable as Work-life balance and dependent variable as Employee satisfaction.
Keywords: Work Life Balance, Stress, Job Satisfaction, work commitment

INTRODUCTION

Work-life balance is an important aspect of a healthy work environment. Maintaining work-life balance helps reduce stress and helps prevent burnout in the workplace. Work life balance is where the tensions between the work life and personal life is minimized by having and implementing a proper policies, systems, supportive management and provisions at work place and a good relations in personal life. Performance and the job satisfaction of the employees are said to be affected by the work life balance. Work life balance of the employees helps in reducing the stress level at work and increases the job satisfaction.

Today, work-life balance has become an increasingly pervasive concern to both employers and employees of most organizations. The criteria that are considered are motivation, Time management, Stress. Work-life balance which primarily deals with an employee‘s ability to properly prioritize between work and his or her lifestyle, social life, health, family etc., is greatly linked with employee productivity, performance and job satisfaction. Where there is proper balance between work and life, employees tend to put in their best efforts at work, because their family is happy. Most research studies have shown that when there are happy homes, work places automatically become conflict free and enjoyable places to be. Increasing attrition rates and increasing demand for work-life balance have forced organizations to look beyond run of the mill Human Resources interventions. As a result, initiatives such as flexible working hours, alternative work arrangements, leave policies and benefits in lieu of family care responsibilities and employee assistance. Organisations face many challenges in implementing the policies on Work life balance as employees today are not just look out for a job but they also want the organization to take of their well being. The present research paper aims to study the work life balance of managerial level employees of Meenakshi hospital in Thanjavur. The factors related to Work-Life balance are Gender, age, marital status, and Emotional intelligence.

OBJECTIVES OF THE STUDY:

PRIMARY OBJECTIVE

- To study the **—WORK - LIFE BALANCE”** of the employees at Meenakshi Hospital, Thanjavur.

SECONDARY OBJECTIVES

1. To find out the concept of work-life balance in general.
2. To know the motivating factor that is influencing balancing the work and life of an employee.
3. To analyze the satisfaction level of an employee towards Work - life balance

REVIEW OF LITERATURE:

Before going into the study, it is important to understand that work-life balance does not mean to devote equal amounts of time to paid work and non-paid family roles; in its broadest sense, is defined as a satisfactory level of involvement or fit‟ between the multiple roles in a person's life.

1. **Phyllis and Yun (2002) mentioned strategies** in paper titled "Effective work life strategies, working couples, work conditions, gender and life quality" focuses on dual earner families. It was concluded and discussed in the study that the work life strategies and work conditions are different among genders. For example, some families prefer husbands working for a long hour and women to work part time or fewer hours. Women report more stress and overload and lower levels of coping when compared to men. Job insecurity is similar in both men and women
2. **Rajadhyaksha and Velgach (2009)** also found that women experienced significantly higher family interference with work as compared to men. However there were no significant differences between men and women in the experience of work interference with family.
3. **Shalini and Bhawna (2012)** reported in their study, "Quality of work life balance" is being used by the organizations as a strategic tool to attract and retain the employees and more importantly to help them to maintain work life balance with equal attention on performance and commitment at work.

RESEARCH METHODOLOGY:

In everyday life human being has to face many problems viz. social, economical, financial problems. These problems in life call for acceptable and effective solutions and for this purpose, research is required and a methodology applied for the solutions can be found out. Research was carried out at Meenakshi Hospital to find out the **—WORK-LIFE BALANCE** of an employee‘s.

The sample size was 100. Structured questionnaire was designed to collect the primary data from the employees. Secondary data was collected from company's official website, internet, journals and text books. Statistical techniques such as multiple regression analysis, ANOVA and percentage analysis are used to analyze the data

RESEARCH HYPOTHESIS

Ho- There is no significance relationship between respondents by marital status and respondents based on the relationship with your family and management with the level of employee satisfaction.

Ha- There significance relationship between respondents by marital status and respondents based on the relationship with your family and management with the level of employee satisfaction.

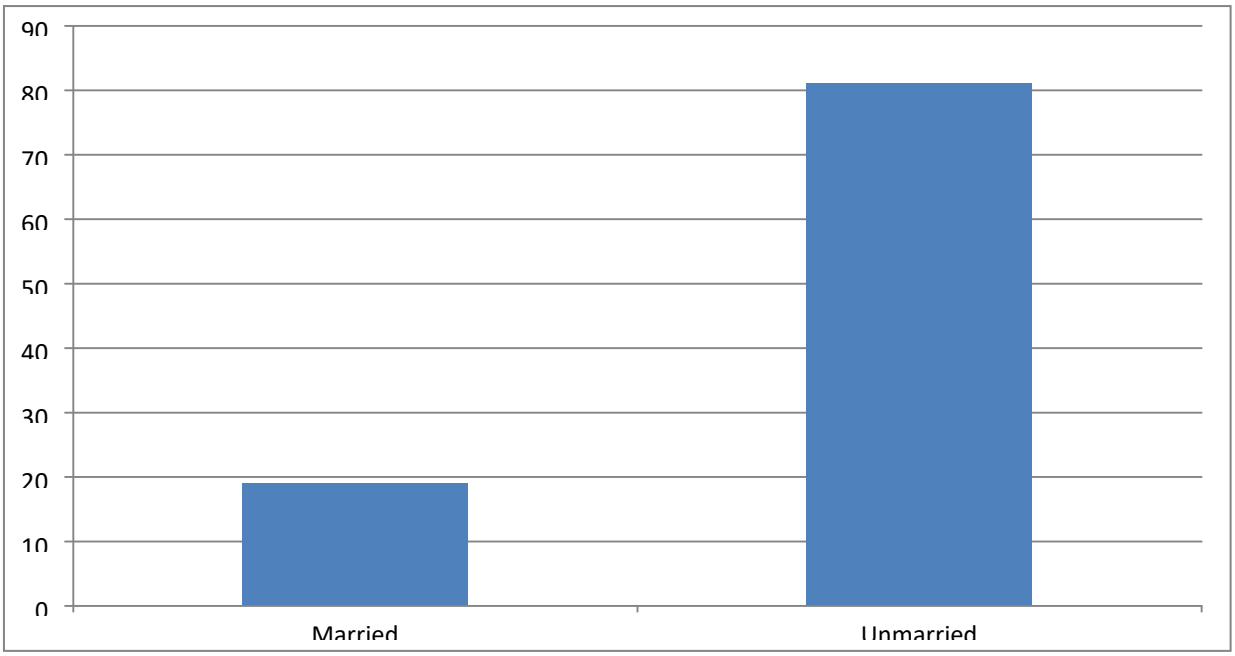
DATA ANALYSIS AND INTERPRETATION:

Classification of respondents by marital status

S. No.	Particular	Frequency	Percentage
1	Married	19	19
2	Unmarried	81	81
	Total	**100**	**100**

Interpretation:

From the above table it is clear that, 19% of the respondents are married and 81% of the respondents are Unmarried.



Observed frequency table:

	A	B	
A	0	8	8
B	9	32	41

C	9	36	45
D	1	2	3
E	0	3	3
	19	**81**	**100**

Expected frequency table:

	A	**B**
A	1.52	6.48
B	7.79	33.21
C	8.55	36.45
D	0.57	2.43
E	0.57	2.43

χ^2 **Test**

$$\chi^2 = \frac{\sum (Oij-Eij)^2}{Eij}$$

χ^2 Test table:

Oij	Eij	Oij-Eij	(Oij-Eij)^2	(Oij-Eij)^2 / Eij
0	1.52	-1.52	2.31	1.51
8	6.48	1.52	2.31	0.35
9	7.79	1.21	1.46	0.18
32	33.21	-1.21	1.46	0.04
9	8.55	0.45	0.20	0.02
36	36.45	-0.45	0.20	0.005
1	0.57	0.43	0.18	0.31
2	2.43	-0.43	0.18	0.07
0	0.57	-0.57	0.32	0.56
3	2.43	0.57	0.32	0.13
				3.175

$$\sum \frac{(Oij-Eij)^2}{Eij} = 3.175$$

Hence the calculated value of χ^2 =**3.175**

Therefore **Degrees Of Freedom** in the given problem is case of

= (r-1) (c-1)

= (5-1) (2-1)

= (4x1)

=4

The table value of χ^2 test is **9.48773** degrees of freedom is 4 at **5%** level of significance.

Result:

The calculated value of χ^2 is less than the table value so the null hypothesis is accepted. Hence, there is no significant relationship between respondents by

marital status and respondents based on the relationship with your family and management.

Statement

Association between respondents by marital status and respondents based on the relationship with your family and management

Hypothesis

Ho- there is no significance relationship between Respondents of Marital Status and Respondents Based on the Relationship with Your Family and Management with the level of employee satisfaction.

Ha- there is significance relationship between Respondents of Marital Status and Respondents Based on the Relationship with Your Family and Management with the level of employee satisfaction.

$$\bar{} = \frac{0+9+9+1+0}{5} = \frac{19}{5} = \mathbf{3.8}$$

$$\bar{} = \frac{32+36+2+3+8}{5} = \frac{81}{5} = \mathbf{16.2}$$

$$= \frac{\bar{} + \bar{}}{2} = \frac{20}{2} = \mathbf{10}$$

SS Between:-

$$= \mathbf{n1 (\bar{} - =)^2 + n2 (\bar{} - =)^2}$$

$$= 5(3.8-10)^2 + 5(16.2-10)^2$$

$$= 5(6.2)^2 + 5(13.8)^2$$

$$= 192.2+952.2$$

$$= \mathbf{1144.4}$$

SS within:-

$$= \sum (X1i - \bar{\ }) ^2 + \sum (X2i - \bar{\ }) ^2$$

$$= [(0-3.8)^2 + (9-3.8)^2 + (9-3.8)^2 + (1-3.8)^2 + (0-3.8)^2$$

$$+$$

$$[(32-16.2)^2 + (36-16.2)^2 + (2-16.2)^2 + (3-16.2)^2 + (8-16.2)^2]$$

$$= (14.44+27.04+27.04+7.84+14.44)+(249.64+392.04+201.64+174.24+67.24)$$

$$= 90.84+1084.8$$

$$= \mathbf{1175.64}$$

SS Total = SS Between+ SS within

=1144.4+1175.64

Sources of variance	SS	Degree of freedom	MS (Mean square)	F/ratio	5% F limit (from the F table)
SS between sample	1144.4	2-1=**1** (K-1)	1144.4/1=**1144.4**	1144.4/146.95= **7.78**	**5.32**
SS within sample	1175.64	10-2=**8** (N-K)	1175.64/8=**146.95**		
Total	**2320.04**				

Result:

The above table shows that the calculated value of F is 7.78 which is greater than the table value of 5.32 at 5% level with d.f. Being v_1 = 1 and v_2 = 8. This analysis supports the Null hypothesis.

Therefore, there is significance relationship between respondents of Marital Status and Respondents Based on the Relationship with Your Family and Management

Findings

Since, balancing of work and family roles is one of the key issues in the coming years, the organisation should improve and innovate the ways to the employees having diverse needs and these should be the integral to core business but not the optional.

There must be provide a flexible time that has to be adopted so that employees doesn't feel stressed about the overtime working and they can spend a quality time with their family and they can even make time to finish their family duties and commitments.

A.Findings based on primary objectives

- 38% of the employees are felt that time makes the work and life imbalanced.
- Majority of the employees said that money makes the work and life balanced.

B.Findings based on Secondary objectives

1. **Finding based on Work - Life Balance in general**
   - 40%of the employee says that the major resistance to balance the work life is Communication.
   - 48% of the employees said that work life balancing level is **good.**

2. **Finding based on satisfaction level**
   - 61% of the employees are **satisfied** in their work.
   - 45% of the employees felt that the relationship between management and their family is **good.**

Suggestions

1. The human resource department should meet employees and know the problem what they have in internal & external and give the proper solution to them in proper way.
2. The management is to give proper training to employees for their clearance at work because it is major one and it helps employees to be comfortable at work to reduce the stress.
3. The welfare facilities of the management are medium level, so the management has to provide more welfare facilities to them.

Conclusion

Thus, work-life balance can bring a huge transformation at the organizational and individual levels. It helps an organization to inherently build a strong value system, which is attributed to the Work - Life Balance enjoyed at the employee level. Consequently, the organization does not have to impose a formulated framework of organizational values because they now become intrinsic to it .

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